to identify where potential future cellular site locations might be located. The removal and possible relocation of these cellular sites would be an obligation of the third-party provider and would occur prior to the removal of the affected existing 220 kV transmission structures. In accordance with existing contract terms and conditions, SCE would provide notice to the third-party providers regarding the need for cellular site removal approximately one year prior to the start of the Proposed Project's construction.

The relocation of the existing 66 kV subtransmission lines from the WOD corridor would require the removal and transfer of third-party telephone and cable services that are currently installed on SCE structures. Additionally, relocation of existing underground utilities such as water lines and gas pipeline may be required as well. For the same reasons explained above, additional information related to the scope of this work is not available at this time.

3.2 Proposed Project Construction Plan

The following subsections describe the construction activities associated with the Proposed Project.

For ease of comparison with the Alternative Project, the 220 kV transmission line land disturbance table and construction equipment and workforce estimates tables have been separated into two distinct tables each. Table 3.2-E1, Transmission Approximate Land Disturbance (Excluding Segment 5) and Table 3.2-H, Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates, include information related to Segments 1, 2, 3, 4, and 6. Table 3.2-E2, Transmission Approximate Land Disturbance (Segment 5), and Table 3.2-I, Transmission (Segment 5) Construction Equipment and Workforce Estimates, include information related to only Segment 5.

3.2.1 General Construction

3.2.1.1 Staging Areas

Construction of the Proposed Project would require the establishment of temporary staging yards. Staging yards would be used as a reporting location for workers, vehicle and equipment parking, and material storage. The yards may also have construction trailers for supervisory and clerical personnel. Staging yards may be lighted for staging and security. Normal maintenance and refueling of construction equipment would also be conducted at these yards. All refueling and storage of fuels would be performed in accordance with the Storm Water Pollution Plan (SWPPP).

SCE anticipates using one or more of the possible locations listed in Table 3.2-A, Potential Staging Yard Locations and seen in Figure 3.2-1, Potential Staging Yard Locations, as the staging yard(s) for the Proposed Project. Typically, each yard would be 3 to 20 acres in size, depending on land availability and intended use. Preparation of the staging yard would include temporary perimeter fencing and, depending on existing ground conditions at the site, grubbing the application of gravel or crushed rock. Power and telecommunications would be needed at the staging areas for the office trailer and lighting at the site. These connections would be established from the nearest existing facilities (e.g., distribution pole) and/or service provider connection. Any land that may be disturbed at the staging yard would be restored to preconstruction conditions or to conditions agreed upon between SCE and the landowner[16] following the completion of construction for the Proposed Project. Sites were selected based on proximity to the project, having existing useable areas of reasonably level terrain, and vehicular access. Some of the yards listed are currently in use by other projects and are projected to be vacated by the time of need for this project. The in-use yards would be reused as an effort to reduce environmental impacts.

Substation staging areas would be located at the existing substations where modifications for this project would occur. Materials commonly stored at the substation construction staging area would include, but not be limited to: portable sanitation facilities, electrical 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.

Table 3.2-A: Potential Staging Yard Locations*

Yard Name	Location	Condition	Approximate Area (acres)
Mountain View No. 1 Material and Equipment Staging Area	West of Mountain View Avenue & North of San Bernardino Avenue, Redlands	Previously Disturbed, Vacant, Fenced	2.8
Lugonia Material and Equipment Staging Area	South of Lugonia Avenue & West of Segment 1 Corridor, Redlands	Currently in use as staging area for a pipeline project (fenced)	3.9
Beaumont No. 1 Material and Equipment Staging Area	Northeast Corner of South California Avenue & East Third Street, Beaumont	Currently in use as a staging area for an electrical project (fenced, gravel)	3.9
Beaumont No. 2 Material and Equipment Staging Area	853 E. Third Street, East of Maple Avenue, Beaumont	Currently in use as a staging area for an electrical project (fenced, gravel)	5.0
Hathaway No. 1 Material and Equipment Staging Area	600 N. Hathaway Street, Banning	Previously Disturbed, Buildings, (concrete, fenced)	30.0
Hathaway No. 2 Material and Equipment Staging Area	Northeast side of East Williams Street and North Hathaway, Banning	Unimproved	15.7
San Timoteo Material and Equipment Staging Area	30595 San Timoteo Canyon Road, Redlands	Previously Disturbed, Vacant	17.0

16 Fencing and other improvements at the staging yard locations may stay in place post-construction per the landowner's request. The potential staging yard locations identified as previously disturbed would be returned to pre-existing condition.

Table 3.2-A: Potential Staging Yard Locations*

Yard Name	Location	Condition	Approximate Area (acres)
Poultry Material and Equipment Staging Area	Directly in Front of MCM Poultry, San Timoteo Canyon Road, Redlands	Previously Disturbed, Vacant	13.0
Devers Material and Equipment Staging Area	East of SCE's Devers Substation	Currently in use as staging yard for an electrical project (fenced, gravel)	9.5
Grand Terrace Material and Equipment Staging Area	Northeast Corner of Mt. Vernon Avenue and Canal Street, Grand Terrace	Vacant, Previously Disturbed SCE Utility Corridor	4.4

*T/L Materials have been identified as the project component for use at each of the yards identified in Table 3.2-A: Potential Staging Yard Locations; however, subtransmission and telecommunications materials may also be stored at each of these yards.

Materials commonly stored at the construction staging yards would include, but not be limited to construction trailers, construction equipment, portable sanitation facilities, steel bundles, steel/wood poles, conductor reels, OHGW or OPGW reels, hardware, insulators, cross arms, signage, consumables (such as fuel and filler compound), waste materials for salvaging, recycling, or disposal, and BMP materials (straw wattles, gravel, and silt fences).

This project does not include the construction of any new substations; however, there would be modifications to existing substations as described in Section 3.1.1.1, Modifications to Existing Substations. Modifications or upgrades to the existing Vista, San Bernardino, El Casco, Etiwanda, Timoteo, Tennessee, and Devers substations would be confined inside each existing site boundary fence for all the facilities.

Fuel and hydraulic fluids would be located at the construction staging yards. The routine transport, use, and disposal of hazardous materials, such as fuels, during construction may result in inadvertent releases of these materials. An SWPPP would be prepared and implemented throughout construction and would include BMPs to address the handling of hazardous materials during construction activities. Fuel from the construction staging yards may be transported to other portions of the project area (e.g., tower locations, access roads, ROW, etc.) via mobile refuelers. When not in use (e.g., parked) mobile refuelers would be subject to general containment provisions (e.g., parking area with berms) to contain potential leaks or spills.

A majority of materials associated with the construction efforts would be delivered by truck to designated staging yards, while some materials may be delivered directly to the temporary transmission and subtransmission construction areas.

Transmission and subtransmission construction areas serve as temporary working areas for crews and where project-related equipment and/or materials would be placed at or near each structure location, within SCE ROW or franchise. Table 3.2-B, Approximate Laydown/Work Area Dimensions, identifies the approximate land disturbance for these construction area dimensions (for both removal and installation) for the Proposed Project.

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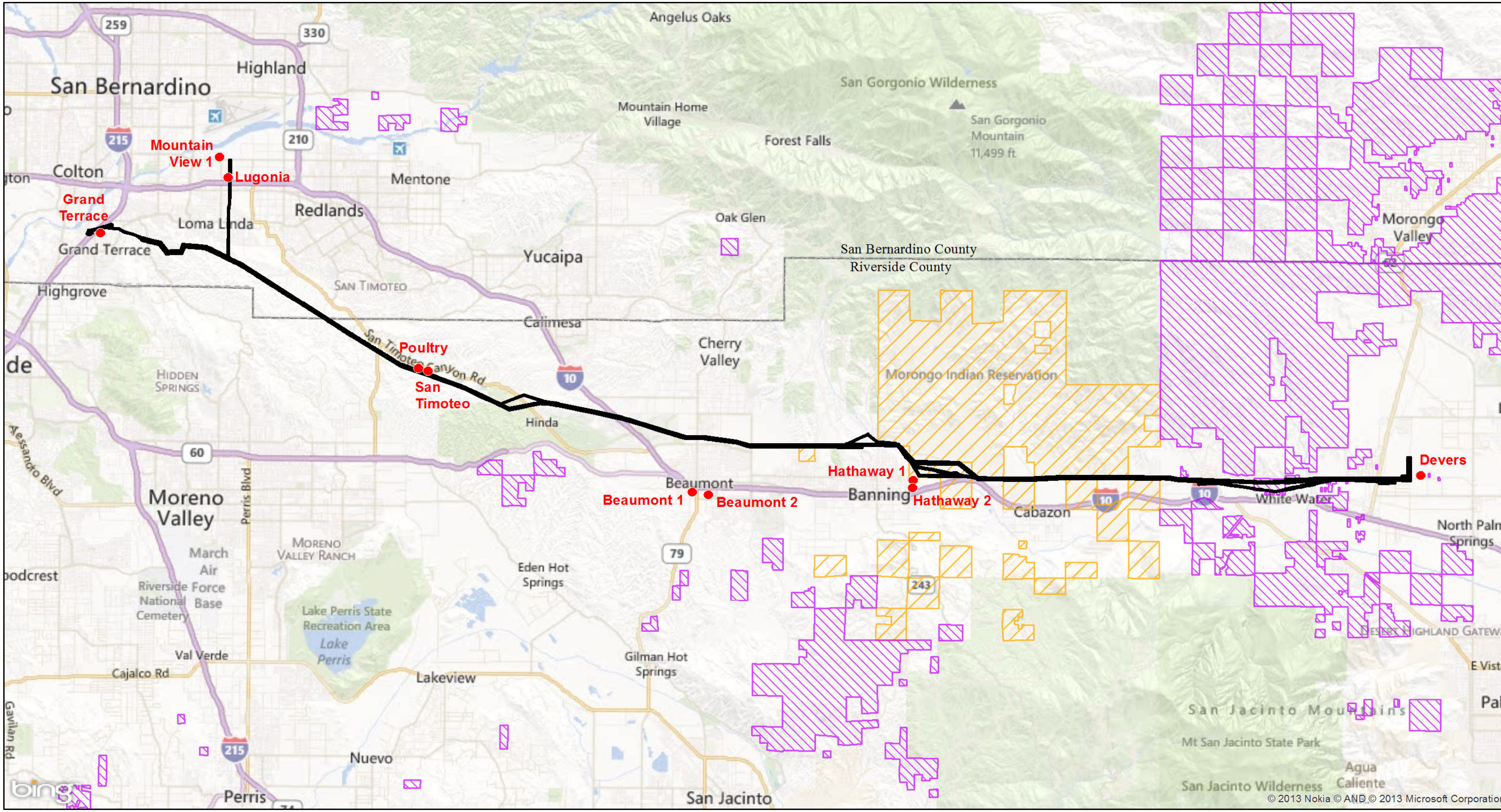

FIGURE 3.2-1

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LEGEND
- Transmission Line Right-of-Way
- Staging Yards
- U.S. Bureau of Land Management
- Morongo Reservation

0 1.5 3
MILES

Southern California Edison
West of Devers Upgrade Project

Potential Staging Yard Locations

SOURCE: Bing Maps (c. 2008); BLM (2012); BIA (2012); SCE (2012, 2013)

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Table 3.2-B: Approximate Laydown/Work Area Dimensions*

Laydown/Work Area Feature	Preferred Size (L × W)**	Acreage
Temporary Guard Structures	150 feet × 50 feet	0.2
Lattice Steel Towers	220 feet × 220 feet	1.1
TSPs	200 feet × 150 feet	0.7
H-Frames	175 feet × 125 feet	0.5
LWS/Wood Poles	175 feet × 100 feet	0.4
Wood Guy Poles	175 feet × 100 feet	0.4
Stringing Setup Area	600 feet × 150 feet	2.0
Stringing Setup Area: Splices	200 feet × 150 feet	0.7
Underground Vaults	100 feet × 100 feet	0.2

* Field and safety conditions may dictate that wire-sites, tower pads, or access roads may be used to stage certain types of helicopter-installed materials (including, but not limited to, travelers, insulators, and light tools) to limit the distance external loads are carried and to make "picks" as safe as possible (i.e., not flying loads over energized lines).

** The acreage of disturbance per laydown/work area would remain consistent with those numbers represented in this table. However, the preferred width and length of these laydown/work areas are only provided for reference and would likely change based on field conditions. For temporary guard structures, the preferred length may increase depending on the angle of crossing.

Any tower construction activities performed by helicopter would be based out of local airports/airfields located within the vicinity of the ROW and staging yards, where possible. Otherwise, the helicopter would be located along the ROW and existing access roads, as needed. Mobile fueling apparatus would be required where helicopters would be staged along the ROW during construction. Use of the mobile fueling equipment would be operated in accordance with proper spill containment requirements.

3.2.1.2 Storm Water Pollution Prevention Plan

Construction of the Proposed Project would disturb a surface area greater than 1 acre. Therefore, SCE would be required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities, Order 2009-0009-DWQ, as amended by Order 2010-0014-DWQ from the State Water Resources Control Board. Commonly used BMPs are storm water runoff quality control measures (boundary protection), dewatering procedures, and concrete waste management. The SWPPP would be based on final engineering design and would include all project construction components.

3.2.1.3 Dust Control

During construction, migration of fugitive dust from the construction sites would be limited by control measures set forth by the South Coast Air Quality Management District (SCAQMD) Rule 403 and Rule 403.1. These measures may include the use of water trucks and other dust control measures.

Water tanks needed for dust suppression may be required in multiple areas in order to support construction activities. Water tanks typically hold 10,000 gallons (and measure 9 feet wide × 35 feet long) and would be filled by water trucks on a regular basis during construction. Water tanks would be located in areas identified for disturbance (e.g., access roads, temporary laydown/work areas, and the ROW).

Existing water sources within the project area would be utilized for dust suppression.

3.2.1.4 Traffic Control

Construction activities completed within public street ROWs would require the use of a traffic control service, and any lane closures would be conducted consistent with local ordinances and ministerial city permit conditions. These traffic control measures would be consistent with those published in the *California Joint Utility Traffic Control Manual* (California Inter-Utility Coordinating Committee, 2010).

3.2.2 Substation Construction: Modifications to Existing Substations

The following section describes the construction activities associated with installing the components described in Section 3.1.1.1, Modifications to Existing Substations, at Vista, Etiwanda, San Bernardino, El Casco, Timoteo, Tennessee, and Devers substations for the Proposed Project.

3.2.2.1 Below-Grade Construction

Below-grade facilities, such as new equipment foundations, ground grid, and conduits, would be installed at existing substations, as described in Section 3.1.1.1, Modifications to Existing Substations. All work would restore grade back to original condition.

3.2.2.2 Above-Grade Construction

Above-grade work related to the substation modifications would only be conducted within the perimeter fence of the existing substations.

3.2.2.3 Substation Construction Equipment and Workforce Estimates

The estimated number of personnel and equipment required for construction activities related to the substation modification component of the Proposed Project are summarized in Table 3.2-C, Substation Construction Equipment and Workforce Estimates.

Construction would be performed by either SCE construction crews or contractors. Contractor personnel would be managed by SCE construction management personnel. SCE anticipates that crew members would work concurrently; however, the estimated deployment and number of crew members would be dependent upon material availability, construction scheduling, and local jurisdiction requirements, if applicable.

SCE anticipates a total of approximately 15 construction personnel at each substation site working on any given day on this project.

Table 3.2-C: Substation Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs./ Days)
Vista Substation						
Civil				6-11		
Auger Truck	210	Diesel	1	2	20	6
¾-Ton Crew Cab 4×4	275	Gas	2		45	2
Boom/Crane Truck	180	Diesel	1	2	20	4
Dump Trucks	350	Diesel	2		25	4
Backhoe	125	Diesel	1	1	25	6
Lowboy Truck/ Trailer	450	Diesel	1		25	2
Forklift	75	Diesel	1		30	2
Ditch Digger	75	Diesel	1		15	6
Electrical				8-12		
Manlifts/Bucket Truck	250	Diesel	2		65	6
Boom/Crane Truck	180	Diesel	1	2	60	6
¾-Ton Crew Cab 4×4	275	Gas	2		75	2
150-ton Crane	250	Diesel	1	2	50	6
Lowboy Truck/ Trailer	450	Diesel	1		50	2
Ditch Digger	75	Diesel	1		15	6
Forklift	75	Diesel	1		65	2
Utility Truck	180	Gas	1		75	2
Maintenance				3		
Checker/Truck	180	Gas/Diesel	1		120	2
Manlifts	75	Gas/Diesel	1		20	4
¾-Ton Crew Cab 4×4	275	Gas	1		20	2
Gas/Processing Trailer	0	Electric	0		10	4
Test				2		
Utility Truck	180	Gas	1		120	2
San Bernardino Substation						
Civil				8-13		
Auger Truck	210	Diesel	1	2	24	6
¾-Ton Crew Cab 4×4	275	Gas	2		80	2

Table 3.2-C: Substation Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs./ Days)
Boom/Crane Truck	180	Diesel	1	2	24	6
Dump Trucks	350	Diesel	2		40	4
Backhoe	125	Diesel	1	1	40	6
Lowboy Truck/ Trailer	450	Diesel	1		40	2
Forklift	75	Diesel	1		80	2
Ditch Digger	75	Diesel	1		40	6
Electrical				10-14		
Manlifts/Bucket Truck	250	Diesel	2		100	6
Boom/Crane Truck	180	Diesel	1	2	80	6
¾-Ton Crew Cab 4×4	275	Gas	2		120	2
150-ton Crane	250	Diesel	1	2	40	6
Lowboy Truck/ Trailer	450	Diesel	1		40	2
Ditch Digger	75	Diesel	1		10	6
Forklift	75	Diesel	1		100	2
Utility Truck	180	Gas	1		120	2
Maintenance				4		
Checker/Truck	180	Gas/Diesel	1		200	2
Manlifts	75	Gas/Diesel	1		20	4
¾-Ton Crew Cab 4×4	275	Gas	1		20	2
Gas/Processing Trailer	0	Electric	0		10	4
Test				2		
Utility Truck	180	Gas	1		140	2
El Casco Substation						
Civil				6-11		
Auger Truck	210	Diesel	1	2	25	6
¾-Ton Crew Cab 4×4	275	Gas	2		40	2
Boom/Crane Truck	180	Diesel	1	2	25	4
Dump Trucks	350	Diesel	2		25	4
Backhoe	125	Diesel	1	1	25	6
Lowboy Truck/ Trailer	450	Diesel	1		25	2

Table 3.2-C: Substation Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs./ Days)
Forklift	75	Diesel	1		30	2
Ditch Digger	75	Diesel	1		10	6
Electrical				8-12		
Manlifts/Bucket Truck	250	Diesel	2		40	6
Boom/Crane Truck	180	Diesel	1	2	30	6
¾-Ton Crew Cab 4×4	275	Gas	2		60	2
150-ton Crane	250	Diesel	1	2	20	6
Lowboy Truck/ Trailer	450	Diesel	1		20	2
Ditch Digger	75	Diesel	1		10	6
Forklift	75	Diesel	1		50	2
Utility Truck	180	Gas	1		60	2
Maintenance				3		
Checker/Truck	180	Gas/Diesel	1		100	2
Manlifts	75	Gas/Diesel	1		10	4
¾-Ton Crew Cab 4×4	275	Gas	1		10	2
Gas/Processing Trailer	0	Electric	0		5	4
Test				2		
Utility Truck	180	Gas	1		70	2
Devers Substation						
Civil				8-13		
Auger Truck	210	Diesel	1	2	24	6
¾-Ton Crew Cab 4×4	275	Gas	2		80	2
Boom/Crane Truck	180	Diesel	1	2	24	6
Dump Trucks	350	Diesel	2		40	4
Backhoe	125	Diesel	1	1	40	6
Lowboy Truck/ Trailer	450	Diesel	1		40	2
Forklift	75	Diesel	1		80	2
Ditch Digger	75	Diesel	1		40	6
Electrical				10-14		
Manlifts/Bucket Truck	250	Diesel	2		100	6

Table 3.2-C: Substation Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs./ Days)
Boom/Crane Truck	180	Diesel	1	2	80	6
¾-Ton Crew Cab 4×4	275	Gas	2		120	2
150-ton Crane	250	Diesel	1	2	40	6
Lowboy Truck/ Trailer	450	Diesel	1		40	2
Ditch Digger	75	Diesel	1		10	6
Forklift	75	Diesel	1		100	2
Utility Truck	180	Gas	1		120	2
Maintenance				4		
Checker/Truck	180	Gas/Diesel	1		200	2
Manlifts	75	Gas/Diesel	1		20	4
¾-Ton Crew Cab 4×4	275	Gas	1		20	2
Gas/Processing Trailer	0	Electric	0		10	4
Test				2		
Utility Truck	180	Gas	1		140	2
Etiwanda Substation						
Electrical				2		
¾-Ton Crew Cab 4×4	275	Gas	1		25	2
Test				2		
Utility Truck	180	Gas	1		20	2
Tennessee Substation						
Civil				3-4		
¾-Ton Crew Cab 4×4	275	Gas	1		4	2
Dump Trucks	350	Diesel	1	1	2	4
Backhoe	125	Diesel	1		2	6
Electrical				5		
Manlifts/Bucket Truck	250	Diesel	1		10	6
Boom/ Crane Truck	180	Diesel	1		3	4
¾-Ton Crew Cab 4×4	275	Gas	1		14	2
Forklift	75	Diesel	1		8	4
Maintenance				4		
Checker/ Truck	180	Gas/Diesel	1		14	2

Table 3.2-C: Substation Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs./ Days)
¾-Ton Crew Cab 4×4	275	Gas	1		2	2
Gas/Processing Trailer	0	Electric	1		1	6
Test				2		
Utility Truck	180	Gas	1		8	2
Timoteo Substation						
Civil				3-8		
Auger Truck	210	Diesel	1	2	66	44
¾-Ton Crew Cab 4×4	275	Gas	1		8	2
Boom/Crane Truck	180	Diesel	1	2	66	44
Dump Trucks	350	Diesel	1	1	4	4
Backhoe	125	Diesel	1		4	6
Forklift	75	Diesel	1		88	44
Ditch Digger	75	Diesel	1		55	66
Electrical				7-10		
Manlifts/Bucket Truck	250	Diesel	1		20	6
Boom/ Crane Truck	180	Diesel	1	2	6	4
¾-Ton Crew Cab 4×4	275	Gas	1		25	2
Ditch Digger	75	Diesel	1	1	10	66
Forklift	75	Diesel	1		10	4
Maintenance				3		
Checker/Truck	180	Gas/Diesel	1		25	2
¾-Ton Crew Cab 4×4	275	Gas	1		4	2
Gas/Processing Trailer	0	Electric	1		2	6
Test				2		
Utility Truck	180	Gas	1		15	2

3.2.3 Transmission and Subtransmission Line Installation

The following sections describe the construction activities associated with installing the transmission and subtransmission line components for the Proposed Project.

3.2.3.1 Access and Spur Roads

Of the 160 miles of new and existing access/spur roads included in the Proposed Project, 130 miles of those roads would require rehabilitation, and 30 miles of planned new access/spur roads would require more extensive construction activities. Both scenarios are described below.

Typical construction activities associated with rehabilitation of existing dirt access roads include vegetation clearing, blade-grading and recompacting to remove potholes, ruts, and other surface irregularities in order to provide a smooth dense riding surface capable of supporting heavy construction and maintenance equipment. Existing dirt roads may also require additional upgrades such as protection for underground utilities and widening existing roads that are too narrow for safe vehicle operation. Repair and stabilization of slides, washouts, and other slope failures may be necessary to prevent future failures. The type of structure to be utilized would be based on specific site conditions to be determined during final engineering.

Typical construction activities associated with new roads generally include activities similar to those described for the rehabilitation of existing dirt roads, but may also include the following additional construction requirements that depend upon the existing land terrain.

- Existing relatively flat terrain approximately 0 to 4 percent grade: Construction activities are generally similar to rehabilitation activities to existing dirt roads, and in addition may require activities such as clearing, grubbing, and constructing drainage improvements (e.g., wet crossings, water bars, and/or culverts).
- Existing rolling terrain approximately 5 to 12 percent grade: Construction activities generally include activities typical to flat terrain and in addition may require activities such as cut and fill in excess of 2-feet depth, benched grading, drainage improvements (e.g., v-ditches, down drains, and energy dissipaters), and slope stability improvements such as retaining walls and mechanically stabilized earth walls. Figure 3.2-2, Typical Retaining and Mechanically Stabilized Earth Walls, shows the types of retaining and mechanically stabilized earth walls typically used by SCE. The extent of slope stability improvements and structure type is determined after site-specific geotechnical investigations and final engineering are performed.
- Existing mountainous terrain over 12 percent grade: Construction activities would include similar activities as rolling terrain construction activities and, in addition, may likely require significant cut and fill depths, benched grading, drainage improvements, and slope stability improvements. In some cases, paving of the road may be necessary.

Retaining wall locations are preliminarily assumed to occur within areas identified for proposed grading. For the purposes of the environmental analysis, it is estimated that the project will have approximately 10,400 linear feet of retaining wall structures spread amongst the various project segments. The specific number of retaining wall structures and locations would be identified during final engineering. Retaining walls could range between 5 and 20 feet in exposed height.

Typical concrete crib wall.

Typical gabion wall.

Typical soldier pile wall.

Typical welded wire wall.

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FIGURE 3.2-2

Southern California Edison
West of Devers Upgrade Project

Typical Retaining and Mechanically Stabilized Earth Walls

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The estimated length of new retaining walls for each segment is summarized in Table 3.2-D, Approximate Length of New Retaining Wall per Segment.

Table 3.2-D: Approximate Length of New Retaining Wall per Segment

	Seg. 1	Seg. 2	Seg. 3	Seg. 4	Seg. 5	Seg. 6	Total
Retaining Wall (feet)	900	3,100	2,850	550	1,800	1,200	10,400

Generally, dirt access roads would have a minimum 14-foot drivable width with 2 feet of shoulder on each side, as determined by the existing land terrain to accommodate required drainage features. Typically, the drivable road would be widened, generally ranging from an additional 1 to 8 feet along curved sections of the access road. Specific site locations may warrant widening the drivable width on curves with a radius with curvature less than 50 feet by a distance equal to 400/radius of curvature. Curves would generally have a minimum radius of curvature of 50 feet measured from the center line of the drivable road width. Access road gradients may be modified so that sustained grades do not generally exceed 12 percent. Grades greater than 12 percent would be permitted when such grades do not exceed 40 feet in length and are located more than 50 feet from any other excessive grade. In some instances, SCE may deviate from mitigating grades greater than 12 percent.

New spur roads would be constructed similar to how access roads are described above. The new spur roads would typically have circle-type turnaround areas around the structure location. Where a circle-type turnaround is not practical, an alternative turnaround configuration would be constructed to provide safe ingress/egress of vehicles to access the structure location. It is common to use access roads and turnaround areas for structure access, parking, laydown areas, and as a crane pad set-up area during construction activities. In some instances, the turnaround area would remain as a permanent feature.

Temporary construction roads may be required for construction of the 220 kV transmission portion of the Proposed Project. These roads would be separate from the access and spur roads. These temporary roads would be constructed solely for the purpose of facilitating construction activities when use of existing or proposed permanent roads would not be feasible. Approximately 15 miles of new roads would be used for temporary construction access.

Land disturbance related to access/spur roads and retaining walls includes temporary construction work areas and permanent areas to be maintained for ongoing operations and maintenance. Additional information related to land disturbance for this portion of the Proposed Project is included in Section 3.2.3.17, Transmission and Subtransmission Land Disturbance.

Project-related foot travel between towers and along the SCE ROW may facilitate construction activities. Crews walking from structure to structure at times may be more efficient than utilizing vehicle or helicopter travel to and from tower sites. Project-related foot travel would occur in areas identified for temporary and/or permanent disturbance (e.g., access roads, temporary laydown/work areas, or the ROW).

3.2.3.2 Structure Site Preparation

The new structure pad locations and laydown/work areas (previously referenced in Table 3.2-B, Approximate Laydown/Work Area Dimensions) would first be graded and/or cleared of vegetation as required to provide a vegetation-free surface for structure installation. Sites would be graded in such a manner to prevent ponding and to enable water flow in 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 be capable of supporting heavy vehicular traffic.

Erection of the structures typically requires establishment of a crane pad. The crane pad would occupy an area of approximately 50 feet by 50 feet and be located adjacent to each applicable structure within the laydown/work area used for structure assembly and erection. It would remain for operations and maintenance activities. The pad may be cleared of vegetation and/or graded as necessary to provide a relatively level surface for crane operation. The decision to use a separate crane pad within the laydown/work areas would be determined during final engineering for the Proposed Project and the selection of the appropriate construction methods to be used by SCE or its contractor.

If an underground utility is identified as being potentially affected by SCE’s construction or operation procedures, a method to mitigate conflicts would be implemented as agreed to by SCE and the affected underground utility owner/operator.

Benching may be required to provide access for footing construction, assembly, erection, and wire-stringing activities during line construction. Benching is a technique in which an earth-moving vehicle excavates a terraced access to structure locations in extremely steep and rugged terrain. Benching would also be used on an as-needed basis in areas to help ensure the safety of personnel during construction activities.

3.2.3.3 Foundation Installation

Structure foundations for each LST would typically consist of four poured-in-place concrete footings, whereas foundations for each TSP would require a single drilled poured-in-place concrete footing. Actual footing diameters and depths for each of the structure foundations would depend on the structure design as well as the soil conditions and topography at each site and would be determined during final engineering.

The foundation process begins with the drilling of the holes using truck- or track-mounted excavators with various diameter augers to match the diameter requirements of the structure type. LSTs typically require an excavated hole approximately 3 feet to 7 feet in diameter and approximately 15 feet to 50 feet deep; TSPs typically require an excavated hole approximately 5 feet to 12 feet in diameter and approximately 30 feet to 60 feet deep. On average, each footing for a LST structure would project approximately 1 to 4 feet above ground level; TSP footings would project approximately 1 to 2 feet above ground level within franchise areas and approximately 1 to 4 feet above ground level in uninhabited areas.

The excavated material would be distributed at each structure site, used to backfill excavations from the removal of nearby structures (if any), used in the rehabilitation of existing access roads, or used as fill at existing substations. Alternatively, the excavated soil may be disposed of at an off-site disposal facility in accordance with all applicable laws.

Following excavation of the foundation footings, steel reinforced rebar cages and stub angles (LSTs) or anchor bolts (TSPs) would be set, survey positioning would be verified, and concrete would then be placed. The steel reinforced rebar cages may be assembled at staging yards or vendor facilities and delivered to each structure location by flatbed truck or they may be delivered loose and assembled at the job site. Depending upon the type of structure being constructed, soil conditions, and topography at each site, LSTs would require approximately 20 to 310 cubic yards of concrete delivered to each structure location and, TSPs would require approximately 25 to 270 cubic yards of concrete delivered to each structure location.

Slight to severe ground caving is anticipated along the preferred route during the drilling of the LST/TSP foundations due to the presence of loose soils or groundwater levels. The use of water, fluid stabilizers, drilling mud and/or casings would be made available to control ground caving and to stabilize the sidewalls from sloughing. If fluid stabilizers are utilized, mud slurry would be added in conjunction with the drilling. The concrete for the foundation would then be pumped to the bottom of the hole, displacing the mud slurry. Mud slurry brought to the surface is typically collected in a pit adjacent to the foundation and/or vacuumed directly into a truck to be reused or discarded at an off-site disposal facility in accordance with all applicable laws.

During construction, existing commercial concrete supply facilities would be used. Concrete samples would be drawn at time of pour and tested to ensure engineered strengths were achieved. A normally specified SCE concrete mix typically takes approximately 20 working days to cure to an engineered strength. This strength is verified by controlled testing of sampled concrete. Once this strength has been achieved, crews would be permitted to commence erection of the structure.

Conventional construction techniques would generally be used as described above for new foundation installation. Alternative foundation installation methods would be used where conventional methods are not practical. In certain cases, equipment and material may be deposited at structure sites using helicopters or by workers on foot, and crews may prepare the foundations using hand labor assisted by hydraulic or pneumatic equipment, or other methods.

Prior to drilling for foundations, SCE, or its Contractor, would contact Underground Service Alert to identify any underground utilities in the construction zone.

3.2.3.4 Lattice Steel Tower Installation

LSTs would primarily be assembled within the construction areas at each tower site. See Table 3.2-B, Approximate Laydown/Work Area Dimensions, for approximate laydown dimensions. Structure assembly begins with the hauling and stacking of steel bundles, per engineering drawing requirements, from a material staging yard to each structure location. This activity requires use of several trucks with 40-foot trailers and a rough terrain forklift. After steel is delivered and stacked, crews would proceed with assembly of leg extensions, body panels, boxed sections, and the cages/bridges. Assembled sections would be lifted into place with a crane and secured by a combined erection and torquing crew. When the steel work is completed, the construction crew may opt to install insulators and wire rollers (travelers) at this time.

If the LST is located in terrain inaccessible by a crane, it is anticipated that a helicopter may be used for the installation of the structure. The use of helicopters for the erection of structures would be similar to methods detailed in Institute of Electrical and Electronic Engineers (IEEE) 951-1996, Guide to the Assembly and Erection of Metal Transmission Structures, Section 9, Helicopter Methods of Construction. See Section 3.2.3.12, Helicopter Use, for detailed information on helicopter usage.

3.2.3.5 Tubular Steel Pole Installation

Each TSP would require a drilled, poured-in-place, concrete footing that would form the structure foundation. The hole would be drilled using truck or track-mounted excavators. Excavated material would be used as described in Section 3.7, Reusable, Recyclable, and Waste Material Management. Following excavation of the foundation footings, steel-reinforced cages would be set, positioning would be survey verified, and concrete would then be poured. Foundations in soft or loose soil or those that extend below the groundwater level may be stabilized with drilling mud slurry. In this instance, mud slurry would be placed in the hole during the drilling process to prevent the sidewalls from sloughing. Concrete would then be pumped to the bottom of the hole, displacing the mud slurry. Depending on site conditions, the mud slurry brought to the surface would typically be collected in a pit adjacent to the foundation or vacuumed directly into a truck to be reused or discarded at an appropriate off-site disposal facility.

TSPs consist of multiple sections. The pole sections would be placed in temporary laydown areas at each pole location. See Table 3.2-B, Approximate Laydown/Work Area Dimensions, for approximate laydown dimensions. Depending on conditions at the time of construction, the top sections may come pre-configured, may be configured on the ground, or configured after pole installation with the necessary cross arms, insulators, and wire stringing hardware. A crane would then be used to set each steel pole base section on top of the previously prepared foundations. If existing terrain around the TSP location is not suitable to support crane activities, a crane pad would be constructed within the laydown area. When the base section is secured, the subsequent section of the TSP would be slipped together into place onto the base section. The pole sections may also be spot welded together for additional stability. Depending on the terrain and available equipment, the pole sections could also be pre-assembled into a complete structure prior to setting the poles.

Installation of the single-phase TSPs proposed for San Bernardino Substation would be similar to TSPs as explained above.

3.2.3.6 Wood Pole Installation

Each wood pole would require a hole to be excavated using either an auger, backhoe, or with hand tools. Excavated material would be used as described in Section 3.7, Reusable, Recyclable, and Waste Material Management. The wood poles would be placed in temporary laydown areas at each pole location. While on the ground, the wood poles may be configured (if not preconfigured) with the necessary cross arms, insulators, and wire-stringing hardware before being set in place. The wood poles would then be installed in the holes, typically by a line truck with an attached boom.

Wood guy stub poles would be installed similarly to wood poles.

3.2.3.7 Lightweight Steel Pole Installation

Each LWS pole would require a hole to be excavated using either an auger or excavated with a backhoe. Excavated material would be used as described in Section 3.7, Reusable, Recyclable, and Waste Material Management. LWS poles consist of separate base and top sections and may be placed in temporary laydown areas at each pole location. Depending on conditions at the time of construction, the top sections may come pre-configured, may be configured on the ground, or configured after pole installation with the necessary cross arms, insulators, and wire-stringing hardware. The LWS poles would then be installed in the holes, typically by a line truck with an attached boom. When the base section is secured, the top section would be installed on top of it. Depending on the terrain and available equipment, the pole sections could also be assembled into a complete structure on the ground prior to setting the poles in place within the holes.

Lightweight steel guy stub poles would be installed similarly to LWS poles.

3.2.3.8 Counterpoise

Transmission structures located within the substation boundary would be grounded to the substation ground grid. Foundations for 220 kV structures located more than 700 feet outside a substation would require adequate grounding.

If adequate foundation-to-ground resistance criteria cannot be met with ground rods, a counterpoise system would be installed. A counterpoise is an additional ground wire installed below ground adjacent to and attached to the structure to increase conductivity between the structure and the ground so that adequate grounding can be achieved. This additional ground wire would be installed within the approximate laydown/work area.

3.2.3.9 Guard Structures

Guard structures are temporary facilities that would typically be installed at transportation, flood control, and utility crossings for wire stringing/removal activities. These structures are designed keep a conductor above a minimum height should it momentarily drop too far below a conventional stringing height. SCE estimates that approximately 663 guard structure locations may need to be constructed along the proposed 220 kV ROW. For the 66 kV subtransmission line relocations, SCE estimates approximately 70 guard structure locations may need to be constructed.[17] However, additional guard structures may be needed at the time of construction based upon changes in field conditions (e.g., additional transportation, flood control and utility crossings).

Typical guard structures are standard wood poles. Depending on the overall spacing of the conductors being installed, approximately two to four guard poles would be required on either side of a road crossing. In some cases, the wood poles could be substituted with the use of specifically equipped boom trucks or, at highway crossings, temporary netting could be installed, if required by the governing transportation agency. The guard structures would be removed after the conductor is secured into place.

For highway and flood control crossings, SCE would work closely with the applicable jurisdiction to secure the necessary permits to string conductor over the affected infrastructure.

3.2.3.10 Wire Stringing

Wire stringing activities would be in accordance with SCE common practices and 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, and suspension or 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, Option 1: Sock Line Threading (Transmission):* 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

17. Guard structures would be located within the disturbance footprint identified in Table 3.2-B, Approximate Laydown/Work Area Dimensions, but exact locations cannot be identified at this time.

roller. This threading process would continue between all structures through the rollers of a particular set of spans selected for a wire pull.

- *Step 2, Option 2: Sock Line Threading (Subtransmission):* A bucket truck is typically used to install a lightweight sock line from structure to structure. The sock line would be threaded through the wire 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 conductor pull.
- *Step 2, Option 3: Sock Line, Threading (Subtransmission):* In areas where a bucket truck is unable to install a lightweight sock line, a helicopter would fly the lightweight sock line from structure to structure. The sock line would be threaded through the wire 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 conductor 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. Once the splicing has been completed, the conductor would be sagged to proper tension and dead-ended to structures.
- *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.

3.2.3.11 Transmission Wire Pulling and Splicing Locations

The puller, tensioner, and splicing set-up locations associated with the Proposed Project would be temporary and post construction clean up would be addressed as described in Section 3.5, Post Construction Activities. The set-up locations require reasonably 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. For purposes of the environmental analysis, it is estimated that approximately 135 pulling, tensioning and splicing equipment set-up areas would be required for the 220 kV transmission line construction, and approximately 28 set up areas for the 66 kV subtransmission relocation. The approximate area needed for stringing set-ups associated with wire installation is variable and depends upon terrain. See Table 3.2-B, Approximate Laydown/Work Area Dimensions, 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. On relatively straight alignments, typical wire pulls for transmission occur approximately every 3 miles and wire splices every 1.5 miles on flat terrain. Typical wire pulls for subtransmission occur approximately every 6,000 feet. When the line route alignment contains multiple deflections or is situated in rugged terrain, the length of the wire pull is diminished. 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. These assumptions were used to develop the estimates for land disturbance that were provided in Table 3.2-E1, Transmission Approximate Land Disturbance (Excluding Segment 5), 3.2-E2, Transmission Approximate Land Disturbance (Segment 5), and Table 3.2-F, Subtransmission Approximate Land Disturbance.

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. Pulling and wire tensioning locations may also be utilized for splicing and field snubbing of the conductors. Temporary splices (e.g., pulling socks), if required, are necessary since permanent splices that join the conductor together typically 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. Field snubs (i.e., anchoring and dead-end hardware) would be temporarily installed to sag conductor wire to the correct tension at locations where stringing equipment cannot be positioned in back of a dead-end structure.

3.2.3.12 Helicopter Use

Project-related helicopter activities for the construction of the transmission lines could include delivery of equipment and materials from staging yards to structure sites, structure placement, hardware installation, and conductor and/or optical ground wire (OPGW) stringing operations. The specific helicopter models assumed to be used include the Bell 500 (MD 500) and Kaman Kmax. It is also assumed that the total time within any given hour of the day that the helicopters would be used at one location is approximately 15 minutes. The helicopters may travel back and forth between sites and staging yards multiple times within that hour. Depending upon the specific needs, project-related helicopter activities for the construction of the transmission lines could occur across the entire project area. Prior to the start of construction, SCE and the selected construction contractor would create a detailed Project Specific Helicopter Use Plan describing all planned usage of helicopters or other aircraft in the performance of this work. This plan will be reviewed by SCE to ensure FAA regulations/guidance and/or industry best management practices are met. It would also include flight routes and altitudes in order to minimize flight into sensitive areas and to avoid aircraft congestion.

The operations area of the helicopters would be limited to the Proposed Project area, including staging areas, ground locations in close proximity to conductor and/or OPGW pulling, tensioning, and splice sites, including locations in previously disturbed areas near construction sites. In addition, helicopters must be able to land within SCE ROWs, which could include landing on access or spur roads. All helicopter refueling in the staging areas, ROWs or access or spur roads, would be in accordance with the SWPPP. It is also assumed that at night or during off days, for safety and security concerns, helicopters and their associated support vehicles and equipment may be based at a local airport.

3.2.3.13 Installation of FAA Considerations for Transmission and Subtransmission Lines

As presented earlier in Section 3.1.4, Federal Aviation and Administration Considerations for Transmission and Subtransmission Lines, to the extent practicable, FAA recommendations, including the installation of marker balls on appropriate infrastructure where necessary, would be implemented into the design of the Proposed Project. In most cases, marker balls would be installed by helicopter because of this method’s efficiency, minimal ground disturbance, and ability to operate in rugged terrain. In limited circumstances, marker balls may be installed using a spacer cart, but this method is generally less efficient and may result in additional ground disturbance.

SCE would select the most suitable installation method for a particular span. SCE would generally use a light-duty helicopter to install the marker balls. Installation by helicopter may require a short-term outage to nearby energized subtransmission lines and transmission lines.

Helicopter installation requires staging at a landing zone where the helicopter would pick up the construction worker and a marker ball(s), and travel to the installation location. To minimize ground disturbance, SCE would propose to use previously disturbed areas as landing zones.

In limited circumstances, SCE may employ a spacer cart to install marker balls and associated hardware. The spacer cart would be installed on the overhead wire by installation crews, either by helicopter or by using a crane placed on an existing crane pad created during the construction of the structure. Because any installation of spacer carts by crane would take place during construction, it is not expected that installation or use of spacer carts would cause any additional ground disturbance.

Due to the terrain in the areas where marker balls may be required, installation by crane would likely be infeasible, and may entail significant additional ground disturbance. For these reasons, crane installation would not be considered for the Proposed Project.

FAA structure lighting, if necessary, would be installed on the appropriate transmission structures during construction of the structure using similar equipment.

3.2.3.14 Transfer/Removal of Existing Structures/Facilities

The land disturbance tables and workforce estimate tables provide specific information related to specific activities, summarized below:

Removal of Wood Poles

The existing wood poles would typically be removed after the subtransmission, distribution, and telecommunication lines are transferred to the new structures. The removal would consist of the above and below-ground portions of the pole. Any holes left from removing the poles would be backfilled with spoils that may be available as a result of the excavation for new poles and using imported fill as needed.

Topping Off of Existing Poles

Where necessary to support existing underbuild (e.g., distribution, and/or third-party communication facilities), the top portion of the existing poles would be removed and existing underbuild would remain.

Removal of LSTs and TSPs

Removal of both LSTs and TSPs structures would involve removing structures, conductor, and associated hardware. The following would be removed in the sequence below:

- *Road Work:* Existing access roads would be used to access structures, but some rehabilitation and grading may be necessary before removal activities would begin to establish temporary crane pads for structure removal.
- *Wire-pulling Locations:* Wire pulling sites for wire removals would be located according to a Pulling Plan. The Pulling Plan would be completed after final engineering. 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. On relatively straight alignments, typical wire pulls for transmission occur approximately every 3 miles and wire splices every 1.5 miles on flat terrain. Typical wire pulls for subtransmission occur approximately every 6,000 feet. When the line route alignment contains multiple deflections or is situated in rugged terrain, the length of the wire pull is diminished. 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.
- *Conductor Removal:* After the wire pulling equipment is in place, rollers would be installed on structures, the old conductor would be unclipped from the supporting structures, placed in rollers, and pulled out with a pulling rope and/or cable attached to the trailing end of the conductor. The old conductor wire would be transported to a construction yard where it would be prepared for recycling.
- *Structure Removal:* For each structure to be removed, a laydown/work area equivalent to the structure type being removed would be required. Most structure removal activities would use the crane pad or other previously disturbed area established for structure installation. If previously disturbed areas adjacent to the structure site are not available, an area would be cleared of vegetation and graded if

the ground is not level. The crane would be positioned approximately 60 feet from the LST or TSP location to dismantle the structure. LSTs and TSPs would be dismantled down to the foundations and the materials would be transported to a recycling center. In the event that constructing a crane pad is not feasible, then a helicopter would be utilized for removal of the structure.

- *Footing/Foundation Removal:* Foundations/footings would typically be crushed by mechanical means such as a pneumatic hammer. Footings would be removed to a depth approximately 1 to 2 feet below grade[18] and the holes would be filled with excess soil and smoothed to match the surrounding grade. Footing materials would be transported to a construction yard where they would be prepared for disposal or reuse.

Existing transmission lines, subtransmission lines, distribution lines, and telecommunication lines (where applicable) would be transferred to the new structures prior to removal of existing structures. Any remaining facilities that are not reused by SCE would be removed and delivered to an authorized facility for recycling and/or disposal.

Table 3.2-E1, Transmission Approximate Land Disturbance (Excluding Segment 5), 3.2-E2, Transmission Approximate Land Disturbance (Segment 5), and Table 3.2-F, Subtransmission Approximate Land Disturbance provide the temporary and permanent land disturbance required for the removal of structures for the Proposed Project.

3.2.3.15 Shoo-Fly

Construction of the Proposed Project would require the use of temporary shoo-fly facilities in order to maintain continuous power flow in the WOD corridor/ROW during construction. A shoo-fly is a temporary electrical line on temporary poles that is used during construction to maintain electrical service to the area while allowing portions of a permanent line to be taken out of service, ensuring safe working conditions during construction activities. The shoo-fly facilities would be removed after construction is completed.

A variety of shoo-fly facilities would need to be installed in order to accommodate the installation of the new 220 kV towers within the existing ROW. Locations of individual shoo-fly facilities would be developed as part of final engineering. SCE estimates approximately 300 shoo-fly structure locations would be necessary for construction. Shoo-fly structures could consist of steel and/or wood poles that may be guyed for stability. These structures would range in height from approximately 40 to 145 feet above ground.

Shoo-fly structures would typically be direct buried and would be installed similar to wood poles, as explained in Section 3.2.3.6, Wood Pole Installation. Removal of the

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18 Where necessary, footings may be removed at a greater depth than 1 to 2 feet below grade.

shoo-fly facilities would be similar to the removal of wood poles, as explained in Section 3.2.3.14, Transfer/Removal of Existing Structures/Facilities.

3.2.3.16 Idle Facilities

A portion of the existing San Bernardino-Redlands-Tennessee 66 kV Subtransmission Line would be idled from the existing WOD corridor east along Barton Road to Iowa Street.

A portion of the existing San Bernardino-Redlands-Timoteo 66 kV Subtransmission Line would be idled from the existing WOD corridor west along Barton Road to Mountain View Avenue.

Though the subtransmission lines will be idled as a result of the Proposed Project, the poles will remain in place because a significant majority of them also support existing distribution, telecommunications, and cable television lines that will remain in service after the completion of the Proposed Project.

3.2.3.17 Transmission and Subtransmission Land Disturbance

The estimated land disturbance for the Proposed Project features described above are summarized below in the following tables:

- Table 3.2-E1: Transmission Approximate Land Disturbance (Excluding Segment 5).
- Table 3.2-E2: Transmission Approximate Land Disturbance (Segment 5).
- Table 3.2-E3: Transmission Shoo-Fly Approximate Land Disturbance.
- Table 3.2-F: Subtransmission Approximate Land Disturbance.
- Table 3.2-G: Staging Area Approximate Land Disturbance.

Table 3.2-E1: Transmission Approximate Land Disturbance (Excluding Segment 5)

Project Feature	Site Quantity	Approximate Disturbed Acreage Calculation (L × W)	Approximate Acres Disturbed During Construction	Approximate Acres to be Restored (Temporary)	Approximate Acres Permanently Disturbed
Guard Structures	667	150' × 50'	114.8	114.8	0.0
Remove Existing Lattice Steel Tower (1)	426	220' × 220'	473.3	473.3	0.0
Remove Existing Tubular Steel Pole (1)	5	220' × 150'	3.8	3.8	0.0

Table 3.2-E1: Transmission Approximate Land Disturbance (Excluding Segment 5)

Project Feature	Site Quantity	Approximate Disturbed Acreage Calculation (L × W)	Approximate Acres Disturbed During Construction	Approximate Acres to be Restored (Temporary)	Approximate Acres Permanently Disturbed
Remove Existing 220kV Wood H-Frame & Wood 3 Pole Structures(1)	186	175' × 125'	93.4	93.4	0.0
Construct New Lattice Steel Tower (2)	452	220' × 220'	502.2	389.2	113.0
Construct New Tubular Steel Pole (2)	4	220' × 150'	3.0	2.8	0.2
Conductor Stringing Setup Area (3)	93	600' × 150'	192.1	192.1	0.0
Conductor Splicing Setup Areas (3)	10	200' × 150'	6.9	6.9	0.0
Existing Access Roads to be improved (4)	130.0	linear miles × 18’	283.6	0.0	283.6
New Access Roads (4)	21.0	linear miles × 18'	45.8	0.0	45.8
Crane Pads, Walls, Cut Slopes	—	—	2611.3	2538.8	73
Total Estimated Disturbance Acreage			**4,330.4**	**3,815.2**	**515.2**

(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 & OPGW installation. Area to be restored after construction. Portion of ROW within 20' of ALL structures to remain cleared of vegetation. Permanently disturbed areas for TSP=0.06 acre, LWS=0.05 acre, and H-Frame=0.06 acre.
(3) Based on 9,000' standard conductor reel lengths, conductor size, number of circuits, route design, and terrain.
(4) Based on approximate length of road in miles × drivable road width of 14'-22' w/ 2' of berm on each side of road.
(5) The disturbed acreage calculations are estimates based upon SCE’s preferred area of use for the described project feature, the width of the existing right-of-way, or the width of the proposed right-of-way and, they do not include any new access/spur road information; they are subject to revision based upon final engineering and review of the project by SCE’s Construction Manager and/or Contractor awarded project.

Footing/Base Volume and Area Calculations (approximate)

Average TSP depth 30 feet deep, 7-foot diameter, quantity 1 per TSP: earth removed for footing = 42.8 c.y.; surface area= 38.5 sq. ft.

Average LWS/Wood pole depth 12 feet deep, 2.5 foot diameter, quantity 1 per LWS/wood pole; earth removed for pole base 2.2 c.y.; surface area= 4.9 sq. ft.

Average Wood H-Frame depth 12 feet deep, 2.5 foot diameter, qty 2 per H-Frame: earth removed for pole base= 4.4 c.y.; surface area= 9.8 sq. ft.

Permanent areas of disturbance were calculated based on the foot print of the structures with an additional 20-foot buffer around that structures reserved for operation and maintenance purposes and the utilization of the crane pad for O&M activities.

Acres permanently disturbed are assumed to be project areas where the disturbance will continue to be used during Operations and Maintenance (O&M) Activities post construction. Areas that would be stabilized or revegetated per requirements identified in Section 4.4 Biological Resources and not used for O&M have been assumed to be temporarily impacted (Acres to be Restored).

Table 3.2-E2: Transmission Approximate Land Disturbance (Segment 5)

Project Feature	Site Quantity	Approximate Disturbed Acreage Calculation (L × W)	Approximate Acres Disturbed During Construction	Approximate Acres to be Restored (Temporary)	Approximate Acres Permanently Disturbed
Construct New Lattice Steel Tower (1)	72	220' × 220'	80.0	62.0	18.0
Construct New Tubular Steel Pole (1)	36	220' × 150'	27.3	25.1	2.2
Conductor Stringing Setup Area (2)	30	600' × 150'	62.0	62.0	0.0
Conductor Splicing Setup Areas (2)	4	200' × 150'	2.8	2.8	0.0
New Access Roads (3)	4.7	linear miles × 18'	10.3	0.0	10.3
Crane Pads, Walls, Cut Slopes	—	—	308.4	301.7	6.7
Total Estimated Disturbance Acreage			**490.7**	**453.6**	**37.1**

(1) Includes structure assembly & erection, conductor & OPGW installation. Area to be restored after construction. Portion of ROW within 20' of ALL structures to remain cleared of vegetation. Permanently disturbed areas for TSP=0.06 acre, LWS=0.05 acre, and H-Frame=0.06 acre.
(2) Based on 9,000' standard conductor reel lengths, conductor size, number of circuits, route design, and terrain.
(3) Based on approximate length of road in miles × drivable road width of 14'-22' w/ 2' of berm on each side of road.
(4) The disturbed acreage calculations are estimates based upon SCE's preferred area of use for the described project feature, the width of the existing right-of-way, or the width of the proposed right-of-way and, they do not include any new access/spur road information; they are subject to revision based upon final engineering and review of the project by SCE's Construction Manager and/or Contractor awarded project.

Removals, existing roads to be improved and guard structures are not accounted for in this table considering these counts will not fluctuate with selection of either alternative. These areas are accounted for in Table 3.2-E1.

Footing/Base Volume and Area Calculations (approximate):

Average TSP depth 30 ft deep, 7 ft diameter, qty 1 per TSP: earth removed for footing = 42.8 c.y.; surface area = 38.5 sq. ft.

Average LWS depth 12 ft deep, 2.5 ft diameter, qty 1 per LWS: earth removed for pole base = 2.2 c.y.; surface area = 4.9 sq. ft.

Average Wood H-Frame depth 12 ft deep, 2.5 ft diameter, qty 2 per H-Frame: earth removed for pole base = 4.4 c.y.; surface area = 9.8 sq. ft.

Acres permanently disturbed are assumed to be project areas where the disturbance will continue to be used during Operations and Maintenance (O&M) Activities post construction. Areas that would be stabilized or revegetated per requirements identified in Section 4.4 Biological Resources and not used for O&M have been assumed to be temporarily impacted (Acres to be Restored).

Table 3.2-E3: Transmission Shoo-Fly Approximate Land Disturbance

Project Feature	Quantity	Disturbed Acreage Calculation (L × W)	Approximate Total Acres Disturbed During Construction	Approximate Total Acres to be Restored (Temporary)	Approximate Total Acres Permanently Disturbed
Install and Removal shoo-fly structure (1)	300	100' × 100'	68.9	68.9	0.0
Conductor Stringing Setup Area (2)	7	600' × 150'	14.5	14.5	0.0
Conductor Splicing Setup Areas (2)	6	200' × 150'	4.1	4.1	0.0
Temporary Construction Roads (3)	17.0	linear miles × 18'	37.1	0.0	37.1
Total Estimated Disturbance Acreage (4)			**124.6**	**87.5**	**37.1**

1. Includes structure assembly & erection, conductor & OPGW installation. Area to be restored after construction. Structures would be removed once permanent structures were erected, new conductors were strung and energized.
2. Based on 9,000' standard conductor reel lengths, conductor size, number of circuits, route design, and terrain.
3. Based on approximate length of road in miles × drivable road width of 14'-22' w/ 2' of berm on each side of road. With an average of 300 feet of new road assumed per structure

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

Removals, existing roads to be improved and guard structures are not accounted for in this table considering these counts will not fluctuate with selection of either alternative. These areas are accounted for in Table 3.3-E1.

Table 3.2-F: Subtransmission Approximate Land Disturbance

Project Feature	Quantity	Disturbed Acreage Calculation (L × W)	Approximate Total Acres Disturbed During Construction	Approximate Total Acres to be Restored (Temporary)	Approximate Total Acres Permanently Disturbed
Guard Structures	70	75’ × 50’	6.0	6.0	0.0
Remove Existing Lattice Steel Tower (1)	9	220’ × 220’	10.0	10.0	0.0
Remove Existing Wood Pole (1)	28	175’ × 100’	11.2	11.2	0.0

Table 3.2-F: Subtransmission Approximate Land Disturbance

Project Feature	Quantity	Disturbed Acreage Calculation (L × W)	Approximate Total Acres Disturbed During Construction	Approximate Total Acres to be Restored (Temporary)	Approximate Total Acres Permanently Disturbed
Construct New Tubular Steel Pole (2)	26	220’ × 150’	19.7	18.1	1.6
Construct New Light Weight Steel/ Wood Pole (2)	146	175’ × 100’	58.7	57.2	1.5
Guying Structures (3)	8	100’ × 75’	1.4	0	0
Conductor Stringing Setup Area (4)	28	400’ × 100’	25.7	25.7	0.0
Install Underground Cable in Conduit	5,280 (linear feet)	Linear feet × 24” wide	2.9	2.9	0.0
Install Underground Vault	9	100’ × 100’	2.1	2.1	0.0
Total Estimated Disturbance Acreage (4)			137.7	133.3	3.1

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 & OPGW installation. Area to be restored after construction. Portion of ROW within 20’ of ALL structures to remain cleared of vegetation. Permanently disturbed areas for TSP= 0.06 acre, LWS/Wood= 0.05 acre, and H-Frame= 0.06 acre.
3. Permanent disturbance around a guy stub pole would be 10 foot radial, centered on the pole
4. Based on 7,500’ standard conductor reel lengths, conductor size, number of circuits, route design, and terrain.

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

Footing/Base Volume and Area Calculations (approximate):

Average TSP depth 30 feet deep, 7-foot diameter, quantity 1 per TSP: earth removed for footing = 42.8 c.y.; surface area= 38.5 sq. ft.

Average LWS/Wood pole depth 12 feet deep, 2.5-foot diameter, quantity 1 per LWS/wood pole; earth removed for pole base 2.2 c.y.; surface area= 4.9 sq. ft.

Table 3.2-G: Potential Staging Yard Approximate Land Disturbance

Project Feature	Site Quantity	Disturbed Acreage Calculation (L × W)	Acres Disturbed During Construction	Acres to be Restored (Temporary)	Acres Permanently Disturbed
Grand Terrace Material and Equipment Staging Area	1	n/a	4.5	0	4.5
Mountain View No. 1 Material and Equipment Staging Area	1	n/a	2.8	0	2.8
Lugonia Material and Equipment Staging Area	1	n/a	3.7	0	3.7
Beaumont No. 1 Material and Equipment Staging Area	1	n/a	0*	0	0
Beaumont No. 2 Material and Equipment Staging Area	1	n/a	0*	0	0
Hathaway No. 1 Material and Equipment Staging Area	1	n/a	0*	0	0
Hathaway No. 2 Material and Equipment Staging Area	1	n/a	14.0	0	14.0
San Timoteo Material and Equipment Staging Area	1	n/a	17.0	0	17.0
Poultry Material and Equipment Staging Area	1	n/a	13.0	0	13.0
Devers Material and Equipment Staging Area	1	n/a	0*	0	0
Total Estimated Disturbance Area				0	55.0

The disturbed acreage calculations are estimates based upon SCE’s preferred area of use for the described project feature, the width of the existing ROW, or the width of the proposed ROW. They do not include any new access/spur road information. They are subject to revision based upon final engineering and review of the project by SCE's Construction Manager and/or contractor awarded the project. In summary, the disturbance calculations are based on preliminary calculations and are expected to change.

* The yard has previously been improved to a condition where the project can use it without further modifications. Therefore, no disturbance acreage is included for this location.

3.2.3.18 Transmission and Subtransmission Workforce and Construction Equipment

The estimated number of personnel and equipment required for construction activities related to the Transmission and Subtransmission component of the Proposed Project are summarized in the following tables:

- Table 3.2-H: Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates.
- Table 3.2-I: Transmission (Segment 5) Construction Equipment and Workforce Estimates.
- Table 3.2-J: Transmission Shoo-Fly Construction Equipment and Workforce Estimates.
- Table 3.2-K: Subtransmission Construction Equipment and Workforce Estimates.

Construction would be performed by either SCE construction crews or contractors. Contractor personnel would be managed by SCE construction management personnel. SCE anticipates that crew members would work concurrently whenever possible; however, the estimated deployment and number of crew members would be dependent upon local jurisdiction permitting, material availability, and construction scheduling.

SCE anticipates a total of up to approximately 300 construction personnel working on any given day on this project component.

Table 3.2-H: Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Survey (1)				**4**	**31**		**38.5 Miles**
¾-Ton Pick-up Truck, 4×4	200	Gas	2		31	8	1.3 miles/ day
Marshaling Yard (2)				**4**			
1-Ton Crew Cab, 4×4	300	Diesel	1		Duration of Project for Each Yard	4	
R/T Crane (M)	300	Diesel	1			5	
R/T Forklift	200	Diesel	1			5	
Water Truck	300	Diesel	1			10	
Jet A Fuel Truck			1			4	
Truck, Semi, Tractor	350	Diesel	1			6	
ROW Clearing (3)				**5**	**124**		**38.5 miles**
1-Ton Crew Cab, 4×4	300	Diesel	1		124	10	0.4 miles/ day
Motor Grader	350	Diesel	1		124	7	
Water Truck	350	Diesel	2		124	7	
Backhoe/Front Loader	350	Diesel	1		124	7	

Table 3.2-H: Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Track Type Dozer	350	Diesel	1		124	9	
Lowboy Truck/Trailer	500	Diesel	1		124	5	
Roads & Landing Work (4)				**10**	**122**		**152.5 miles & 464 pads**
1-Ton Crew Cab, 4×4	300	Diesel	4		122	5	1.3 miles/day & 5 structure pads/day
Motor Grader	350	Diesel	2		122	5	
Water Truck	350	Diesel	4		122	10	
Backhoe/Front Loader	350	Diesel	2		122	7	
Drum Type Compactor	250	Diesel	2		122	5	
Track Type Dozer	350	Diesel	2		122	7	
Excavator	300	Diesel	2		61	7	
Lowboy Truck/Trailer	500	Diesel	2		61	4	
Guard Structure Installation (5)				**12**	**56**		**667 structures**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		56	8	12 structures/ day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	2		56	8	
Compressor Trailer	120	Diesel	2		56	7	
Auger Truck	500	Diesel	2		56	5	
Extendable Flatbed Pole Truck	350	Diesel	2		56	8	
R/T Crane (M)	500	Diesel	2		56	8	
Water Truck	350	Diesel	1		56	8	
Extendable Flatbed Pole Truck	350	Diesel	2		56	8	
Remove Existing Conductor & OHGW (6)				**56**	**468**		**772 circuit miles**
1-Ton Crew Cab, 4×4	300	Diesel	16		468	10	1.7 miles/day
Manlift/Bucket Truck	350	Diesel	12		468	10	
Sleeving Truck	300	Diesel	4		468	5	
R/T Crane (M)	300	Diesel	4		468	5	
Flatbed Trailer	N/A	N/A	12		422	3	
Truck, Semi, Tractor	350	Diesel	4		422	3	
Bull Wheel Puller	500	Diesel	4		317	5	
Water Truck	350	Diesel	4		317	6	
Hydraulic Rewind Puller	300	Diesel	4		317	5	

Table 3.2-H: Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
220 kV H-Frame/Three Pole Structure Removals				**32**	**31**		**186 Structures**
1-Ton Truck, 4×4	300	Diesel	8		31	10	6 structures/ day
Compressor Trailer	120	Diesel	8		31	5	
Backhoe/Front Loader	350	Diesel	4		31	10	
Manlift/Bucket Truck	250	Diesel	4		31	8	
Boom/Crane Truck	350	Diesel	4		31	8	
Flatbed Pole Truck	400	Diesel	4		31	10	
Remove Existing Lattice Steel Towers (7)				**32**	**171**		**426 towers**
1-Ton Crew Cab, 4×4	300	Diesel	8		171	8	2.5 towers/day
R/T Crane (M)	215	Diesel	8		171	5	
Compressor Trailer	120	Diesel	8		171	10	
Flatbed Truck/Trailer	350	Diesel	4		171	8	
Water Truck	350	Diesel	4		171	6	
Remove Existing Foundations (8)				**16**	**173**		**431**
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	4		173	10	2.5 towers/day
Dump Truck	350	Diesel	4		173	10	
Backhoe/Front Loader	350	Diesel	4		173	10	
Water Truck	350	Diesel	4		173	10	
Remove Existing Tubular Steel Poles (9)				**24**	**2**		**5 TSP**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		2	8	3.8 steel poles/day
R/T Crane (M)	300	Diesel	4		2	5	
Compressor Trailer	120	Diesel	4		2	10	
Water Truck	350	Diesel	4		2	10	
Install LST Foundations (10)				**28**	**142**		**452 LSTs**
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		142	5	3.2 LSTs/day
R/T Crane (M)	300	Diesel	4		142	7	
Backhoe/Front Loader	200	Diesel	4		142	10	
Auger Truck	500	Diesel	4		142	10	
10-cu. yd. Dump Truck	350	Diesel	8		142	10	
Kaman K-MAX		Jet A	1		142	7	
4,000-gallon Water Truck	350	Diesel	4		142	10	
10-cu. yd. Concrete Mixer Truck	425	Diesel	12		142	7	

Table 3.2-H: Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
LST Steel Haul (11)				**8**	**181**		**452 LSTs**
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	4		181	10	2.5 LSTs/day
Truck/Trailer	400	Diesel	4		181	10	
Bell 500		Jet A	2		105	7	
4,000-gallon Water Truck	350	Diesel	4		181	10	
R/T Forklift	200	Diesel	2		181	6	
LST Steel Assembly (12)				**40**	**339**		**452 LSTs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		339	5	1.4 LSTs/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	6		339	5	
R/T Forklift	125	Diesel	4		339	7	
R/T Crane (L)	300	Diesel	4		339	10	
Kaman K-MAX		Jet A	1		339	7	
Compressor Trailer	120	Diesel	4		339	6	
LST Erection (13)				**48**	**236**		**452 LSTs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		236	8	2 LSTs/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		236	8	
4,000-gallon Water Truck	350	Diesel	4		236	10	
R/T Crane (M)	215	Diesel	4		236	7	
R/T Crane (L)	350	Diesel	4		236	7	
Install Tubular Steel Pole Foundations (14)				**24**	**4**		**10 TSPs**
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	12		4	5	2.5 TSPs/day
R/T Crane (M)	300	Diesel	4		4	7	
Backhoe/Front Loader	200	Diesel	4		4	10	
Auger Truck	500	Diesel	4		4	10	
4,000-gallon Water Truck	350	Diesel	4		4	10	
10-cu. yd. Dump Truck	350	Diesel	8		4	10	
10-cu. yd. Concrete Mixer Truck	425	Diesel	12		4	6	
Steel Pole Haul (15)				**8**	**1**		**10 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		1	8	10 steel poles/day

Table 3.2-H: Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
4,000-gallon Water Truck	350	Diesel	4		1	10	
R/T Crane (L)	350	Diesel	2		1	10	
40' Flatbed Truck/Trailer	350	Diesel	4		1	8	
Steel Pole Assembly (16)				**24**	**2**		**10 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		2	8	5 steel poles/day
4,000-gallon Water Truck	350	Diesel	4		2	10	
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		2	6	
Compressor Trailer	120	Diesel	4		2	6	
R/T Crane (L)	350	Diesel	4		2	6	
Steel Pole Erection (17)				**24**	**2**		**10 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		2	5	5 steel poles/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		2	5	
4,000-gallon Water Truck	350	Diesel	4		2	10	
Compressor Trailer	120	Diesel	4		2	5	
R/T Crane (L)	350	Diesel	4		2	6	
H-Frame Installation (18)				**12**	**5**		**1 structure**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		5	8	
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	2		5	8	
Compressor Trailer	120	Diesel	2		5	7	
Auger Truck	500	Diesel	2		5	5	
Extendable Flatbed Pole Truck	350	Diesel	2		5	8	
R/T Crane (M)	500	Diesel	2		5	8	
Water Truck	350	Diesel	1		5	8	
Extendable Flatbed Pole Truck	350	Diesel	2		5	8	
Install Conductor — (19)				**220**	**95**		**144 circuit miles**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		95	10	1.6 miles/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		95	10	

Table 3.2-H: Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Wire Truck/Trailer	350	Diesel	4		65	10	
R/T Crane (M)	215	Diesel	4		95	10	
Dump Truck	350	Diesel	2		95	10	
Bucket Truck	350	Diesel	4		95	10	
22-Ton Manitex	350	Diesel	4		95	10	
Splicing Rig	350	Diesel	2		25	5	
Splicing Lab	300	Diesel	2		25	5	
Sock Line Puller	300	Diesel	2		25	6	
Bull Wheel Puller	350	Diesel	2		50	10	
Backhoe/Front Loader	125	Diesel	2		50	8	
D8 Cat	350	Diesel	1		50	8	
Hughes 500 E Helicopter		Jet A	2		50	7	
Fuel, Helicopter Support Truck	300	Diesel	2		50	7	
Sag Cat w/ 2 winches	350	Diesel	1		25	10	
Static Truck/Tensioner	350	Diesel	2		50	10	
Guard Structure Removal (20)				**12**	**39**		**663 structures**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		39	7	17.2 structures/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	4		39	7	
Compressor Trailer	120	Diesel	4		39	7	
Extendable Flatbed Pole Truck	350	Diesel	4		39	6	
Water Truck	300	Diesel	2		39	10	
R/T Crane (M)	500	Diesel	2		39	8	
80 ft. Hydraulic Manlift/ Bucket Truck	350	Diesel	2		39	4	
Restoration (21)				**14**	**16**		**38.5 Miles**
1-Ton Crew Cab, 4×4	300	Diesel	4		16	2	2.5 miles/day
Motor Grader	350	Diesel	2		16	6	
Water Truck	350	Diesel	2		16	8	
Backhoe/Front Loader	350	Diesel	2		16	6	
Drum Type Compactor	250	Diesel	2		16	6	
Track Type Dozer	350	Diesel	2		16	6	
Lowboy Truck/Trailer	300	Diesel	2		16	3	

Table 3.2-H: Transmission (Excluding Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Retaining walls (22)				**100**			**53 Walls**
1-Ton Crew Cab, 4×4	300	Diesel	4		254	10	48 days/wall
Motor Grader	250	Diesel	2		254	10	
Water Truck	350	Diesel	2		254	10	
Backhoe/Front Loader	125	Diesel	2		254	10	
Drum Type Compactor	250	Diesel	2		254	10	
Track Type Dozer	350	Diesel	2		254	10	
Concrete Mixer	350	Diesel	2		254	10	
Excavator	250	Diesel	2		254	10	
Dump Truck	350	Diesel	2		254	10	
Lowboy Truck/Trailer	300	Diesel	2		254	10	

1 Survey = one 4-man crew
2 Marshaling Yards = four 1-man crews
3 Right-of-way Clearing = one 5-man crew
4 Roads & Landing Work = two 5-man crews
5 Guard Structure Installation = two 6-man crews
6 Remove Existing Conductor & OHGW = four 14-man crews
7 Remove Existing LSTs & LSH-Frames = four 8-man crews
8 Remove Existing Foundations = four 4-man crews
N/A Remove Existing Wood Poles = 0 0-man crews
9 Remove Existing TSP / LWS Poles = four 6-man crews
10 Install Foundations for LSTs = four 7-man crews
11 LST Steel Haul = two 4-man crews
12 LST Steel Assembly = four 10-man crews
13 LST Erection = four 12-man crews
14 Install Foundations for Tubular Steel Poles = four 6-man crews
15 Steel Pole Haul = two 4-man crews
16 Steel Pole Assembly = four 6-man crews
17 Steel Pole Erection = four 6-man crews
18 H-Frame Installation = 1 8-man crew
19 Conductor & OHGW/OPGW Installation = four 55-man crews
20 Guard Structure Removal = two 6-man crews
21 Restoration = two 7-man crews
22 Retaining Walls = ten 10-man crews

Table 3.2-I: Transmission (Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Survey (1)				**4**	**8**		**9 miles**
¾-Ton Pick-up Truck, 4×4	200	Gas	2		8	8	1.3 miles/day
Marshaling Yard (2)				**1**			
1-Ton Crew Cab, 4×4	300	Diesel	1		Duration of Project for Each Yard	4	
R/T Crane (M)	300	Diesel	1			5	
4,000-gallon Water Truck	350	Diesel	1			10	

Table 3.2-I: Transmission (Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Jet A Fuel Truck			1			4	
R/T Forklift	200	Diesel	1			5	
Truck, Semi, Tractor	350	Diesel	1			6	
ROW Clearing (3)				**5**	**29**		**9 miles**
1-Ton Crew Cab, 4×4	300	Diesel	1		29	10	0.4 mile/day
Motor Grader	350	Diesel	1		29	7	
Water Truck	350	Diesel	2		29	7	
Backhoe/Front Loader	350	Diesel	1		29	7	
Track Type Dozer	350	Diesel	1		29	9	
Lowboy Truck/Trailer	500	Diesel	1		29	5	
Roads & Landing Work (4)				**10**	**22**		**13.7 miles & 108 pads**
1-Ton Crew Cab, 4×4	300	Diesel	4		22	5	2.5 miles/day & 10 structure pads/day
Motor Grader	350	Diesel	2		22	5	
Water Truck	350	Diesel	4		22	10	
Backhoe/Front Loader	350	Diesel	2		22	7	
Drum Type Compactor	250	Diesel	2		22	5	
Track Type Dozer	350	Diesel	2		22	7	
Excavator	300	Diesel	2		11	7	
Lowboy Truck/Trailer	500	Diesel	2		11	4	
Guard Structure Installation (5)				**12**	**1**		**6 structures**
¾-Ton Pick-up Truck, 4×4	275	Diesel	4		1	8	12 structures/ day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	2		1	8	
Compressor Trailer	120	Diesel	2		1	7	
Auger Truck	500	Diesel	2		1	5	

Table 3.2-I: Transmission (Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Extendable Flatbed Pole Truck	350	Diesel	2		1	8	
R/T Crane (M)	500	Diesel	2		1	8	
Water Truck	350	Diesel	4		1	8	
Manlift/ Bucket Truck	350	Diesel	2		1	8	
Install LST Foundations (6)				**28**	**23**		**72 LSTs**
¾-Ton Pick-up Truck, 4×4	275	Diesel	4		23	5	3.2 LSTs/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		23	5	
Backhoe/Front Loader	200	Diesel	4		23	10	
Auger Truck	500	Diesel	4		23	10	
Dump Truck	350	Diesel	8		23	10	
4,000-gallon Water Truck	350	Diesel	4		23	10	
Concrete Mixer Truck	425	Diesel	12		23	7	
LST Steel Haul (7)				**8**	**29**		**72 LSTs**
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	4		29	10	2.5 LSTs/day
Water Truck	350	Diesel	2		29	10	
Flatbed Truck/ Trailer	350	Diesel	2		29	10	
Rough Terrain Forklift	200	Diesel	2		29	8	
LST Steel Assembly (8)				**40**	**54**		**72 LSTs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		54	5	1.4 LSTs/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	6		54	5	
Rough Terrain Forklift	200	Diesel	4		54	7	
R/T Crane (L)	300	Diesel	4		54	10	
Compressor Trailer	120	Diesel	4		54	7	

Table 3.2-I: Transmission (Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
LST Erection (9)				**48**	**38**		**72 LSTs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		38	5	2 LSTs/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		38	5	
Water Truck	350	Diesel	2		38	10	
R/T Crane (M)	500	Diesel	4		38	7	
Compressor Trailer	120	Diesel	4		38	7	
R/T Crane (L)	350	Diesel	4		38	7	
Install Tubular Steel Pole Foundations (10)				**24**	**15**		**36 TSPs**
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	12		15	5	2.5 TSPs/day
R/T Crane (M)	300	Diesel	4		15	7	
Backhoe/Front Loader	200	Diesel	4		15	10	
Auger Truck	500	Diesel	4		11	10	
4,000-gallon Water Truck	350	Diesel	4		15	10	
Dump Truck	350	Diesel	8		15	10	
Concrete Mixer Truck	425	Diesel	12		11	6	
Steel Pole Haul (11)				**8**	**4**		**36 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		4	8	10 steel poles/day
4,000-gallon Water Truck	350	Diesel	4		4	10	
R/T Crane (M)	350	Diesel	2		4	6	
40' Flatbed Truck/Trailer	400	Diesel	4		4	10	
Steel Pole Assembly (12)				**24**	**8**		**36 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		8	6	5 steel poles/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		8	6	
4,000-gallon Water Truck	350	Diesel	4		8	10	

Table 3.2-I: Transmission (Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Compressor Trailer	120	Diesel	4		8	6	
R/T Crane (L)	350	Diesel	4		8	7	
Steel Pole Erection (13)				**24**	**8**		**36 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		8	6	5 steel poles/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		8	6	
4,000-gallon Water Truck	350	Diesel	4		8	10	
Compressor Trailer	120	Diesel	4		8	6	
R/T Crane (L)	350	Diesel	4		8	7	
Install Conductor (14)				**220**	**24**		**36 circuit miles**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		24	10	1.6 miles/day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		24	10	
Wire Truck/ Trailer	350	Diesel	4		17	6	
Dump Truck (Trash)	350	Diesel	2		24	10	
R/T Crane (M)	350	Diesel	2		24	10	
Bucket Truck	350	Diesel	4		24	10	
22-Ton Manitex	350	Diesel	4		24	10	
Splicing Rig	350	Diesel	2		7	2	
Splicing Lab	300	Diesel	2		7	2	
Splicing Cart	10	Diesel	4		7	10	
3 Drum Straw line Puller	300	Diesel	2		13	7	
D8 Cat	350	Diesel	1		24	7	
Sag Cat W/ 2 Winches	350	Diesel	1		24	7	
Hughes 500 E Helicopter		Jet A	2		24	7	
Fuel, Helicopter Support Truck	300	Diesel	2		24	7	

Table 3.2-I: Transmission (Segment 5) Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Static Truck/ Tensioner	350	Diesel	2		13	6	
Guard Structure Removal (15)				**12**	**1**		**6 structures**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		1	7	17.2 structures/ day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	4		1	7	
Compressor Trailer	120	Diesel	4		1	7	
Water Truck	350	Diesel	2		1	10	
Extendable Flatbed Pole Truck	350	Diesel	4		1	6	
R/T Crane (M)	500	Diesel	2		1	10	
80-foot Hydraulic Manlift/ Bucket Truck	350	Diesel	2		1	7	
Restoration (16)				**14**	**4**		**9 miles**
1-Ton Crew Cab, 4×4	300	Diesel	4		4	2	2.5 miles/day
Motor Grader	350	Diesel	2		4	6	
Water Truck	350	Diesel	2		4	8	
Backhoe/Front Loader	350	Diesel	2		4	6	
Drum Type Compactor	250	Diesel	2		4	6	
Track Type Dozer	350	Diesel	2		4	6	
Lowboy Truck/Trailer	300	Diesel	2		4	3	

Crew Size Assumptions:

1 Survey = one 4-man crew
2 Marshaling Yards = one 1-man crew
3 Right-of-way Clearing = one 5-man crew
4 Roads & Landing Work = two 5-man crews
5 Guard Structure Installation = two 6-man crews
6 Install Foundations for LSTs = four 7-man crews
7 LST Steel Haul = two 4-man crews
8 LST Steel Assembly = four 10-man crews
9 LST Erection = four 12-man crews
10 Install Foundations for Tubular Steel Poles = four 6-man crews
11 Steel Pole Haul = two 4-man crews
12 Steel Pole Assembly = four 6-man crews
13 Steel Pole Erection = four 6-man crews
14 Conductor & OHGW/OPGW Installation = four 55-man crews
15 Guard Structure Removal = two 6-man crews
16 Restoration = two 7-man crews

Table 3.2-J: Transmission Shoo-Fly Construction Equipment and Workforce Estimates

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
Survey (1)				**16**	**26**		**20 miles**
1-Ton Pick-up Truck, 4×4	300	Gas	8		26	10	
ROW Clearing (3)				**15**	**14**		**20 Miles**
1-Ton Truck, 4×4	300	Gas	3		14	10	
Backhoe/ Front Loader	350	Diesel	3		14	7	
Track Type Dozer	350	Diesel	3		14	7	
Road Grader	350	Diesel	3		14	7	
Water Truck	300	Diesel	6		14	9	
Lowboy Truck/ Trailer	500	Diesel	3		14	5	
Roads & Landing Work (4)				**24**	**60**		**300 Pads**
1-Ton Truck, 4×4	300	Gas	8		60	5	
Backhoe/ Front Loader	350	Diesel	4		60	7	
Track Type Dozer	350	Diesel	4		60	7	
Motor Grader	350	Diesel	4		60	5	
Water Truck	300	Diesel	8		60	10	
Drum Type Compactor	250	Diesel	4		60	5	
Excavator	300	Diesel	4		36	7	
Lowboy Truck/ Trailer	500	Diesel	4		36	4	
Shoo-fly Direct Buried Steel/Wood Poles (DBSP) Haul (5)				**8**	**120**		**300 DBSP Poles**
¾-Ton Truck, 4×4	275	Gas	2		120	10	
Water Truck	300	Diesel	1		120	10	
Boom/Crane Truck	350	Diesel	2		120	8	
Flatbed Pole Truck	400	Diesel	2		120	10	

Table 3.2-J: Transmission Shoo-Fly Construction Equipment and Workforce Estimates

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
Shoo-fly Direct Buried Steel/Wood Pole Assembly (6)				**18**	**150**		**300 DBSP Poles**
¾-Ton Truck, 4×4	275	Gas	2		150	6	
Compressor Trailer	120	Diesel	1		150	6	
1-Ton Truck, 4×4	300	Diesel	2		150	10	
4,000-gallon Water Truck	350	Diesel	1		150	10	
Boom/Crane Truck	350	Diesel	1		150	8	
Install Shoo-fly Direct Buried Steel/Wood Pole (7)				**18**	**100**		**300 DBSP Poles**
1-Ton Truck, 4×4	300	Diesel	2		100	6	
Manlift/ Bucket Truck	350	Diesel	2		100	10	
Boom/Crane Truck	350	Diesel	2		100	7	
Auger Truck	210	Diesel	2		70	8	
Water Truck	300	Diesel	2		100	10	
Backhoe/ Front Loader	125	Diesel	2		100	10	
Extendable Flatbed Pole Truck	400	Diesel	2		100	6	
Install Conductor/GW (8)				**165**	**20**		**20 Miles**
¾-Ton Truck, 4×4	275	Gas	3		20	10	
1-Ton Truck, 4×4	300	Diesel	6		20	10	
Manlift/ Bucket Truck	350	Diesel	3		20	10	
Boom/Crane Truck	350	Diesel	3		20	10	
R/T Crane (M)	215	Diesel	3		20	10	
Dump Truck	350	Diesel	2		20	10	
Wire Truck/ Trailer	350	Diesel	3		5.4	10	

Table 3.2-J: Transmission Shoo-Fly Construction Equipment and Workforce Estimates

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
Sock Line Puller	300	Diesel	2		5.4	10	
Bull Wheel Puller	350	Diesel	2		10	10	
Static Truck/ Tensioner	350	Diesel	2		20	10	
Splicing Rig	350	Diesel	2		5.4	10	
Spacing Cart	10	Diesel	4		5.4	10	
Backhoe/ Front Loader	125	Diesel	2		4	8	
D8 Cat	350	Diesel	1		4	8	
Sag Cat w/ 2 winches	350	Diesel	1		4	10	
Lowboy Truck/ Trailer	450	Diesel	3		20	10	
Hughes 500 E		Jet A	2		4	7	
Fuel, Helicopter Support Truck	300	Diesel	2		4	7	
Remove Shoo-fly Conductor & GW (9)				**28**	**20**		**20 Circuit Miles**
1-Ton Truck, 4×4	300	Diesel	8		20	10	
Manlift/ Bucket Truck	250	Diesel	6		20	10	
Sleeving Truck	300	Diesel	4		20	5	
Boom/Crane Truck	350	Diesel	4		20	5	
Bull Wheel Puller	500	Diesel	2		14	5	
Truck, Semi-Tractor	350	Diesel	2		10	2	
Hydraulic Rewind Puller	300	Diesel	2		14	5	
4,000-gallon Water Truck	350	Diesel	2		20	10	

Table 3.2-J: Transmission Shoo-Fly Construction Equipment and Workforce Estimates

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
Lowboy Truck/ Trailer	450	Diesel	6		20	3	
Shoo-fly Pole Removal (10)				**8**	**80**		**300 LWS Poles**
1-Ton Truck, 4×4	300	Diesel	2		80	6	
Compressor Trailer	60	Diesel	2		80	6	
Water Truck	300	Diesel	2		80	10	
Manlift/ Bucket Truck	250	Diesel	2		80	10	
Boom/Crane Truck	350	Diesel	2		80	7	
Flatbed Truck/ Trailer	400	Diesel	2		80	6	
Restoration (11)				**21**	**8**		**20 Miles**
1-Ton Truck, 4×4	300	Diesel	6		8	4	
Backhoe/ Front Loader	125	Diesel	3		8	7	
Motor Grader	250	Diesel	3		8	7	
Water Truck	300	Diesel	3		8	10	
Drum Type Compactor	100	Diesel	3		8	7	
Lowboy Truck/ Trailer	450	Diesel	3		8	3	

Crew Size Assumptions:

1 Survey = four 4-man crews
2 Construction and Materials Yards = one 4-man crew for each yard
3 Right-of-Way Clearing = three 5-man crews
4 Roads & Landing Work = four 6-man crews
5 Shoo-fly Pole Haul = two 4-man crews
6 Wood/LWS/Shoo-fly Pole Assembly = three 6-man crews
7 Install Wood/H-Frame/LWS/Shoo-fly Pole = three 6-man crews
8 Install/Transfer Conductor/GW = three 55-man crews
9 Remove Shoo-fly Conductor & GW = two 14-man crews
10 Shoo-fly Pole Removal = one 6-man crew
11 Restoration = three 7-man crews

Table 3.2-K: Subtransmission Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Survey (1)				**4**	**6**		**5.3 miles**
1-Ton Truck, 4×4	300	Gas	2		6	8	1 mile
Marshaling Yard (2)				**4**			**1 yard**
1-Ton Truck, 4×4	300	Gas	1		Duration of Project	4	5 acres
R/T Forklift	125	Diesel	1			6	
Boom/Crane Truck	350	Diesel	1			2	
Water Truck	300	Diesel	1			8	
Truck, Semi-Tractor	400	Diesel	1			2	
ROW Clearing (3)				**5**	**14**		**3.3 miles**
1-Ton Truck, 4×4	300	Gas	1		14	8	0.25 mile
Backhoe/Front Loader	125	Diesel	1		14	6	
Track Type Dozer	150	Diesel	1		14	6	
Motor Grader	250	Diesel	1		14	6	
Water Truck	300	Diesel	1		14	8	
Lowboy Truck/Trailer	450	Diesel	1		14	4	
Roads & Landing Work (4)				**5**	**4**		**2 miles & 9 pads**
1-Ton Truck, 4×4	300	Gas	1		4	8	existing roads: 2 miles structure pads (flat to mod): 4 pads
Backhoe/ Front Loader	125	Diesel	1		4	4	
Track Type Dozer	150	Diesel	1		4	4	
Motor Grader	250	Diesel	1		4	6	
Water Truck	300	Diesel	1		4	8	
Drum Type Compactor	100	Diesel	1		4	6	
Excavator	250	Diesel	1		3	4	
Lowboy Truck/Trailer	450	Diesel	1		4	4	

Table 3.2-K: Subtransmission Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Guard Structure Installation (5)				**6**	**14**		**70 structures**
¾-Ton Truck, 4×4	275	Gas	1		14	8	5 structures
1-Ton Truck, 4×4	300	Gas	1		14	8	
Compressor Trailer	60	Diesel	1		14	4	
Manlift/Bucket Truck	250	Diesel	1		14	4	
Boom/Crane Truck	350	Diesel	1		14	6	
Auger Truck	210	Diesel	1		14	4	
Extendable Flatbed Pole Truck	400	Diesel	1		14	8	
Remove Existing Conductor & GW (6)				**14**	**8**		**4 circuit miles**
1-Ton Truck, 4×4	300	Gas	2		8	4	non-bundled: 0.5 mile
Manlift/ Bucket Truck	250	Diesel	2		8	8	
Boom/Crane Truck	350	Diesel	2		8	8	
Bull Wheel Puller	350	Diesel	1		6	6	
Sock Line Puller	300	Diesel	1		6	6	
Static Truck/ Tensioner	350	Diesel	1		8	6	
Lowboy Truck/Trailer	450	Diesel	2		8	4	
Wood/LWS Pole Removal (7)				**6**	**4**		**28 poles**
1-Ton Truck, 4×4	300	Gas	2		4	8	9 poles
Compressor Trailer	60	Diesel	1		4	4	
Manlift/ Bucket Truck	250	Diesel	1		4	6	
Boom/Crane Truck	350	Diesel	1		4	6	
Flatbed Pole Truck	400	Diesel	1		4	8	

Table 3.2-K: Subtransmission Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
LST Removal (8)				**6 (S/C)**	**18**		**9 LSTs**
1-Ton Truck, 4×4	300	Gas	2		18	4	0.5 LSTs
Compressor Trailer	60	Diesel	1		18	8	
R/T Crane (M)	215	Diesel	1		18	6	
Boom/Crane Truck	350	Diesel	1		18	6	
Flatbed Truck/Trailer	400	Diesel	1		18	4	
LST Foundation Removal (9)				**4**	**5**		**9 LSTs**
¾-Ton Truck, 4×4	275	Gas	1		5	4	2 LSTs
Compressor Trailer	60	Diesel	1		**5**	8	
Backhoe/Front Loader	125	Diesel	1		5	6	
Dump Truck	350	Diesel	1		5	6	
Excavator	250	Diesel	1		5	4	
Install TSP Foundations (10)				**6**	**54**		**26 TSPs**
¾-Ton Truck, 4×4	275	Gas	1		54	4	0.5 TSPs
Boom/Crane Truck	350	Diesel	1		54	4	
Backhoe/ Front Loader	125	Diesel	1		54	6	
Auger Truck	210	Diesel	1		21	6	
Water Truck	300	Diesel	1		49	8	
Dump Truck	350	Diesel	1		49	4	
Concrete Mixer Truck	350	Diesel	3		33	2	
TSP Haul (11)				**4**	**7**		**26 TSPs**
¾-Ton Truck, 4×4	275	Gas	1		7	8	4 TSPs
Boom/Crane Truck	350	Diesel	1		7	6	
Flatbed Pole Truck	400	Diesel	1		7	8	
TSP Assembly (12)				**8**	**26**		**26 TSPs**
¾-Ton Truck, 4×4	275	Gas	2		26	4	1 TSP
1-Ton Truck,	300	Gas	2		26	4	

Table 3.2-K: Subtransmission Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
4×4							
Compressor Trailer	60	Diesel	1		26	6	
Boom/Crane Truck	350	Diesel	1		26	8	
TSP Erection (13)				**8**	**26**		**26 TSPs**
¾-Ton Truck, 4×4	275	Gas	2		26	4	1 TSP
1-Ton Truck, 4×4	300	Gas	2		26	4	
Compressor Trailer	60	Diesel	1		26	4	
Boom/Crane Truck	350	Diesel	1		26	8	
LWS Pole Haul (14)				**4**	**27**		**154 LWS poles**
¾-Ton Truck, 4×4	275	Gas	1		27	8	6 poles
Boom/Crane Truck	350	Diesel	1		27	6	
Flatbed Pole Truck	400	Diesel	1		27	8	
LWS Pole Assembly (15)				**8**	**39**		**154 LWS poles**
¾-Ton Truck, 4×4	275	Gas	2		39	4	4 poles
1-Ton Truck, 4×4	300	Gas	2		39	4	
Compressor Trailer	60	Diesel	1		39	6	
Boom/Crane Truck	350	Diesel	1		39	8	
Install LWS Pole (16)				**6**	**39**		**154 poles**
1-Ton Truck, 4×4	300	Gas	1		39	8	4 poles
Manlift/ Bucket Truck	250	Diesel	1		39	6	
Boom/Crane Truck	350	Diesel	1		39	6	
Auger Truck	210	Diesel	1		39	4	
Backhoe/ Front Loader	125	Diesel	1		39	8	
Extendable Flatbed Pole	400	Diesel	1		39	8	

Table 3.2-K: Subtransmission Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Truck							
Install Conductor (17)				**20**	**13**		**4.3 circuit miles**
1-Ton Truck, 4×4	300	Gas	3		13	4	0.33 mile
Manlift/ Bucket Truck	250	Diesel	4		13	8	
Boom/Crane Truck	350	Diesel	1		13	8	
Dump Truck	350	Diesel	1		13	2	
Wire Truck/ Trailer	350	Diesel	2		13	6	
Sock Line Puller	300	Diesel	1		5	6	
Bull Wheel Puller	350	Diesel	1		9	6	
Static Truck/ Tensioner	350	Diesel	1		13	6	
Backhoe/ Front Loader	125	Diesel	1		13	2	
Lowboy Truck/Trailer	450	Diesel	2		13	4	
Hughes 500 E Helicopter		Jet A	1		4	6	
Fuel, Helicopter Support Truck	300	Diesel	1		4	6	
Guard Structure Removal (18)				**6**	**10**		**70 structures**
¾-Ton Truck, 4×4	275	Gas	1		10	8	7 structures
1-Ton Truck, 4×4	300	Gas	1		10	8	
Compressor Trailer	60	Diesel	1		10	4	
Manlift/ Bucket Truck	250	Diesel	1		10	4	
Boom/Crane Truck	350	Diesel	1		10	6	
Extendable Flatbed Pole Truck	400	Diesel	1		10	8	

Table 3.2-K: Subtransmission Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/Day)	Estimated Production Per Day
Restoration (19)				**7**	**4**		**3.3 miles**
1-Ton Truck, 4×4	300	Gas	2		4	4	1 mile
Backhoe/ Front Loader	125	Diesel	1		4	4	
Motor Grader	250	Diesel	1		4	6	
Water Truck	300	Diesel	1		4	8	
Drum Type Compactor	100	Diesel	1		4	4	
Lowboy Truck/Trailer	450	Diesel	1		4	4	
Vault Installation (20)				**6**	**27**		**9 vaults**
1-Ton Truck, 4×4	300	Gas	2		27	4	0.33 vaults
Backhoe/ Front Loader	125	Diesel	1		27	8	
Excavator	250	Diesel	1		14	6	
Dump Truck	350	Diesel	2		27	8	
Water Truck	300	Diesel	1		27	8	
Crane (L)	500	Diesel	1		9	6	
Concrete Mixer Truck	350	Diesel	3		14	2	
Lowboy Truck/Trailer	450	Diesel	1		9	4	
Flatbed Truck/Trailer	400	Diesel	3		9	4	
Duct Bank Installation (21)				**6**	**22**		**5,380 trench feet**
1-Ton Truck, 4×4	300	Gas	2		22	4	250 feet
Compressor Trailer	60	Diesel	1		22	4	
Backhoe/ Front Loader	125	Diesel	1		22	6	
Dump Truck	350	Diesel	2		22	6	
Pipe Truck/ Trailer	275	Diesel	1		22	6	
Water Truck	300	Diesel	1		22	8	
Concrete Mixer Truck	350	Diesel	3		22	2	
Lowboy Truck/Trailer	450	Diesel	1		8	4	

Table 3.2-K: Subtransmission Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Work-force	Estimated Schedule (Days)	Duration of Use (Hrs/ Day)	Estimated Production Per Day
Install Underground Cable (22)				**8**	**3**		**1 circuit mile**
1-Ton Truck, 4×4	300	Gas	2		3	4	0.33 mile
Manlift/ Bucket Truck	250	Diesel	1		3	6	
Boom/Crane Truck	350	Diesel	1		3	6	
Wire Truck/ Trailer	350	Diesel	2		3	6	
Puller	350	Diesel	1		3	6	
Static Truck/ Tensioner	350	Diesel	1		3	6	

Crew Size Assumptions:
1 Survey = one 4-man crew
2 Marshaling Yards = one 4-man crew
3 Right-of-way Clearing = one 5-man crew
4 Roads & Landing Work = one 5-man crew
5 Guard Structure Installation = one 6-man crew
6 Remove Existing Conductor & GW = one 14-man crew
7 Remove Existing Wood/LWS Poles = one 6-man crew
8 Remove Existing LSTs = one 6-man crew
9 Remove Existing LST Foundations = one 4-man crew
10 Install Foundations for TSPs = one 6-man crew
11 TSP Haul = one 4-man crew
12 TSP Assembly = one 8-man crew
13 TSP Erection = one 8-man crew
14 TSP Haul = one 4-man crew
15 TSP Assembly = one 8-man crew
16 Install Wood/LWS Pole = one 6-man crew
17 Conductor & GW Installation = two 10-man crews
18 Guard Structure Removal = one 6-man crew
19 Restoration = one 7-man crew
20 Vault Installation = one 6-man crew
21 Duct Bank Installation = one 6-man crew
22 Install Underground Cable = one 8-man crew

3.2.4 Underground Subtransmission Line Installation

The following sections describe the construction activities associated with installing the underground 66 kV subtransmission lines for the Proposed Project.

3.2.4.1 Survey

Construction activities would commence following surveys of existing underground utilities along the proposed underground subtransmission source line route, and survey/staking of proposed structure locations. In accordance with California law, SCE would notify all applicable utilities via underground service alert to locate and mark existing utilities and conducting exploratory excavations (potholing) as necessary to verify the location of existing utilities. SCE would secure encroachment permits for trenching in public streets.

3.2.4.2 Trenching

The Proposed Project includes a total of approximately 3,100 feet of new underground 66 kV subtransmission lines and associated transition and support structures. An approximately 20 to 24 inch wide by 60-inch deep trench would be required to place the

66 kV subtransmission line underground. This depth is required to meet the minimum 36 inches of cover above the duct bank. Trenching may be performed by using the following general steps, including but not limited to: mark the location and applicable underground utilities, lay out trench line, saw cut asphalt or concrete pavement as necessary, dig to appropriate depth with a backhoe or similar equipment, and install duct bank. Once the duct bank has been installed, the trench would be backfilled with a two-sack sand slurry mix. Excavated materials would be used as fill on other project elements, and/or disposed of at an off-site disposal facility in accordance with all applicable laws as described in Section 3.7, Reusable, Recyclable, and Waste Material Management. Should groundwater be encountered, it would be pumped into a tank and disposed of at an off-site disposal facility in accordance with all applicable laws as well.

The trench for underground construction would be widened and shored where appropriate to meet California Occupation and Safety Health Administration requirements. Trenching would be staged so that open trench lengths would not exceed that which is required to install the duct banks. Where needed, open trench sections would have steel plates placed over them in order to maintain vehicular and pedestrian traffic. Provisions for emergency vehicle access, where necessary, would be incorporated into the construction plan.

3.2.4.3 Duct Bank Installation

As trenching for the underground 66 kV subtransmission line is completed, SCE would begin to install the underground duct bank. Collectively, the duct bank is comprised of conduit, spacers, ground wire, and concrete encasement. The duct bank typically consists of six 5-inch diameter polyvinyl chloride (PVC) conduits fully encased with a minimum of 3 inches of concrete all around. Typical 66 kV subtransmission duct bank installations would accommodate six cables. The Proposed Project would utilize three conduits and leave three spare conduits for any potential future circuit pursuant to SCE’s current standards for 66 kV underground construction. See Figure 3.2-3, Typical Subtransmission Duct Bank, for the standard subtransmission duct bank configuration.

The majority of the 66 kV duct banks would be installed in a vertically stacked configuration and each duct bank would be approximately 21 inches in height by 20 inches in width. In areas where underground utilities are highly congested or areas where it is necessary to fan out the conduits to reach termination structures, a flat configuration duct bank may be required. However, for the Proposed Project it is not anticipated that a flat underground duct bank configuration would be required.

In instances where a subtransmission duct bank would cross or run parallel to other substructures that operate at normal soil temperature (e.g., gas lines, telephone lines, water mains, storm drains, sewer lines), a minimal radial clearance of 6 inches for crossing and 12 inches for paralleling these substructures would be required, respectively. Where duct banks cross or run parallel to substructures that operate at temperatures significantly exceeding normal soil temperature (e.g., other underground transmission circuits, primary distribution cables, steam lines, heated oil lines), additional radial clearance may be required. Clearances and depths would meet requirements set forth within Rule 41.4 of CPUC General Order 128.

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Typical 66 kV Underground Duct Bank Cross Section

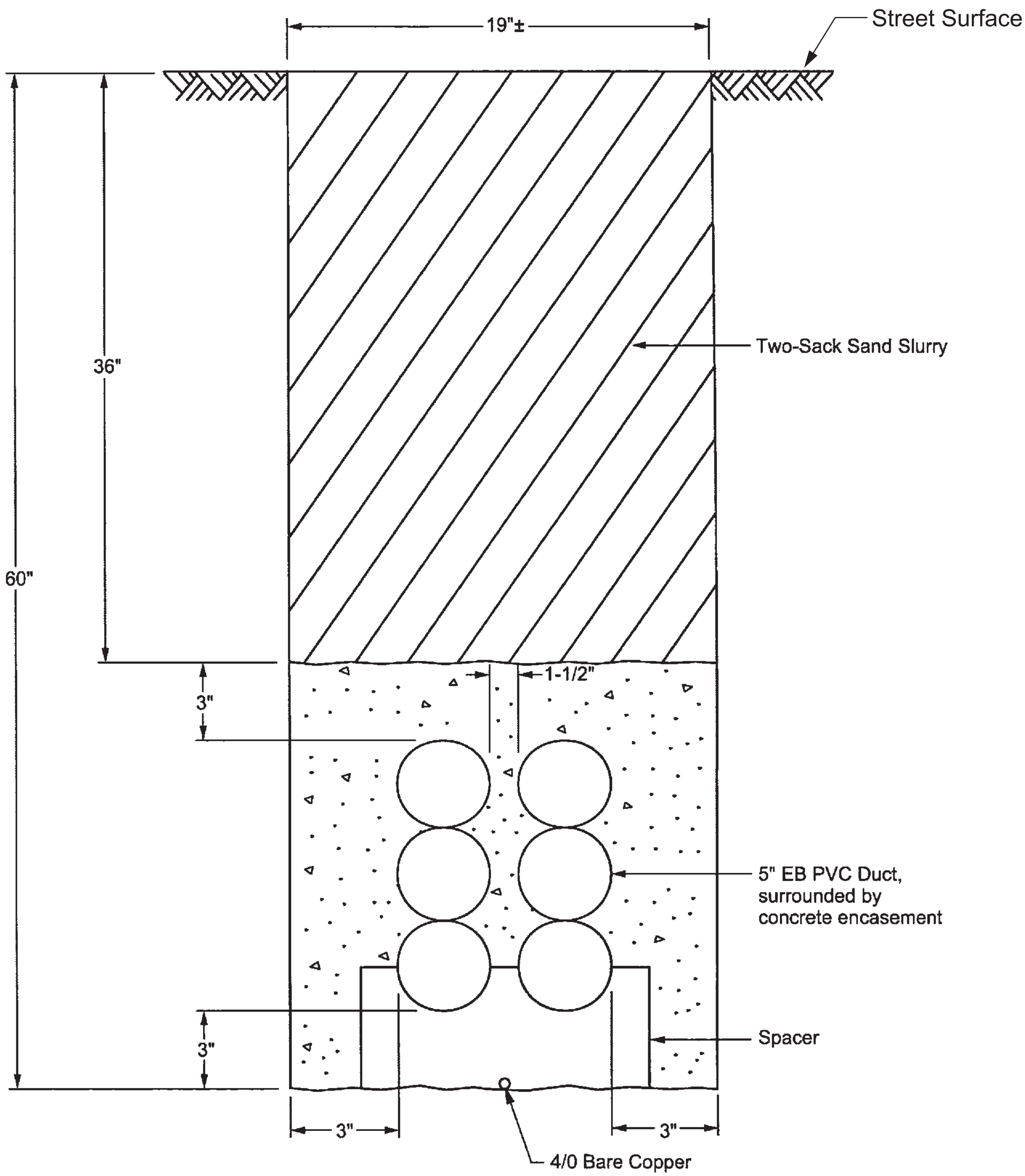

FIGURE 3.2-3

Southern California Edison
West of Devers Upgrade Project

Typical Subtransmission Duct Bank

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3.2.4.4 Vault Installation

Vaults are below-grade concrete enclosures where the duct banks terminate. The vaults are constructed of prefabricated steel-reinforced concrete and designed to withstand heavy truck traffic loading. The inside dimensions of the underground vaults would be approximately 10 feet wide by 20 feet long with an inside height of 9.5 feet. The vaults would be placed no more than 1,500 feet apart along the underground portion of the subtransmission source line. Initially, the vaults would be used as pulling locations to pull cable through the conduits. After the cable is installed, the vaults would be utilized to splice the cables together. During operation, the vaults would provide access to the underground cables for maintenance, inspections, and repairs. See Figure 3.2-4, Typical Subtransmission Vault, for the standard subtransmission vault configuration.

The vault pit would be excavated and shored; a minimum of 6 inches of mechanically compacted aggregate base would be placed to cover the entire bottom of the pit, followed by delivery and installation of the vault. Once the vault is set, grade rings and the vault casting would be added and set to match the existing grade. The excavated area would be backfilled with a sand slurry mix to a point just below the top of the vault roof. Excavated materials, if suitable, would be used to backfill the remainder of the excavation and any excess-materials would be used as described in Section 3.7, Reusable, Recyclable, and Waste Material Management. Finally, the excavated area would be restored as required.

3.2.4.5 Cable Pulling, Splicing, Termination

Following vault and duct bank installation, SCE would pull the electrical cables through the duct banks, splice the cable segments at each vault, and terminate cables at the transition structures where the subtransmission line would transition from underground to overhead. To pull the cables through the duct banks, a cable reel would be placed at one end of the conduit segment, and a pulling rig would be placed at the opposite end. The cable from the cable reel would be attached to a rope in the duct bank, and the linked to the pulling rig, which would pull the rope and the attached cable through the duct banks. A lubricant would be applied as the cable enters the ducts to decrease friction and facilitate travel through the PVC conduits. The electrical cables for the 66 kV subtransmission line circuit would be pulled through the individual conduits in the duct bank.

After cable pulling is completed, the electrical cables would be spliced together. A splice crew would conduct splicing operations at each vault location and continue until all splicing is completed.

3.2.4.6 Transition Structure Construction

At each end of an underground segment, the cables would rise out of the ground at transition structures, which accommodate the transition from underground to overhead subtransmission lines. Transition structures constructed as part of the Proposed Project would consist of engineered TSP structures (TSP riser poles). The transition structure would support cable terminations, lightning arresters, and dead-end hardware for overhead conductors. Construction methods for these structures would be substantially similar to those described in Section 3.2.3.5, Tubular Steel Pole Installation.

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Typical Underground Subtransmission Vault - Isometric View (10' x 20' x 9'-6")

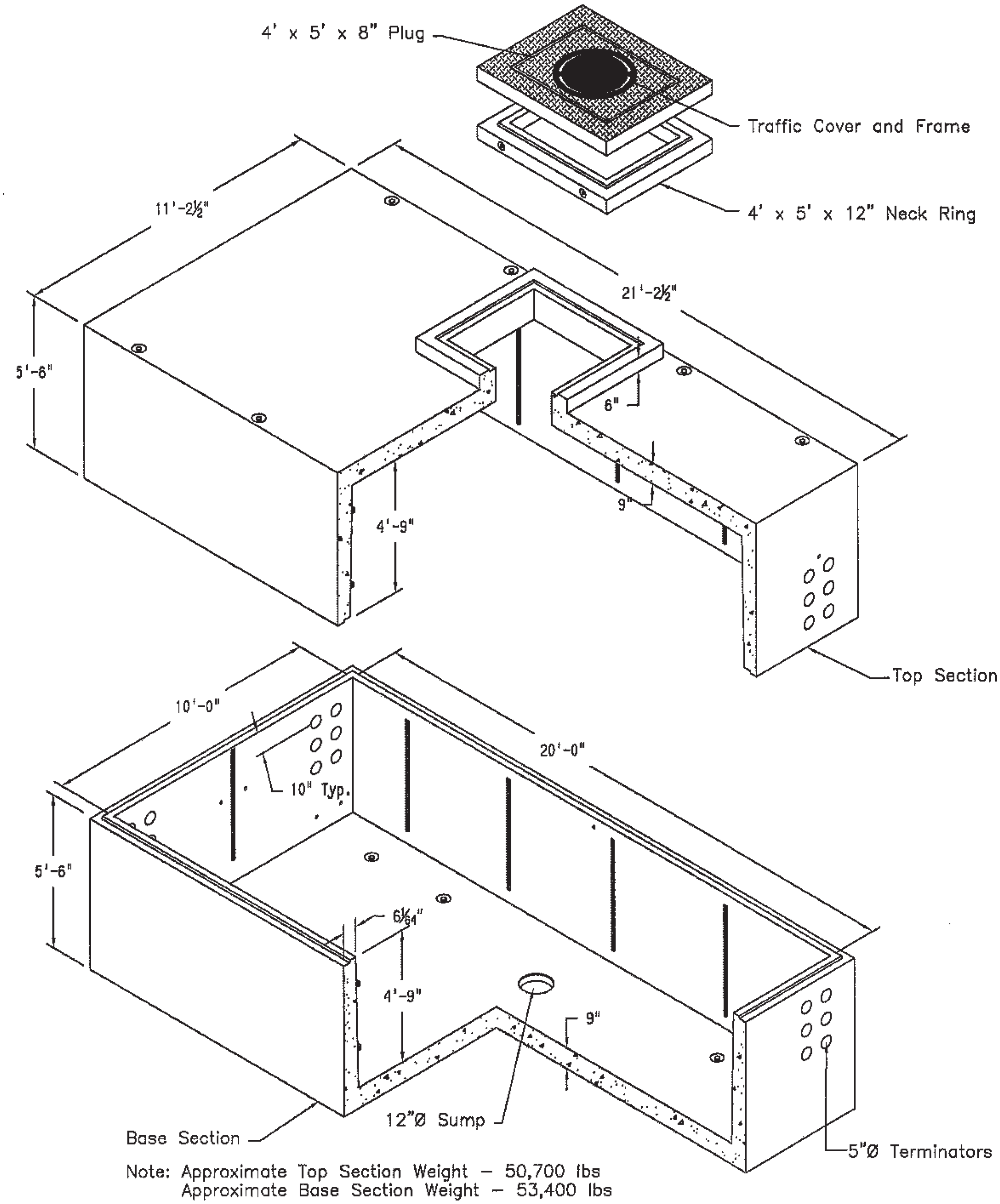

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FIGURE 3.2-4

Southern California Edison
West of Devers Upgrade Project
Typical Subtransmission Vault

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3.2.5 Distribution Relocation and Underbuild (Resulting from Transmission and Subtransmission Lines) Construction

For the relocation of existing distribution facilities described in Section 3.1.2.6, Subtransmission and Distribution Work Resulting from Transmission Lines, the following would occur:

- For those portions of the subtransmission route where existing distribution facilities would be relocated to new subtransmission structures, access to the sites would be via the existing paved streets. Transfer of existing distribution conductor and equipment would typically be performed using a line truck.
- For the new underground distribution system along Mission Road and California Street, access will be via the existing paved streets. Excavation would occur in the existing paved streets and would be approximately 20 inches wide and 1.5 miles long. The work area for the trenching would be approximately 15 feet wide and 1.5 miles long. The excavated soil would temporarily be placed next to the trench on previously disturbed area. Construction activities would typically include the use of a backhoe, dump trucks, crew trucks, concrete trucks and asphalt trucks. Soil excavated would be used to refill the trench and area surrounding the vaults, and excess soil would be trucked to an approved disposal facility. New asphalt would be placed over the top of the trench to match the existing asphalt in the street. Once the underground infrastructure is in place, the crews would install cable in two of the four conduits. See Figure 3.2-5, Typical Distribution Duct Bank, for the standard distribution duct bank configuration. See Figure 3.2-6, Typical Distribution Vault, for the standard vault configuration.
- For the portion of distribution underbuild that may result in up to 21 subtransmission structures being replaced along Mayberry Street and Barton Road, access to the site will be via the existing paved streets. Activities associated with structure installation and removal is discussed in Sections 3.2.3.6, Wood Pole Installation and 3.2.3.14 Transfer/Removal of Existing Structures/Facilities.

3.2.5.1 Distribution Land Disturbance

Land disturbance for the Proposed Project would include structure installation and removal activities and installation of new conductor. The estimated land disturbance for these project features are summarized below in Table 3.2-L, Distribution Approximate Land Disturbance.

3.2.5.2 Distribution Workforce and Construction Equipment Estimates

The estimated number of personnel and equipment required for construction activities related to the distribution component of the Proposed Project are summarized in Table 3.2-M, Distribution Construction Equipment and Workforce Estimates.

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Typical Underground
Distribution Duct Bank Cross Section

4 - 5" Ducts

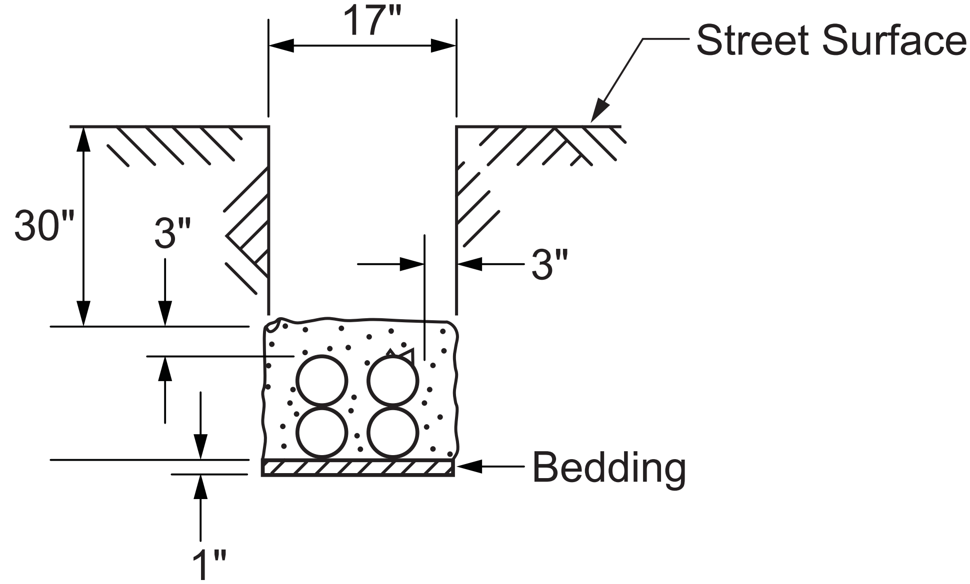

FIGURE 3.2-5

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Typical Underground Distribution Vault

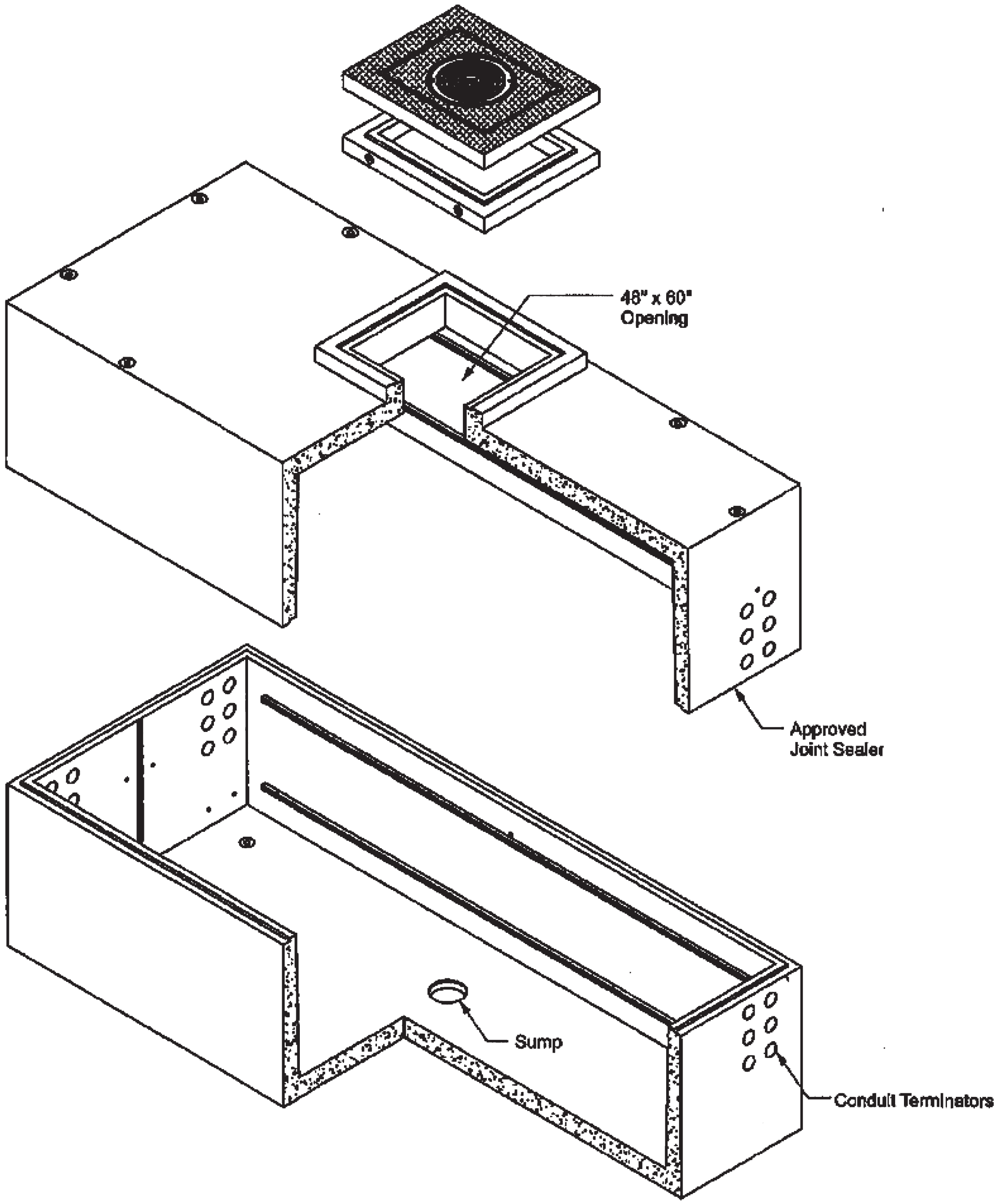

FIGURE 3.2-6

Southern California Edison
West of Devers Upgrade Project
Typical Distribution Vault

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Table 3.2-L: Distribution Approximate Land Disturbance

Project Feature	Site Quantity	Disturbed Acreage Calculation (L × W)	Approximate Total Acres Disturbed During Construction	Approximate Total Acres to be Restored	Approximate Total Acres Permanently Disturbed
Underground conduit Installation	7,920 linear feet	Linear feet × 15’	2.7	2.7	0
Vault	10	55’ × 40’	0.5	0.5	0
Distribution Pole Removal	34	5’ × 5’	<0.1	<0.1	0
Potential Replacement of Existing Subtransmission Wood Poles with LWS Poles	21	150’ × 75’	5.3	5.3	0
Total Estimated Disturbance Acreage			8.6	8.6	0

Table 3.2-M: Distribution Construction Equipment and Workforce Estimates

Activity and Number of Personnel	Number of Work Days	Equipment and Quantity	Duration of Use (Hours)	Fuel Type
Location 1 (8 people)	3 3	2 – Line Truck 2 – Pickup Truck	7 7	Diesel Diesel
Location 2 (8 people)	3 3	2 – Line Truck 2 – Pickup Truck	7 7	Diesel Diesel
Location 3 (8 people)	6 6	2 – Line Truck 2 – Pickup Truck	7 7	Diesel Diesel
Location 4 (7 people)	5 5 5 20 20 20	1 – Rodder Truck 1 – Cable Dolly 1 – Reel Truck 1 – Concrete Truck 1 – Dump Truck 1 – Backhoe	6 6 6 4 6 8	Diesel Diesel Diesel Diesel Diesel
Location 5 (8 people)	8 8	2 – Line Truck 2 – Pickup Truck	7 7	Diesel Diesel

Construction would be performed by either SCE construction crews or contractors. Contractor personnel would be managed by SCE construction management personnel. SCE anticipates that crew members would work concurrently whenever possible; however, the estimated deployment and number of crew members would be dependent upon local jurisdiction permitting, material availability, and construction scheduling.

SCE anticipates a total of up to approximately 20 construction personnel working on any given day on this project component.

3.2.6 Energizing Transmission and Subtransmission Lines

To safely conduct work on an existing transmission line, the transmission line must be de-energized. Temporary de-energizing of the circuits involved with the Proposed Project will take place throughout the duration of this project. Energizing the new lines is the final step in completing the transmission and subtransmission construction. To reduce the need for electric service interruption, de-energizing and re-energizing the existing lines may occur at night when electrical demand is low.

3.2.7 Other Major Work

As presented in Section 3.1.6, Other Major Components, portions of the Proposed Project would be constructed on irrigated agricultural lands. These properties contain irrigation infrastructure including pumps, sprinklers, supply lines, and other equipment that may need to be removed, relocated, and/or replaced to facilitate construction of the Project. Prior to construction, SCE would consult with property owners to locate irrigation infrastructure and determine appropriate protection measures. Actions could include the marking of agricultural infrastructure, installation of steel or wood plating on access roads to distribute the weight of construction vehicles and protect shallow-buried irrigation piping, or the installation of temporary protection structures (e.g., bollards, jersey walls) adjacent to infrastructure along access roads. Protection, replacement, or relocation measures would be accomplished using conventional construction equipment. Where infrastructure cannot be protected in place, SCE would temporarily relocate infrastructure to prevent damage, and would then re-site the infrastructure following completion of construction. Infrastructure damaged during construction or relocation would be repaired or replaced to as close to pre-construction conditions as feasible, or to the conditions agreed upon between the landowner and SCE following the completion of construction of the Proposed Project.

Additionally, removal and transfer of cellular sites, and third-party telecommunications equipment (telephone and cable services) would be required to facilitate construction of the Proposed Project. Similarly, removal and relocation of underground utilities, such as gas and water pipelines, may be required.

3.2.8 Telecommunications Construction

The following sections describe the construction activities associated with installing the new telecommunications facilities for the Proposed Project. Telecommunications construction would include installation of new OPGW, new fiber optic cable, or a combination thereof. This telecommunications work is necessary to maintain the operation of the telecommunications network during the removal and installation of the Proposed Project.

3.2.8.1 Telecommunications Equipment Installation

All new communications equipment installations and upgrades at the existing substations would occur within the existing MEERs, therefore no additional ground disturbance is associated with this work.

Installation of new telecommunication equipment would consist of fiber optic terminals (with increased optical range), multiplexers, and other telecommunication equipment devices installed at each of the identified substations as described in Section 3.1.5, Telecommunications Description.

Temporary fiber optic jumpers would be used within each MEER to redirect and route the fiber optic systems and services during the Proposed Project's construction phase. The new fiber optic terminal equipment is needed to compensate for the losses created by the redirected fiber optic routes.

3.2.8.2 Fiber Optic Cable Installation

Overhead Telecommunications Facilities Installation

Overhead telecommunications facilities would be installed by attaching cable to structures in a manner similar to that described above for wire stringing. A truck with a cable reel would be set up at one end of the section to be pulled, and a truck with a winch would be set up at the other end. Typically, fiber optic cable pulls vary between 6,000 feet to 10,000 feet in length. Fiber optic cable pulls are the length of any given continuous cable installation process between two selected points along the existing overhead or underground structure line. 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. Cable would be pulled onto the pole and permanently secured. Fiber strands in the cable from one installed section of cable would be spliced to fiber strands in the cable from the next installed section to form one continuous path.

Fiber Optic Cables within the WOD Corridor

OPGW fiber optic cable would be installed on the 220 kV towers as described in Section 3.2.3.10 Wire Stringing. All fiber optic cable splicing and testing would be completed by SCE or contractor crews using industry and SCE accepted practices.

Underground Telecom Facilities Installation – Fiber Optic Cable

New underground conduit and structures would typically be installed using a backhoe. The trench would be excavated to approximately 12 to 18 inches wide and a minimum of approximately 36 inches deep. The ground disturbance area for the trenching would be approximately 25 feet wide by the specific length of the excavation. PVC conduit would be placed in the trench and covered with approximately 8 inches of concrete slurry, then backfilled and compacted. For manholes and pull boxes, a hole is excavated between approximately 4 to 10 feet deep, 5 to 8 feet long, and 4 to 8 feet wide. The ground disturbance area for the manhole installation is approximately 40 feet wide by 50 feet long. The disturbance is due to activities associated with the conduit and structure installation and concrete encasement. The manhole or pull box would be lowered into place, connected to the conduits, and the hole backfilled with concrete slurry. Excess soil would be hauled to an approved disposal facility in accordance will all applicable laws or may be used as fill material for transmission, subtransmission, or substation project elements. Construction activities would typically include the use of a backhoe, dump trucks, crew trucks, and concrete trucks. See Figure 3.2-7, Typical Telecommunications Duct Bank, for the standard telecommunications duct bank configuration. See Figure 3.2-8, Typical Telecommunications Manhole, for the standard manhole configuration.

The fiber optic cable would be installed throughout the length of the underground conduit and structures by first installing an innerduct, which provides for protection and identification of the cable. The innerduct would be pulled in the conduit from structure to structure using a pull rope and pulling machine, or truck-mounted hydraulic capstan. After installation of the innerduct, the fiber optic cable would be pulled through the innerduct using similar equipment.

3.2.8.3 Road Access for Telecommunications Installation

Existing and new roads for the 220 kV transmission line as described in Section 3.1.2.1, Transmission Line Segments, and Section 3.2.3.1, Access and Spur Roads, would provide access for telecommunications during construction, operation, and maintenance. Additionally, existing public and SCE access and spur roads for locations that are specifically not along the WOD corridor would be utilized for telecommunications construction, operations, and maintenance.

3.2.8.4 Telecommunication System Land Disturbance

Land disturbance for the new telecommunication system would include OPGW installation, wire stringing, and new conduit installation. The estimated land disturbance for these project features are summarized below in Table 3.2-N, Telecommunication System Approximate Land Disturbance.

3.2.8.5 Telecommunication System Workforce and Construction Equipment Estimates

The estimated number of personnel and equipment required for construction activities related to the Telecommunications System for the Proposed Project are summarized in Table 3.2-O: Telecommunication System Construction Equipment and Workforce Estimates.

Construction would be performed by either SCE construction crews or contractors. Contractor personnel would be managed by SCE construction management personnel. SCE anticipates that crew members would work concurrently whenever possible; however, the estimated deployment and number of crew members would be dependent upon local jurisdiction permitting, material availability, and construction scheduling.

SCE anticipates a total of up to approximately 14 construction personnel working on any given day on this project component.

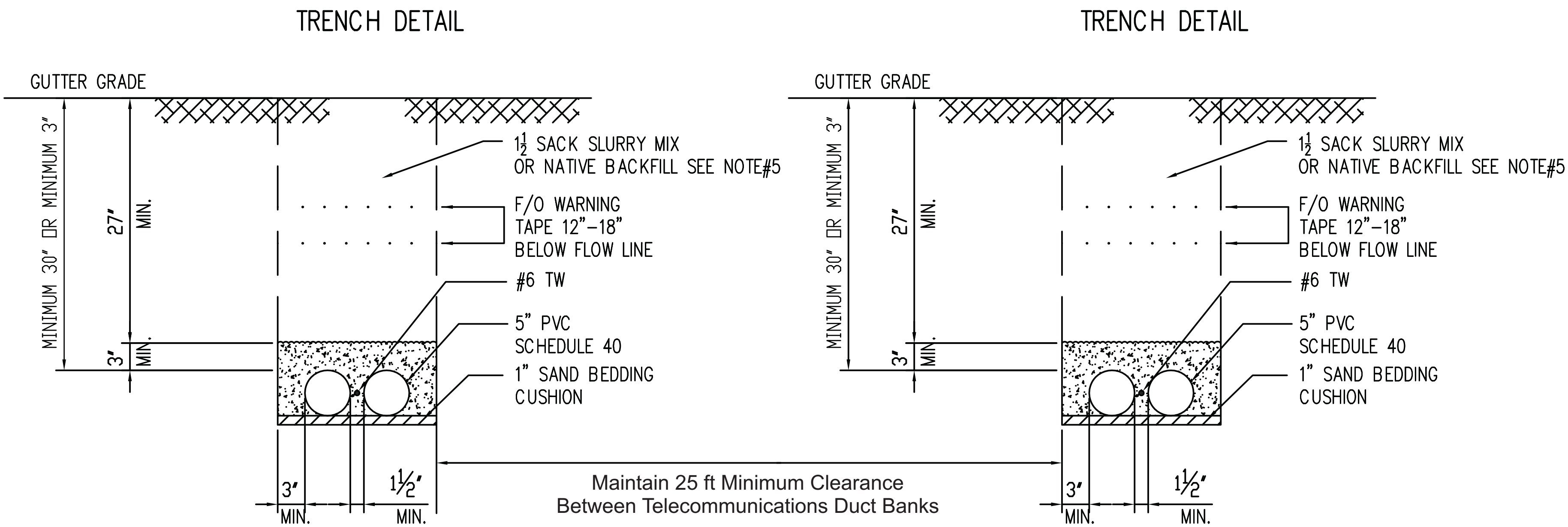

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FIGURE 3.2-7

Southern California Edison
West of Devers Upgrade Project

Typical Telecommunications Duct Bank

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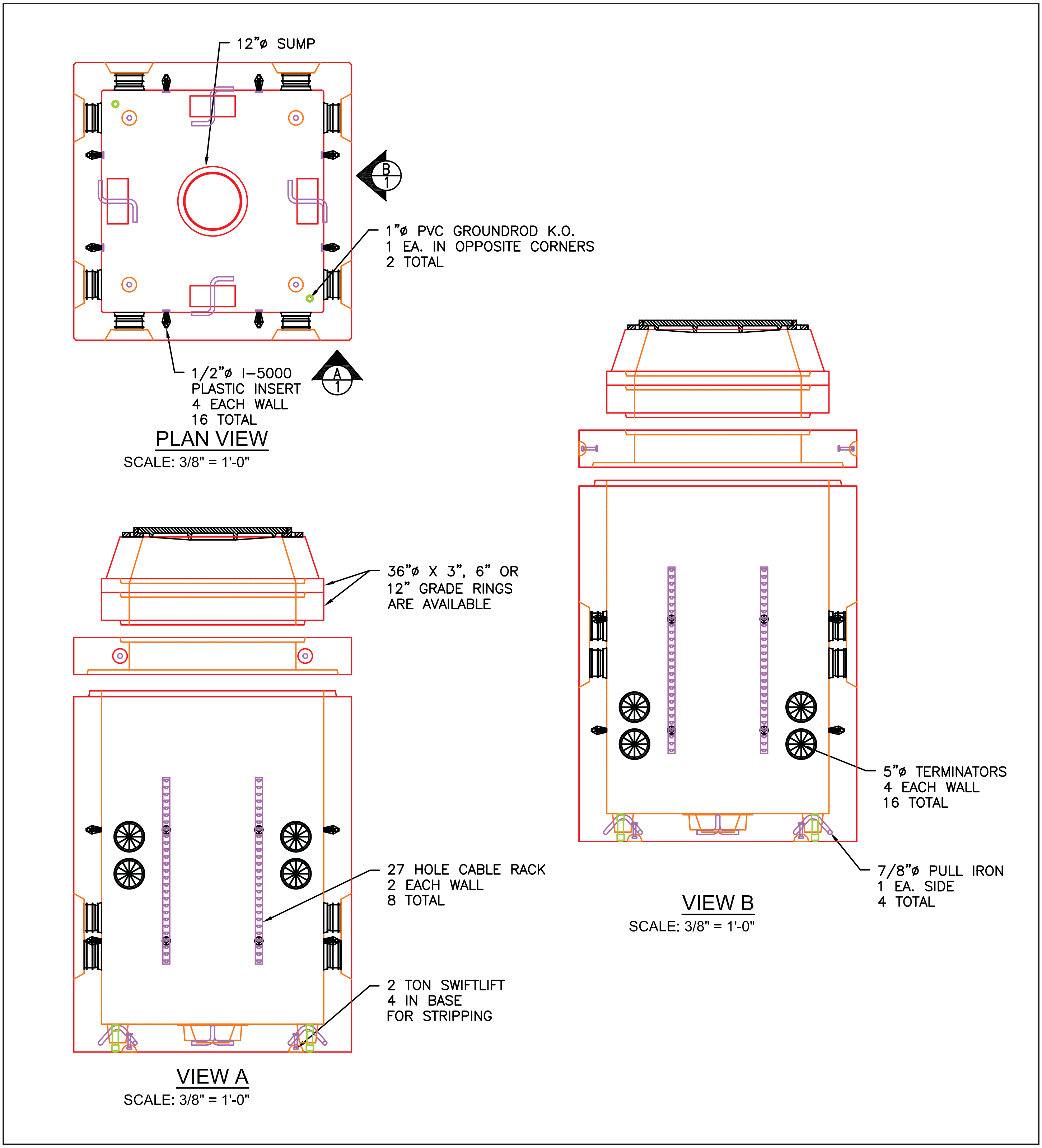

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FIGURE 3.2-8

Southern California Edison
West of Devers Upgrade Project
Typical Manhole Design

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Table 3.2-N: Telecommunication System Approximate Land Disturbance

Project Feature	Site Quantity	Disturbed Acreage Calculation (L × W)	Approximate Total Acres Disturbed During Construction	Approximate Total Acres to be Restored	Approximate Total Acres Permanently Disturbed
New cable to Banning Substation					
Devers-Valley No. 2 M21-T1, trenching	1	690’ × 25’	0.40	0.40	0
Old Idyllwild Road Crossing 500 kV, trenching	1	470’ × 25’	0.27	0.27	0
Crossing Lincoln Street to Banning MEER, trenching	1	230’ × 25’	0.13	0.13	0
New cable to Maraschino Substation					
Devers-Valley No. 2 M24-T1, trenching	1	1,460’ × 25’	0.84	0.84	0
4×4 manholes	3	40’ × 50’	0.14	0.14	0
SCE vault to ECS manhole, trenching	1	1,550’ × 25’	0.89	0.89	0
Connect Devers-Vista OPGW to Banning Sub					
D-V 12, trenching	1	560’ × 25’	0.32	0.32	0
Connect Devers-Vista OPGW to Maraschino Sub					
D-V 133, trenching	1	800’ × 25’	0.46	0.46	0
Connect Devers-Vista OPGW to El Casco Sub east					
D-V 110, trenching	1	120’ × 25’	0.07	0.07	0
Connect Devers-Vista OPGW to El Casco Sub west					
D-V 87, trenching	1	100’ × 25’	0.06	0.06	0
Fiber Optic Cable Entrance at Devers					
D-EC 136, D-V 243 Trenching	2	80’ × 25’ 329’ × 25’	0.24	0.24	0
Fiber Optic Cable Entrance at El Casco					
Tie between towers D-EC 2 EC-SB 96, Trenching	3	200’ × 25’ 840’ × 25’ 200’ × 25’	0.71	0.71	0

Table 3.2-N: Telecommunication System Approximate Land Disturbance

Project Feature	Site Quantity	Disturbed Acreage Calculation (L × W)	Approximate Total Acres Disturbed During Construction	Approximate Total Acres to be Restored	Approximate Total Acres Permanently Disturbed
Fiber Optic Cable Entrance at San Bernardino					
SB-V 1 EC-SB 1, trenching	2	350’ × 25’ 350’ × 25’	0.40	0.40	0
Connect San Bernardino to Inland District Office					
SB-V 7, trenching	1	200’ × 25’	0.11	0.11	0
Option: Connect San Bernardino to Inland District Office					
Redlands Blvd at Bryn Mawr Trenching	1	560’ × 25’	0.3	0.5	0
Fiber Optic Cable Entrance at Vista					
D-V 1, trenching	1	1,000’ × 25’	0.57	0.57	0
New cable to Banning Substation					
Devers-Valley No. 2 M21-T1, trenching	1	690’ × 25’	0.4	0.4	0
Old Idyllwild Rd Crossing 500 kV, trenching	1	470’ × 25’	0.3	0.3	0
Crossing Lincoln St to Banning MEER, trenching	1	230’ × 25’	0.1	0.1	0
New cable to Maraschino Substation					
Devers-Valley No. 2 M24-T1, trenching	1	1,460’ × 25’	0.8	0.8	0
4×4 manholes	3	40’ × 40’	0.1	0.1	0
SCE vault to ECS manhole, trenching	1	1,550’ × 25’	0.9	0.9	0
Connect Devers-Vista OPGW to Banning Sub					
D-V 12, trenching	1	560’ × 25’	0.3	0.3	0
Connect Devers-Vista OPGW to Maraschino Sub					
D-V 133, trenching	1	800’ × 25’	0.5	0.5	0
Connect Devers-Vista OPGW to El Casco Sub east					
D-V 110, trenching	1	120’ × 25’	0.1	0.1	0

Table 3.2-N: Telecommunication System Approximate Land Disturbance

Project Feature	Site Quantity	Disturbed Acreage Calculation (L × W)	Approximate Total Acres Disturbed During Construction	Approximate Total Acres to be Restored	Approximate Total Acres Permanently Disturbed
Connect Devers-Vista OPGW to El Casco Sub west					
D-V 87, trenching	1	100’ × 25’	0.1	0.1	0
Fiber Optic Cable Entrance at Devers					
D-EC 136 D-V 243 Trenching	2	80’ × 25’ 329’ × 25’	0.2	0.2	0
Fiber Optic Cable Entrance at El Casco					
Tie between towers D-EC 2 EC-SB 96, Trenching	3	200’ × 25’ 840’ × 25’ 200’ × 25’	0.7	0.7	0
Fiber Optic Cable Entrance at San Bernardino					
SB-V 1 EC-SB 1, trenching	2	350’ × 25’ 350’ × 25’	0.4	0.4	0
Connect San Bernardino to Inland District Office					
SB-V 7, trenching	1	200’ × 25’	0.1	0.1	0
Fiber Optic Cable Entrance at Vista					
D-V 1, trenching	1	1,000’ × 25’	0.6	0.6	0
Total Estimate Disturbance Area			5.9	5.9	0

Table 3.2-O: Telecommunication System Construction Equipment and Workforce Estimates

Primary Equipment Description	Estimated Horse-Power	Probable Fuel Type	Primary Equipment Quantity	Estimated Workforce	Estimated Schedule (Days)	Duration of Use (Hrs./)
Telecommunications work for OPGW and work to accommodate construction						
Bucket Truck	300	Diesel	6	12	24	7
Crew Truck	300	Diesel	3	3	24	8
Backhoe	200	Diesel	2	4	40	7
Dump truck	350	Diesel	2	3	17	3
Material Transport	350	Diesel	1	1	4	4
Forklift	200	Diesel	1	1	4	1
Splice Lab	300	Diesel	6	12	36	7
Telecommunications work inside the MEER						
Crew Truck	300	Gas	3	3	30	8

3.3 Land Use Rights

SCE would acquire property rights to support the Proposed Project as required. The Proposed Project transmission lines would be built on a combination of existing and new ROW. This would require upgrading existing rights and acquiring new land rights. The land rights SCE would acquire may include a combination of grants, leases, licenses, franchise, and easements over public and private lands.

Temporary land rights (e.g., easements, permits, and license) may be required for access roads, laydown areas, pulling sites, helicopter staging yards, construction yards and shoo-fly corridors during construction.

In addition to the rights that will be acquired through the SCE-Morongo ROW Agreement,[19] the following acquisitions may be required for the 220 kV transmission lines:

- Subject to completion of final engineering, approximately 55 acres of ROW may need to be acquired from private property owners for additional ROW, new access and spur roads leading to the new tower locations.

For the 66 kV Subtransmission line relocations, the following acquisition may be required:

- The total distance for both relocated 66 kV subtransmission lines is approximately 6.0 miles. Of that 6.0 miles, 2.8 miles would be located in franchise area, 1.5 miles would require new acquisition (approximately 9 acres), 1.3 miles would be located within existing easement, and 0.9 miles may be converted to underground within franchise area.

3.4 Land Disturbance

Land disturbance would include all areas affected by construction of the Proposed Project. It is estimated that the total permanent land disturbance for the Proposed Project would be approximately 658 acres. It is estimated that the Proposed Project would temporarily disturb approximately 5156 acres. The estimated amount of land disturbance for each project component is summarized in Table 3.4-A, Approximate Land Disturbance Summary for the Proposed Project.

[19] Under the Agreement Related to Grant Easements and Rights-of-Way for Electric Transmission Lines and Appurtenant Fiber-Optic Telecommunications Lines and Access Roads On and Across Lands of the Morongo Indian Reservation (the "ROW Agreement") entered into November 27, 2012, by and between the Morongo Band of Mission Indians ("Morongo") and SCE, Morongo consented to the grants to SCE by the United States of America ("federal grants") of certain easements and rights of way on and across the lands of the Morongo Indian Reservation. Pursuant to the Agreement, Morongo consented to the federal grants to SCE of the rights of way and easements necessary for SCE to continue operating its existing 220 kV facilities on the Morongo Reservation and to replace and upgrade those facilities with the WOD Project for 50 years.

Table 3.4-A: Approximate Land Disturbance Summary for the Proposed Project

Project Element	Approximate Total Acres Temporarily Disturbed	Approximate Total Acres to be Restored	Approximate Total Acres Permanently Disturbed
Transmission and Subtransmission (Section 3.2.3.17, Transmission and Subtransmission Land Disturbance)	5,083	4,490	648
Distribution (Section 3.2.5.1, Distribution Land Disturbance)	9	9	0
Telecommunication System (Section 3.2.8.4, Telecommunication System Land Disturbance)	6	6	0
Total	5,098	4,505	648

3.5 Post-Construction Activities

SCE would cleanup all areas that would be temporarily disturbed by the Proposed Project (which may include the material staging yard, construction setup areas, pull and tension sites, and splicing sites) to as close to pre-construction conditions as feasible, or to the conditions agreed upon between the landowner and SCE following the completion of construction of the Proposed Project.

If construction occurs within sensitive habitats, a habitat restoration and revegetation plan would be developed by SCE with the appropriate resource agencies and implemented after construction is complete. Additional information pertaining to the habitat restoration and revegetation plan can be found in Section 4.4, Biological Resources.

3.6 Hazardous Materials

Construction of the Proposed Project would require the limited use of hazardous materials, such as fuels, lubricants, and cleaning solvents. All hazardous materials would be stored, handled, and used in accordance with applicable regulations. Material Safety Data Sheets would be made available at the construction site for all crew workers.

3.7 Reusable, Recyclable, and Waste Material Management

Construction of the Proposed Project would result in the generation of various waste materials, including wood, metal, soil, vegetation, and sanitation waste (portable toilets). Sanitation waste (i.e., human generated waste) would be disposed of in accordance with sanitation waste management practices. Material from existing infrastructure that would be removed as part of the Proposed Project, such as conductor, steel, concrete, and debris, would be temporarily stored in the staging yards as the material awaits salvage, recycling, or disposal.

The existing wood poles removed due to the Proposed Project would be returned to the staging yards, and either reused by SCE, returned to the manufacturer, disposed of in a

Class I hazardous waste landfill, or disposed of in the lined portion of a Regional Water Quality Control Board (RWQCB)-certified municipal landfill.

Material excavated for the Proposed Project would either be used as fill at existing substations, backfill for other project elements, made available for use by the landowner, or disposed of off-site at an appropriately licensed waste facility. If contaminated material is encountered during excavation, work would stop at that location and SCE's Spill Response Coordinator would be called to the site to make an assessment and, if necessary, notify the proper authorities.

Other hazardous construction materials, if present, will be stored, handled, and used in accordance with applicable regulations. Material Safety Data Sheets will be available at the construction site for all crew workers.

3.8 Environmental Surveys

SCE has conducted an initial biological resources evaluation and would conduct further focused environmental surveys or other studies after project approval, but prior to the start of construction. Cultural resources surveys have been completed. These surveys identify and/or address any potential sensitive biological and cultural resources that may be impacted by the Proposed Project, including the transmission, subtransmission, and telecomm line route(s), wire stringing locations, access roads, and staging yards. Where feasible, the information gathered from these surveys may be used to finalize project design in order to avoid sensitive resources, or to minimize the potential impact to sensitive resources from project-related activities. The results of these surveys would also determine the extent to which environmental specialist construction monitors would be required.

Biological resources in the vicinity of the Proposed Project are presented in detail in Section 4.4, Biological Resources.

The following biological surveys would occur prior to construction:

- Jurisdictional Delineation.
- Focused surveys for various wildlife and plant species may need updating or confirmation of presence/absence findings and location data for various special interest species and/or species subject to State or Federal protection. In general, surveys would be conducted during the appropriate season in the year prior to scheduled construction, if needed.

Prior to the start of ground-disturbing activity, the following surveys would be conducted:

- Clearance Surveys. Clearance surveys would be conducted no more than 30 days prior to the start of construction in a particular area to identify potential plant and animal species that may be affected by construction activities. Clearance surveys include a field survey by qualified botanists and wildlife biologists and would be limited to areas directly impacted by construction activities.

- Nesting bird surveys. Within one week prior to the start of construction in a particular area during nesting season (generally February 1 to August 31), a qualified wildlife biologist would conduct a preconstruction focused nesting survey. If occupied nests are present during the nesting season, SCE biologists would determine appropriate nesting buffers based on a project specific nesting bird management plan or consultation with the appropriate agencies.

Cultural resources in the vicinity of the Proposed Project are presented in detail in Section 4.5, Cultural Resources.

3.9 Worker Environmental Awareness Training

Prior to construction, a Worker Environmental Awareness Program (WEAP) would be developed. A presentation would be prepared by SCE and used to train all site personnel prior to the commencement of work. A record of all trained personnel would be kept.

In addition to instruction on compliance with any additional applicant proposed measures and project mitigation measures developed after the pre-construction surveys, all construction personnel would also receive the following:

- A list of phone numbers of SCE environmental specialist personnel associated with the Proposed Project (archaeologist, biologist, environmental compliance coordinator, and regional spill response coordinator)
- Instruction on the South Coast Air Quality Management District fugitive dust rules
- A review of applicable local, state and Federal ordinances, laws and regulations pertaining to historic preservation, a discussion of disciplinary and other actions that could be taken against persons violating historic preservation laws and SCE policies, a review of archaeology, history, prehistory and Native American cultures associated with historical resources in the project vicinity inclusive of instruction on what typical cultural resources look like, and instruction that if discovered during construction, work is to be suspended in the vicinity of any find and the site foreman and archaeologist or environmental compliance coordinator is to be contacted for further direction
- Information on biological resource issues including desert tortoise, burrowing owl, and other special status species with a potential to occur within the Project area
- Instruction on the importance of maintaining the construction site inclusive of ensuring all food scraps, wrappers, food containers, cans, bottles, and other trash from the Project area would be deposited in closed trash containers. Trash containers would be removed from the Project as required and would not be permitted to overfill
- Instruction on the individual responsibilities under the Clean Water Act, the project SWPPP, site-specific BMPs, and the location of Material Safety Data Sheets for the project

- Instructions to notify the foreman and regional spill response coordinator in case of a hazardous materials spill or leak from equipment, or upon the discovery of soil or groundwater contamination
- A copy of the truck routes to be used for material delivery
- Instruction that noncompliance with any laws, rules, regulations, or mitigation measures could result in being barred from participating in any remaining construction activities associated with the Proposed Project
- Direction that site vehicles must be properly muffled

3.10 Construction Equipment and Personnel

The estimated elements, materials, and number of personnel and equipment required for construction of the Proposed Project are summarized for each project component in their respective Construction Equipment and Workforce Estimates detailed in above sections.

Construction would be performed by either SCE construction crews or contractors. If SCE construction crews are used, they typically would be based at SCE's local facilities, (e.g., service centers, substations, and transmission ROW) or a temporary material staging yard set up for the project. Contractor construction personnel would be managed by SCE construction management personnel and based out of the contractor's existing yard or temporary material staging yard set up for the project. SCE provided an estimated total number of construction personnel working on any given day for the respective components in the following sections:

- Section 3.2.2.3: Substation Construction Equipment and Workforce Estimates.
- Section 3.2.3.18: Transmission and Subtransmission Construction Equipment and Workforce Estimates.
- Section 3.2.5.2: Distribution Construction Equipment and Workforce Estimates.
- Section 3.2.8.5: Telecommunication System Construction Equipment and Workforce Estimates.

SCE anticipates that crews would work concurrently whenever possible; however, the estimated deployment and number of crew members would vary depending on factors such as material availability, resource availability, and construction scheduling.

In general, construction efforts would occur in accordance with accepted construction industry standards. To the extent possible, SCE would comply with local ordinances for construction activity. Should the need arise to work outside the local ordinances, SCE would request a variance from the applicable local jurisdictions. For example, it may be necessary to work during nighttime or outside normal work hours to facilitate major crossings, or when loads on the lines are reduced.

3.11 Construction Schedule

SCE anticipates that construction of the Proposed Project would take approximately 36-48 months. Construction would commence following receipt of CPUC and BLM approvals, completion of final engineering and procurement activities, acquisition of any necessary property rights, and receipt of other applicable permits.

Given that the WOD transmission lines are a necessary component of the CAISO-controlled transmission grid, they must remain operational for the majority of the Proposed Project construction duration in order to accommodate existing electric system operational requirements. Any short or long term transmission line outages that would be needed to facilitate construction of any of the individual transmission lines for the Proposed Project would typically be scheduled through and subject to the approval of the CAISO. As such, construction of the Proposed Project would be complex, given the need to keep existing WOD transmission lines operational during construction and the need to construct safely when in proximity to energized transmission lines.

In addition to uncertain transmission line outage availability, the construction schedule duration would vary depending on other items such as, but not limited to the following: the availability of substation and subtransmission line outages, the ability to construct needed critical telecommunications facilities in advance of transmission line construction, environmental constraints (such as nesting birds) during construction, permit limitations, weather, and construction resource and material availability.

Finally, the Proposed Project construction schedule does not reflect scope modifications that may be recommended during the agency application review phase that: 1) are needed to accommodate requirements identified during final engineering and material procurement; 2) are needed to accommodate compliance with environmental restrictions during construction; 3) are needed to keep the existing WOD transmission lines operational during construction; 4) or are otherwise needed for safety or electric system reliability.

3.12 Project Operation and Maintenance

Ongoing operation and maintenance activities are necessary to ensure reliable service, as well as the safety of the utility workers and the general public, as mandated by the CPUC. SCE facilities are subject to Federal Energy Regulatory Commission jurisdiction. SCE transmission facilities are under operational control of the California Independent System Operator.

The transmission, subtransmission, and distribution lines would be maintained in a manner consistent with CPUC General Order 95 and General Order 128, as applicable. It is not anticipated that additional workforce would be necessary for the operation and or maintenance of the Proposed Project. Normal operation of the lines would be controlled remotely through SCE control systems, and manually in the field as required. SCE inspects the transmission, subtransmission, telecommunications and distribution overhead facilities in a manner consistent with CPUC General Order 165, a minimum of once per year via ground and/or aerial observation. Maintenance would occur as needed and could include activities such as repairing conductors, washing or replacing insulators, repairing or replacing other hardware components, replacing poles and towers, tree trimming, brush and weed control, and access road maintenance. Most regular O&M activities of overhead facilities are performed from existing access roads with no surface disturbance. Repairs to facilities, such as repairing or replacing poles and structures, could occur in undisturbed areas. Existing conductors could require re-stringing to repair damages. Some pulling site locations could be in previously undisturbed areas and at times, conductors could be passed through existing vegetation on route to their destination.

Routine access road maintenance is conducted on an annual and/or as-needed basis. Road maintenance includes maintaining a vegetation-free road way (to facilitate access and for fire prevention) and blading to smooth over washouts, eroded areas, and washboard surfaces as needed. Access road maintenance could include brushing (i.e., trimming or removal of shrubs) approximately 2 to 5 feet beyond berms or road's edge when necessary to keep vegetation from intruding into the roadway. Road maintenance would also include cleaning ditches, moving and establishing berms, clearing and making functional drain inlets to culverts, culvert repair, clearing and establishing water bars, and cleaning and repairing over-side drains. Access road maintenance includes the repair, replacement and installation of storm water diversion devices on an as-needed basis.

Insulators could require periodic washing with water to prevent the buildup of contaminants (dust, salts, droppings, smog, condensation, etc.) and reduce the possibility of electrical arcing which can result in circuit outages and potential fire. Frequency of insulator washing is region specific and based on local conditions and build-up of contaminants. Replacement of insulators, hardware, and other components is performed as needed to maintain circuit reliability.

Some towers and pole locations and/or lay down areas could be in previously undisturbed areas and could result in ground and/or vegetation disturbance, though attempts would be made to utilize previously disturbed areas to the greatest extent possible. In some cases new access is created to remove and replace an existing towers and poles. Wood pole testing and treating is a necessary maintenance activity conducted to evaluate the condition of wood structures both above and below ground level. Intrusive inspections require the temporary removal of soil around the base of the pole, usually to a depth of approximately 12 to 18 inches, to check for signs of deterioration. Roads and trails are utilized for access to poles. For impact prevention, all soil removed for intrusive inspections would be reinstalled and compacted at completion of the testing.

Existing conductors could require re-stringing to repair damages. Some pulling site locations could be in previously undisturbed areas and at times, conductors could be passed through existing vegetation on route to their destination.

Regular tree pruning must be performed to be in compliance with existing state and Federal laws, rules, and regulations and is crucial for maintaining reliable service, especially during severe weather or disasters. Tree pruning standards for distances from overhead lines have been set by the CPUC (General Order-95, Rule 35), Public Resource

Code 4293, California Code of Regulations Title 14, Article 4, and other government and regulatory agencies. SCE's standard approach to tree pruning is to remove at least the minimum required by law plus one years' growth (species dependent).

In addition to maintaining vegetation-free access roads, helipads and clearances around electrical lines, clearance of brush and weeds around poles and transmission tower pads, and as required by local jurisdictions on fee owned ROWs, is necessary for fire protection. A 10-foot radial clearance around non-exempt poles (as defined by California Code of Regulations Title 14, Article 4) and a 25 to 50 foot radial clearance around non-exempt towers (as defined by California Code of Regulations Title 14, Article 4) are maintained in accordance with Public Resource Code 4292.

In some cases, towers and poles do not have existing access roads and are accessed on foot, by helicopter, or by creating temporary access areas. O&M related helicopter activities could include transportation of transmission line workers, delivery of equipment and materials to structure sites, structure placement, hardware installation, and conductor or OPGW stringing operations. Helicopter landing areas could occur where access by road is infeasible. In addition, helicopters must be able to land within SCE ROWs, which could include landing on access or spur roads.

In addition to regular O&M activities, SCE conducts a wide variety of emergency repairs in response to emergency situations such as damage resulting from high winds, storms, fires, and other natural disasters, and accidents. Such repairs could include replacement of downed poles, transmission towers, or lines or re-stringing conductors. Emergency repairs could be needed at any time. SCE would notify the applicable agencies as soon as feasible of any emergency repairs. The notice would include a description of the work, location of the transmission facilities, and cause of the emergency, if known. The applicable agencies and SCE would work together to agree upon habitat restoration needs after the emergency.

The telecommunications equipment would be subject to maintenance and repair activities on an as needed or emergency basis. Activities would include replacing defective circuit boards, damaged radio antennas or feedlines, and testing the equipment. Telecommunication equipment would also be subject to routine inspection and preventative maintenance such as filter change-outs or software and hardware upgrades. Most regular O&M activities of telecommunications equipment are performed at substation or communication sites and inside the equipment rooms and are accessed from existing access roads with no surface disturbance; helicopter transportation may be required to access remote communications sites for routine or emergency maintenance activities. Access road maintenance is performed as mentioned above.

The telecommunications cables would be maintained on an as needed or emergency basis. Maintenance activities would include patrolling, testing, repairing and replacing damaged cable and hardware. Most regular maintenance activities of overhead facilities are performed from existing access roads with no surface disturbance. Repairs done to existing facilities, such as repairing or replacing existing cables and re-stringing cables, could occur in undisturbed areas. Access and habitat restoration, as mentioned in the

Project Operations Transmission and Subtransmission section above may be required for routine or emergency maintenance activities.

3.13 Project Alternatives

This section provides a detailed description of the 220 kV Line Route Alternative 2 (Alternative Project). The 220 kV Line Route Alternative 2 would include relocation of an approximate 3-mile section of Segment 5 of the existing WOD corridor pursuant to an agreement between SCE and Morongo.

Both the Proposed Project and Alternative Project include the same common elements outside of Segment 5. This section focuses on the differences between the Proposed and Alternative Project portion of Segment 5.

3.13.1 Substation Description

The Alternative Project would require the same modifications to existing substations as described in Section 3.1.1, Substation Description.

3.13.2 220 kV Transmission Line Description

The Alternative Project would include the following 220 kV transmission line elements as it relates to Segment 5:

- Segment 5 is approximately 10 miles in length and extends east from San Gorgonio Avenue in the City of Banning to the eastern limit of the Reservation at Rushmore Avenue and includes the following existing 220 kV transmission lines: Devers-Vista No. 1, Devers-Vista No. 2, Devers-El Casco, and Devers-San Bernardino. Proposed work within Segment 5 would include the removal of approximately 33 double-circuit LSTs, 34 single-circuit LSTs, 65 H-frame structures, 5 TSPs, 108 miles of conductor, and 45 miles of OHGW. Proposed work would also include the installation of approximately 74 LSTs, 36 TSPs, 275 miles of new conductor, and 22 miles of new OPGW.

The removals for Segment 5 would remain the same for the Proposed Project and the Alternative, however the Alternative is one mile longer and there are some minor differences regarding installation. The differences in installations for Segment 5 are summarized in Table 3.13-A, Segment 5 Proposed Project and Alternative Project Installations.

Table 3.13-A: Segment 5 Proposed Project and Alternative Project Installations

	Segment 5 Proposed Project	Segment 5 Alternative Project
Double Circuit Lattice Steel Tower	72	74
Double Circuit Tubular Steel Pole	36	36
Single Phase Tubular Steel Pole	0	0

Table 3.13-A: Segment 5 Proposed Project and Alternative Project Installations

	Segment 5 Proposed Project	Segment 5 Alternative Project
Single Phase Wood Pole	0	0
Circuit Length (miles)	36	40
Conductor (miles)	250	275
OPGW (miles)	20	22

Table 3.1-D, Typical Transmission Structure Dimensions, summarizes the type of structures, number of structures, approximate height above ground, approximate pole diameter, approximate auger hole, and approximate auger diameter. All information in Table 3.1-D, Typical Transmission Structure Dimensions, with the exception of the number of structures, would remain the same for the Proposed Project and the Alternative Project. However, the Alternative Project would construct two additional double-circuit LSTs.

3.13.2.1 Vehicular Access and Spur Roads

SCE would need access to all facilities it plans to remove and/or construct as part of the Proposed Project. The estimated length of new access/spur roads for each Segment 5 of the Proposed Project and Alternative are summarized in Table 3.13-B, Approximate Miles of New Access Road for Segment 5.

Table 3.13-B: Approximate Miles of New Access Road for Segment 5

	Segment 5 Proposed Project	Segment 5 Alternative Project
Access Roads (miles)	5.2	5.3

Information contained in Section 3.1.2.4, Transmission Insulators and Conductors, and Section 3.1.2.5, Transmission and Ground Wires, would remain the same for the Alternative Project as what is described for the Proposed Project.

The subtransmission and distribution work resulting for the 220 kV Transmission Lines would remain the same for the Proposed Project and Alternative Project. These project elements are exclusive to Segment 1 and are described in Section, 3.1.2.6, Subtransmission and Distribution Work Resulting from Transmission Lines, and Section 3.1.3, 66 kV Subtransmission Line Description.

3.13.3 66 kV Subtransmission Line Description

As described above, the 66 kV subtransmission line relocations are exclusive to Segment 1 and would remain the same for the Proposed Project and Alternative Project.

3.13.4 Telecommunications Description

The Alternative Project would require the same modifications to the telecommunications system as described in Section 3.1.5, Telecommunications Description.

3.13.5 Other Major Work

The Alternative Project would require the same Other Major Work as described in Section 3.1.6, Other Major Components.

3.13.6 Alternative Project Construction Plan

The following subsections describe the construction activities associated with the Alternative Project.

3.13.6.1 General Construction

The Alternative Project would require the same elements of General Construction as described in Section 3.2.1, General Construction.

3.13.6.2 Substation Construction: Modifications to Existing Substations

The Alternative Project would require the same substation construction as described in Section 3.2.2, Substation Construction: Modifications to Existing Substations.

3.13.6.3 Transmission and Subtransmission Line Installation

With the exception of land disturbance and construction equipment and workforce estimates, all elements described in Section 3.2.3, Transmission and Subtransmission Line Installation, for the Proposed Project would be equally applicable to the Alternative Project. Tables 3.13-C and 3.13-D show the land disturbance and workforce estimates for Segment 5 of the Alternative Project.

Table 3.13-C: Transmission Approximate Land Disturbance (Segment 5 Alternative)

Project Feature	Site Quantity	Disturbed Acreage Calculation (L × W)	Approximate Acres Disturbed During Construction	Approximate Acres to be Restored (Temporary)	Approximate Acres Permanently Disturbed
Construct New Lattice Steel Tower (1)	74	220' × 220'	82.2	63.7	18.5
Construct New Tubular Steel Pole (1)	36	220' × 150'	27.3	25.1	2.2
Conductor Stringing Setup Area (2)	30	600' × 150'	62.0	62.0	0.0

Table 3.13-C: Transmission Approximate Land Disturbance (Segment 5 Alternative)

Project Feature	Site Quantity	Disturbed Acreage Calculation (L × W)	Approximate Acres Disturbed During Construction	Approximate Acres to be Restored (Temporary)	Approximate Acres Permanently Disturbed
Conductor Splicing Setup Areas (2)	4	200' × 150'	2.8	2.8	0.0
New Access Roads (3)	4.8	linear miles × 18’	10.5	0.0	10.5
Crane Pads, Walls, Cut Slopes	—	—	314.4	307.6	6.8
Total Estimated Disturbance Acreage			499.1	461.2	37.9

(1) Includes structure assembly & erection, conductor & OPGW installation. Area to be restored after construction. Portion of ROW within 20' of ALL structures to remain cleared of vegetation. Permanently disturbed areas for TSP=0.06 acre, LWS=0.05 acre, and H-Frame=0.06 acre.
(2) Based on 9,000' standard conductor reel lengths, conductor size, number of circuits, route design, and terrain.
(3) Based on approximate length of road in miles × drivable road width of 14'-22' w/ 2' of berm on each side of road.
(4) The disturbed acreage calculations are estimates based upon SCE’s preferred area of use for the described project feature, the width of the existing right-of-way, or the width of the proposed right-of-way and, they do not include any new access/spur road information; they are subject to revision based upon final engineering and review of the project by SCE’s Construction Manager and/or Contractor awarded project.

Removals, existing roads to be improved and guard structures are not accounted for in this table considering these counts will not fluctuate with selection of either alternative. These areas are accounted for in Table 3.2-E1.

Footing/Base Volume and Area Calculations (approximate):

Average TSP depth 30 ft deep, 7 ft diameter, qty 1 per TSP: earth removed for footing = 42.8 c.y.; surface area = 38.5 sq. ft.

Average LWS depth 12 ft deep, 2.5 ft diameter, qty 1 per LWS: earth removed for pole base = 2.2 c.y.; surface area = 4.9 sq. ft.

Average Wood H-Frame depth 12 ft deep, 2.5 ft diameter, qty 2 per H-Frame: earth removed for pole base = 4.4 c.y.; surface area = 9.8 sq. ft.

Acres permanently disturbed are assumed to be project areas where the disturbance will continue to be used during Operations and Maintenance (O&M) Activities post construction. Areas that would be stabilized or revegetated per requirements identified in Section 4.4 Biological Resources and not used for O&M have been assumed to be temporarily impacted (Acres to be Restored).

For purposes of comparing the land disturbance for Segment 5 of the Proposed Project to Segment 5 of the Alternative Project see Table 3.2-E2, Transmission Approximate Land Disturbance (Segment 5).

Table 3.13-D: Transmission Construction Equipment and Workforce Estimates (Segment 5 Alternative)

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
Survey (1)				**4**	**8**		**10 Miles**
¾-Ton Pick-up Truck, 4×4	200	Gas	2		8	8	1.3 Miles/ Day
Marshaling Yard (2)				**1**			
1-Ton Crew Cab, 4×4	300	Diesel	1		Duration of Project for Each Yard	4	
R/T Crane (M)	300	Diesel	1			5	
4,000-gallon Water Truck	350	Diesel	1			10	
Jet A Fuel Truck			1			4	
R/T Forklift	200	Diesel	1			5	
Truck, Semi, Tractor	350	Diesel	1			6	
ROW Clearing (3)				**5**	**32**		**10 Miles**
1-Ton Crew Cab, 4×4	300	Diesel	1		32	10	0.4 Mile/ Day
Motor Grader	350	Diesel	1		32	7	
Water Truck	350	Diesel	2		32	7	
Backhoe/ Front Loader	350	Diesel	1		32	7	
Track Type Dozer	350	Diesel	1		32	9	
Lowboy Truck/ Trailer	500	Diesel	1		32	5	
Roads & Landing Work (4)				**10**	**22**		**4.7 Miles & 110 Pads**
1-Ton Crew Cab, 4×4	300	Diesel	4		22	5	2.5 Miles/ Day & 10 Structure Pads/Day
Motor Grader	350	Diesel	2		22	5	

Table 3.13-D: Transmission Construction Equipment and Workforce Estimates (Segment 5 Alternative)

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
Water Truck	350	Diesel	4		22	10	
Backhoe/ Front Loader	350	Diesel	2		22	7	
Drum Type Compactor	250	Diesel	2		22	5	
Track Type Dozer	350	Diesel	2		22	7	
Excavator	300	Diesel	2		11	7	
Lowboy Truck/ Trailer	500	Diesel	2		11	4	
Guard Structure Installation (5)				**12**	**1**		**6 Structures**
¾-Ton Pick-up Truck, 4×4	275	Diesel	4		1	8	12 Structures/ Day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	2		1	8	
Compressor Trailer	120	Diesel	2		1	7	
Auger Truck	500	Diesel	2		1	5	
Extendable Flatbed Pole Truck	350	Diesel	2		1	8	
R/T Crane (M)	500	Diesel	2		1	8	
Water Truck	350	Diesel	4		1	8	
Manlift/ Bucket Truck	350	Diesel	2		1	8	
Install LST Foundations (6)				**28**	**24**		**74 LSTs**
¾-Ton Pick-up Truck, 4×4	275	Diesel	4		24	5	
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		24	5	3.2 LSTs/ Day

Table 3.13-D: Transmission Construction Equipment and Workforce Estimates (Segment 5 Alternative)

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
Backhoe/ Front Loader	200	Diesel	4		24	10	
Auger Truck	500	Diesel	4		24	10	
Dump Truck	350	Diesel	8		24	10	
4,000-gallon Water Truck	350	Diesel	4		24	10	
Concrete Mixer Truck	425	Diesel	12		24	7	
LST Steel Haul (7)				**8**	**30**		**74 LSTs**
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	4		30	10	2.5 LSTs/ Day
Water Truck	350	Diesel	2		30	10	
Flatbed Truck/ Trailer	350	Diesel	2		30	10	
Rough Terrain Forklift	200	Diesel	2		30	8	
LST Steel Assembly (8)				**40**	**56**		**74 LSTs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		56	5	1.4 LSTs/ Day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	6		56	5	
Rough Terrain Forklift	200	Diesel	4		56	7	
R/T Crane (L)	300	Diesel	4		56	10	
Compressor Trailer	120	Diesel	4		56	7	

Table 3.13-D: Transmission Construction Equipment and Workforce Estimates (Segment 5 Alternative)

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
LST Erection (9)				**48**	**39**		**74 LSTs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		39	5	2 LSTs/ Day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		39	5	
Water Truck	350	Diesel	2		39	10	
R/T Crane (M)	500	Diesel	4		39	7	
Compressor Trailer	120	Diesel	4		39	7	
R/T Crane (L)	350	Diesel	4		39	7	
Install Tubular Steel Pole Foundations (10)				**24**	**15**		**36 TSPs**
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	12		15	5	2.5 TSPs/ Day
R/T Crane (M)	300	Diesel	4		15	7	
Backhoe/ Front Loader	200	Diesel	4		15	10	
Auger Truck	500	Diesel	4		11	10	
4,000-gallon Water Truck	350	Diesel	4		15	10	
Dump Truck	350	Diesel	8		15	10	
Concrete Mixer Truck	425	Diesel	12		11	6	
Steel Pole Haul (11)				**8**	**4**		**36 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		4	8	10 Steel Poles/Day
4,000-gallon Water Truck	350	Diesel	4		4	10	

Table 3.13-D: Transmission Construction Equipment and Workforce Estimates (Segment 5 Alternative)

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
R/T Crane (M)	350	Diesel	2		4	6	
40' Flatbed Truck/ Trailer	400	Diesel	4		4	10	
Steel Pole Assembly (12)				**24**	**8**		**36 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		8	6	5 Steel Poles/Day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		8	6	
4,000-gallon Water Truck	350	Diesel	4		8	10	
Compressor Trailer	120	Diesel	4		8	6	
R/T Crane (L)	350	Diesel	4		8	7	
Steel Pole Erection (13)				**24**	**8**		**36 TSPs**
¾-Ton Pick-up Truck, 4×4	300	Diesel	8		8	6	5 Steel Poles/Day
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		8	6	
4,000-gallon Water Truck	350	Diesel	4		8	10	
Compressor Trailer	120	Diesel	4		8	6	
R/T Crane (L)	350	Diesel	4		8	7	
Install Conductor (14)				**220**	**27**		**40 Circuit Miles**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		27	10	1.6 Miles/ Day

Table 3.13-D: Transmission Construction Equipment and Workforce Estimates (Segment 5 Alternative)

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
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	8		27	10	
Wire Truck/ Trailer	350	Diesel	4		19	6	
Dump Truck (Trash)	350	Diesel	2		27	10	
R/T Crane (M)	350	Diesel	2		19	10	
Bucket Truck	350	Diesel	4		19	10	
22-Ton Manitex	350	Diesel	4		19	10	
Splicing Rig	350	Diesel	2		8	2	
Splicing Lab	300	Diesel	2		8	2	
Splicing Cart	10	Diesel	4		8	10	
3 Drum Straw line Puller	300	Diesel	2		15	7	
D8 Cat	350	Diesel	1		19	7	
Sag Cat W/ 2 Winches	350	Diesel	1		15	7	
Hughes 500 E Helicopter		Jet A	2		8	7	
Fuel, Helicopter Support Truck	300	Diesel	2		8	7	
Static Truck/ Tensioner	350	Diesel	2		15	6	
Guard Structure Removal (15)				**12**	**1**		**6 Structures**
¾-Ton Pick-up Truck, 4×4	300	Diesel	4		1	7	17.2 Structures/ Day

Table 3.13-D: Transmission Construction Equipment and Workforce Estimates (Segment 5 Alternative)

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
1-Ton Crew Cab Flatbed, 4×4	300	Diesel	4		1	7	
Compressor Trailer	120	Diesel	4		1	7	
Water Truck	350	Diesel	2		1	10	
Extendable Flatbed Pole Truck	350	Diesel	4		1	6	
R/T Crane (M)	500	Diesel	2		1	10	
80 ft. Hydraulic Manlift / Bucket Truck	350	Diesel	2		1	7	
Restoration (16)				**14**	**4**		**10 Miles**
1-Ton Crew Cab, 4×4	300	Diesel	4		4	2	2.5 Miles/ Day
Motor Grader	350	Diesel	2		4	6	
Water Truck	350	Diesel	2		4	8	
Backhoe/ Front Loader	350	Diesel	2		4	6	
Drum Type Compactor	250	Diesel	2		4	6	
Track Type Dozer	350	Diesel	2		4	6	
Lowboy Truck/ Trailer	300	Diesel	2		4	3	

1 Survey = one 4-man crew
2 Marshaling Yards = one 1-man crew
3 Right-of-way Clearing = one 5-man crew
4 Roads & Landing Work = two 5-man crews
5 Guard Structure Installation = two 6-man crews
6 Install Foundations for LSTs = four 7-man crews
7 LST Steel Haul = two 4-man crews
8 LST Steel Assembly = four 10-man crews
9 LST Erection = four 12-man crews
10 Install Foundations for Tubular Steel Poles = four 6-man crews
11 Steel Pole Haul = two 4-man crews
12 Steel Pole Assembly = four 6-man crews
13 Steel Pole Erection = four 6-man crews
14 Conductor & OHGW/OPGW Installation = four 55-man crews
15 Guard Structure Removal = two 6-man crews
16 Restoration = two 7-man crews

3.13.6.4 Distribution Relocation and Underbuild (resulting from Transmission and Subtransmission Lines) Construction

The Alternative Project would require the same telecommunications construction as described in Section 3.2.5, Distribution Relocation and Underbuild (resulting from Transmission and Subtransmission Lines) Construction.

3.13.6.5 Telecommunications Construction

The Alternative Project would require the same telecommunications construction as described in Section 3.2.8, Telecommunications Construction.

3.13.6.6 Land Use Rights

With the exception of Segment 5, all other information described in Section 3.3, Land Use Rights for the Proposed Project would be equally applicable to the Alternative Project.

For the Alternative Project, for Segment 5 approximately 2 miles of new ROW would need to be acquired.

3.13.6.7 Land Disturbance

Land disturbance would include all areas affected by construction of the Alternative Project. It is estimated that the total permanent land disturbance for the Alternative Project would be 37.9 acres. It is estimated that the Alternative Project would temporarily disturb 499.1 acres. The estimated amount of land disturbance for each project component is summarized in Table 3.13-E, Land Disturbance Summary.

Table 3.13-E: Land Disturbance Summary

Project Element	Acres Temporarily Disturbed	Acres Restored	Acres Permanently Disturbed
Transmission Segment 5 Alternative	499.1	461.2	37.9

Sections 3.5 Post-Construction Activities through 3.13 Project Operations (and Maintenance) as explained for the Proposed Project would be equally applicable to the Alternative Project and for that reason have not been duplicated in this section.

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