CHAPTER 2
Project Description

2.1 Introduction

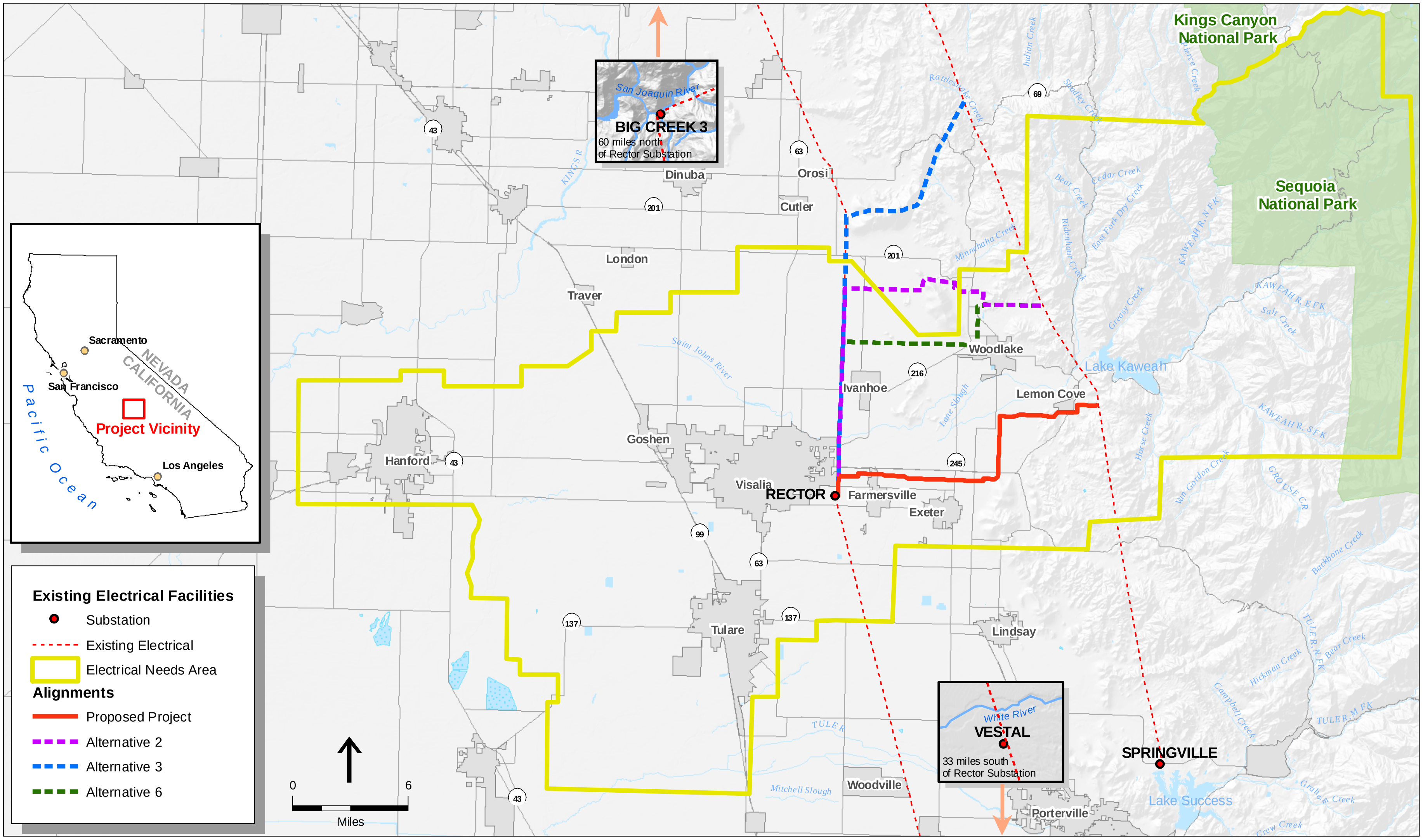
This EIR examines the environmental impacts associated with construction and operation of the proposed Southern California Edison (SCE) San Joaquin Cross Valley Loop Transmission Project (Proposed Project). As described in more detail in the sections below, the Proposed Project would consist of constructing an 18.5-mile long double circuit 220 kilovolt (kV) transmission line, replacing 1.1 miles of existing transmission line, modifying the Rector Substation, and removing wave traps and line tuners and installing additional protective relays at four substations (Rector, Springville, Vestal, and Big Creek 3). The Proposed Project transmission line would occur within 1.1 miles of existing right-of-way (ROW) and 17.4 miles of new ROW. The information presented here was extracted from SCE's Application for CPCN (SCE, 2008a), their Proponent's Environmental Assessment (SCE, 2008b), and their responses to data requests by the EIR team (SCE, 2008c through 2008g, and SCE, 2009). This information is intended to provide a detailed description of project construction, operation and maintenance, serving to provide a common understanding of the project parameters.

2.2 Project Location

The Proposed Project is located in north western Tulare County, California near the cities of Visalia, Farmersville, and Exeter. The Proposed Project transmission line traverses east from the City of Visalia north of the cities of Farmersville and Exeter (Figure 2-1). The Proposed Project generally crosses agricultural lands and scattered rural residences between the Rector substation located southeast of the City of Visalia and the Big Creek 4-Springville existing transmission line located at the western foothills of the Sierra Nevada Mountains. Agriculture in the area consists of orchards (i.e., citrus, walnut, plum, fig), grazing, and row crops (such as hay and alfalfa).

2.3 Existing System

The SCE Rector 220/66 kV System currently serves the Electrical Needs Area which encompasses the cities of Tulare, Visalia, Hanford, Farmersville, Exeter and Woodlake as well as the surrounding areas of Tulare and Kings Counties (Figure 2-1). This system uses electricity generated at facilities located outside of the Electrical Needs Area, including the Big Creek Hydroelectric Project and other facilities located in and south of Kern County. Currently four 220 kV transmission lines commonly referred to as the Big Creek Corridor move electricity from



SOURCE: SCE, 2008; ESRI, 2008

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Figure 2-1
Project Location

the Big Creek Hydroelectric Project to the Electrical Needs Area. Two of the lines begin at Big Creek and terminate at the Rector Substation (Big Creek 1-Rector 220 kV transmission line and Big Creek 3-Rector 220 kV transmission line) while the other two lines begin at Big Creek and terminate at the Springville 220/66 kV Substation (Big Creek 3-Springville 220 kV transmission line and Big Creek 4-Springville 220 kV transmission line). Figure 2-2 illustrates the system as it exists now and as it would exist after construction of the Proposed Project.

2.4 SCE's Proposed Project

The Proposed Project consists of the following activities; a more detailed description of the individual project components is included in Section 2.5:

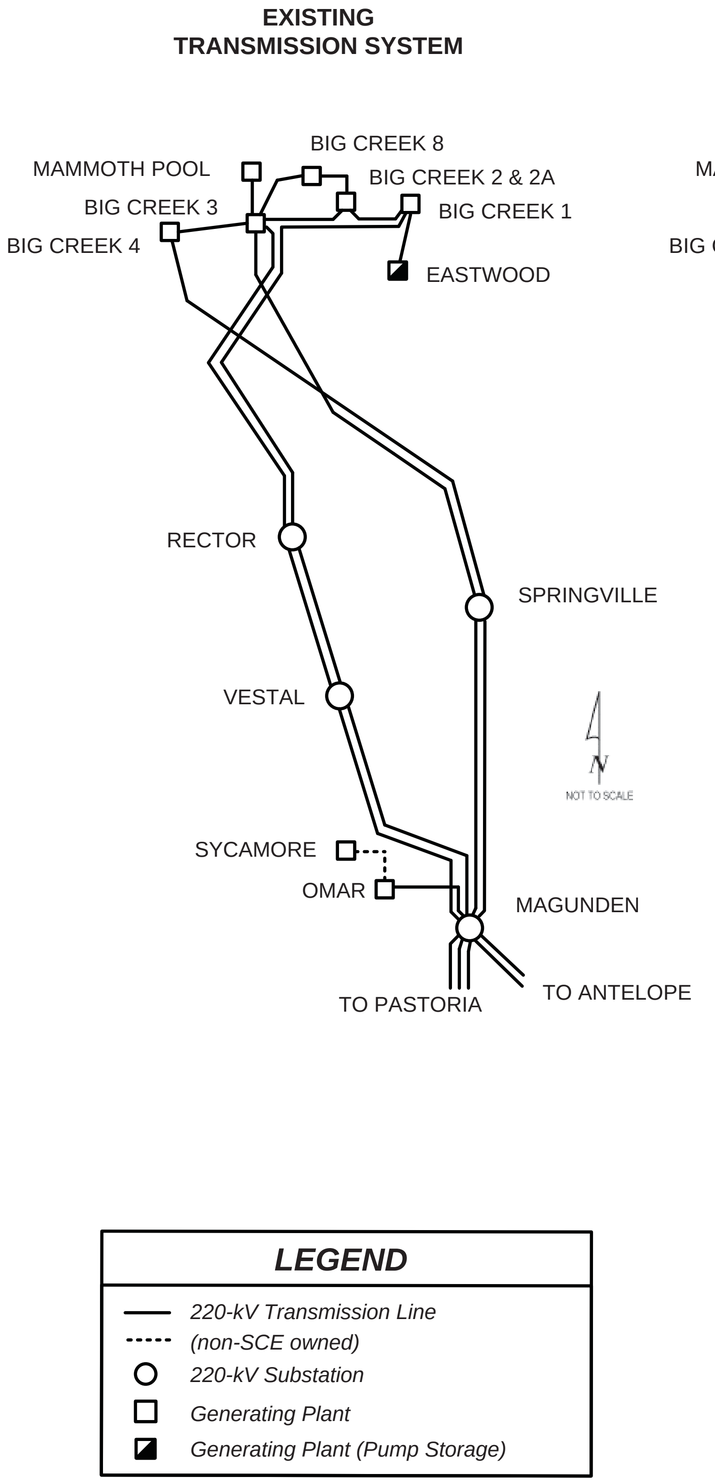
- Replacement of approximately 1.1 miles of two parallel sets of existing single circuit 220 kV transmission line segments with 1.1 miles of double circuit transmission line constructed on the western side of SCE's existing ROW immediately north of Rector Substation. This would clear the eastern side of the existing SCE ROW in order to provide a location for the construction of the first 1.1 miles of the new transmission line described immediately below (Figures 2-3 and 2-3a).

- Construction of a new, approximately 18.5-mile long, double circuit 220 kV transmission line that would loop the existing Big Creek 3-Springville 220 kV transmission line into the 220 kV Rector Substation, creating the new Big Creek 3-Rector No. 2 220 kV transmission line circuit and the new Rector-Springville 220 kV transmission line circuit (Figures 2-3a – 2-3j). The first 1.1 miles of the new double circuit transmission line would be on the eastern side of SCE's existing ROW adjacent to the new double circuit 1.1 mile line segment described above.

- Installation of electrical equipment and substation supporting structures for the transmission lines, protective relays, and a mechanical and electrical equipment room (MEER) at Rector Substation to accommodate the transmission lines; and

- Removal of wave traps and line tuners and installation of additional protective relays at Rector Substation, Springville Substation, Vestal Substation, and Big Creek 3 Substation.

Figure 2-3 shows the general location and alignment of the Proposed Project. The Proposed Project alignment would use approximately 1.1 miles of existing SCE's transmission line ROW (immediately north of the Rector Substation) and require the acquisition of approximately 17.4 miles of new 100-foot wide ROW. After the first 1.1 miles the line would turn east and parallel Highway 198 for 9.2 miles along the valley floor through mature agricultural orchards. The line would then continue north and east generally along property lines until it connects with the existing Big-Creek 3-Springville and Big-Creek 4-Springville transmission lines. This would create two new circuits, the Big-Creek 3-Rector No. 2 220 kV and the Rector-Springville 220kV.



SOURCE: SCE, 2008

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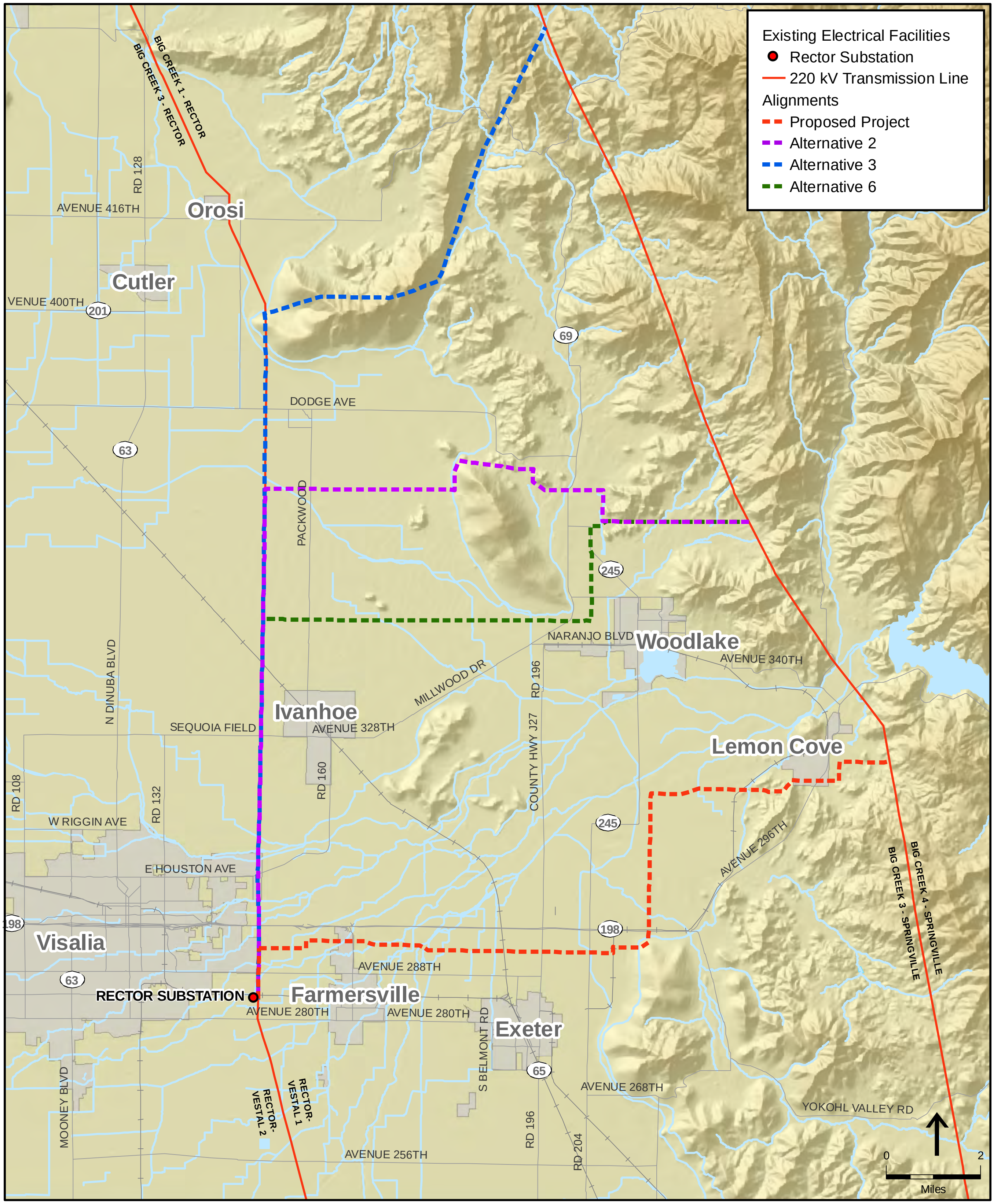
Figure 2-2
Existing and Proposed Transmission System



SOURCE: ESRI, 2008; SCE, 2008; Thomas Bros. Maps, 2008

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Figure 2-3
Proposed Project Overview

2.5 Project Components

A summary of the key components of the Proposed Project is provided Table 2-1, followed by a more detailed discussion by component.

TABLE 2-1
SUMMARY OF PROJECT COMPONENTS

Replace two sets of single circuit 220 kV transmission towers with new 220 kV double circuit structures

- From the Rector Substation to 1.1 miles north within the existing SCE ROW
- Remove approximately 26 single circuit lattice towers, conductor, and assemblies
- Install approximately six double circuit tubular poles, one double circuit lattice tower, and replace or modify two single circuit lattice towers
- Install two circuits of 1033.5 thousand circular mils (kcmil) non-specular aluminum conductor steel reinforced (ACSR), with one conductor per phase and three phases per circuit
- Install one optical ground wire for communication and shielding
- Insulator type: Polymer
- Structure heights: approximately 120 to 160 feet above ground
- Span lengths: Between approximately 850 feet and 1,050 feet

New double circuit 220 kV transmission line from Big Creek 3-Springville 220 kV transmission line into Rector Substation

- From the Rector Substation to a connection point on the Big Creek 3-Springville 220 kV transmission line
- Line length: 18.5 miles long (1.1 miles of existing ROW, 17.4 miles of new ROW to be acquired)
- Install approximately 96 double circuit tubular poles, six single-phase tubular poles at the connection point, and 11 double lattice steel towers (six tubular poles and one lattice tower within existing SCE ROW, and 90 tubular poles and 10 lattice towers within the new ROW to be acquired)
- Install two circuits of 1033.5 kcmil non-specular ACSR conductor, one conductor per phase and three phases per circuit
- Install one optical ground wire for communication and shielding
- Insulator type: Polymer
- Structure height: Approximately 120 to 160 feet above ground
- Span lengths: Between approximately 400 feet and 1,200 feet
- New access: Approximately eight miles of new access roads and spur roads

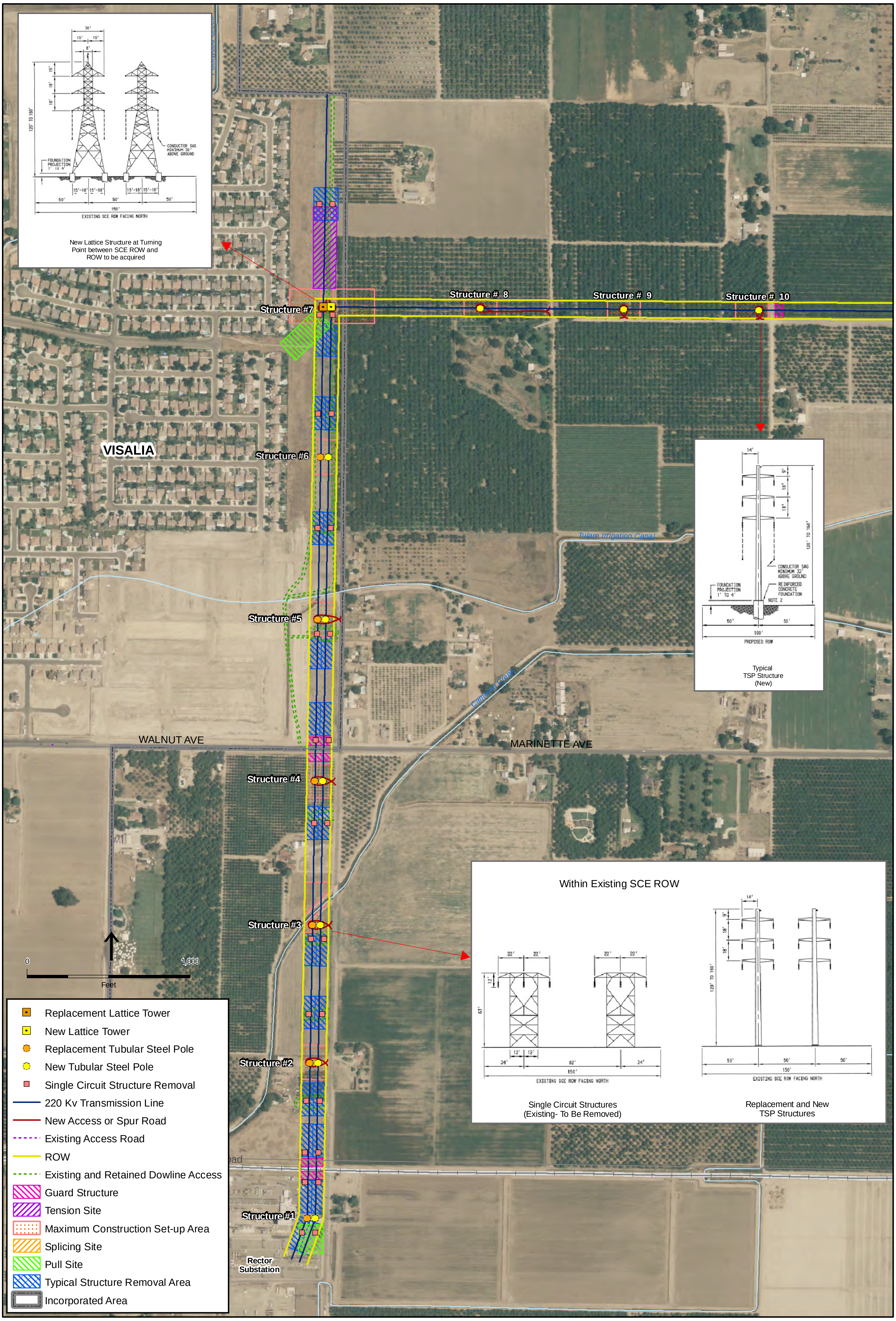
Rector Substation Modifications

- Relocate the terminations of two existing transmission lines to adjacent dead-end bays to accommodate connection of the new transmission lines to the existing 220 kV switchrack
- Equip two 220 kV line positions with circuit breakers, disconnects, and switchracks to accommodate connection of the two new transmission lines to the existing 220 kV switchrack
- Replace the two existing circuit breakers
- Construct a MEER to house protective relay equipment

Rector Substation, Big Creek 3 Substation, Vestal Substation, and Springville Substation Modifications

- Install upgraded protective relays and remove existing wave trap and line tuner

SOURCE: SCE, 2008b.



SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

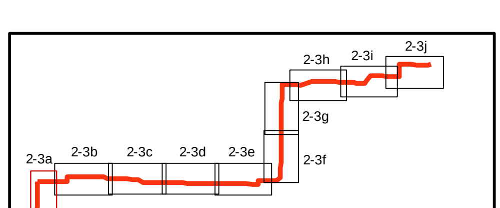


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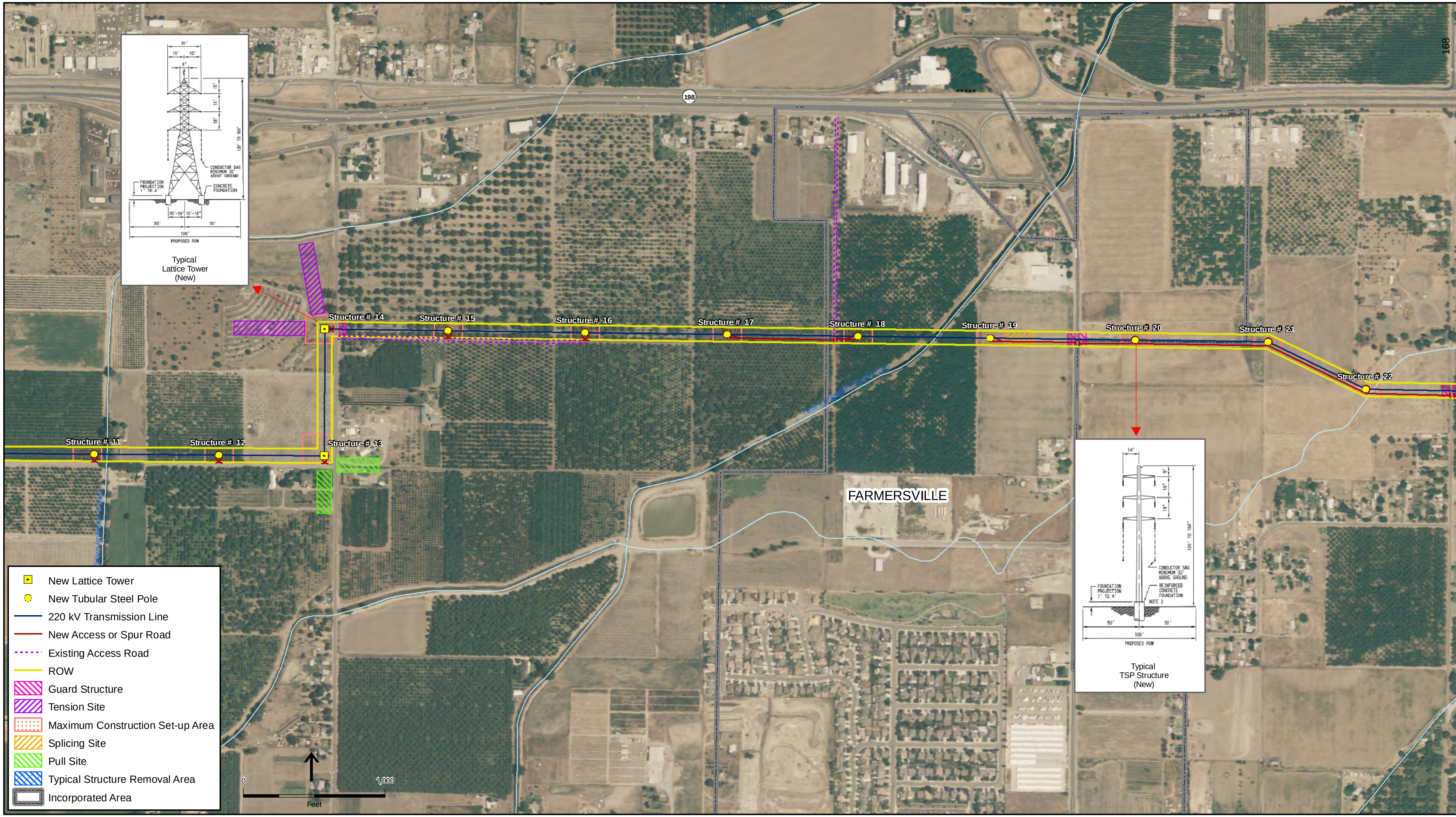
Figure 2-3a
Proposed Project



SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

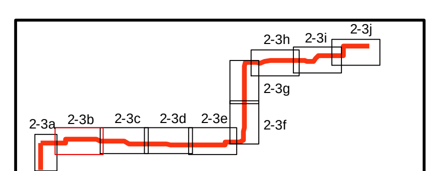


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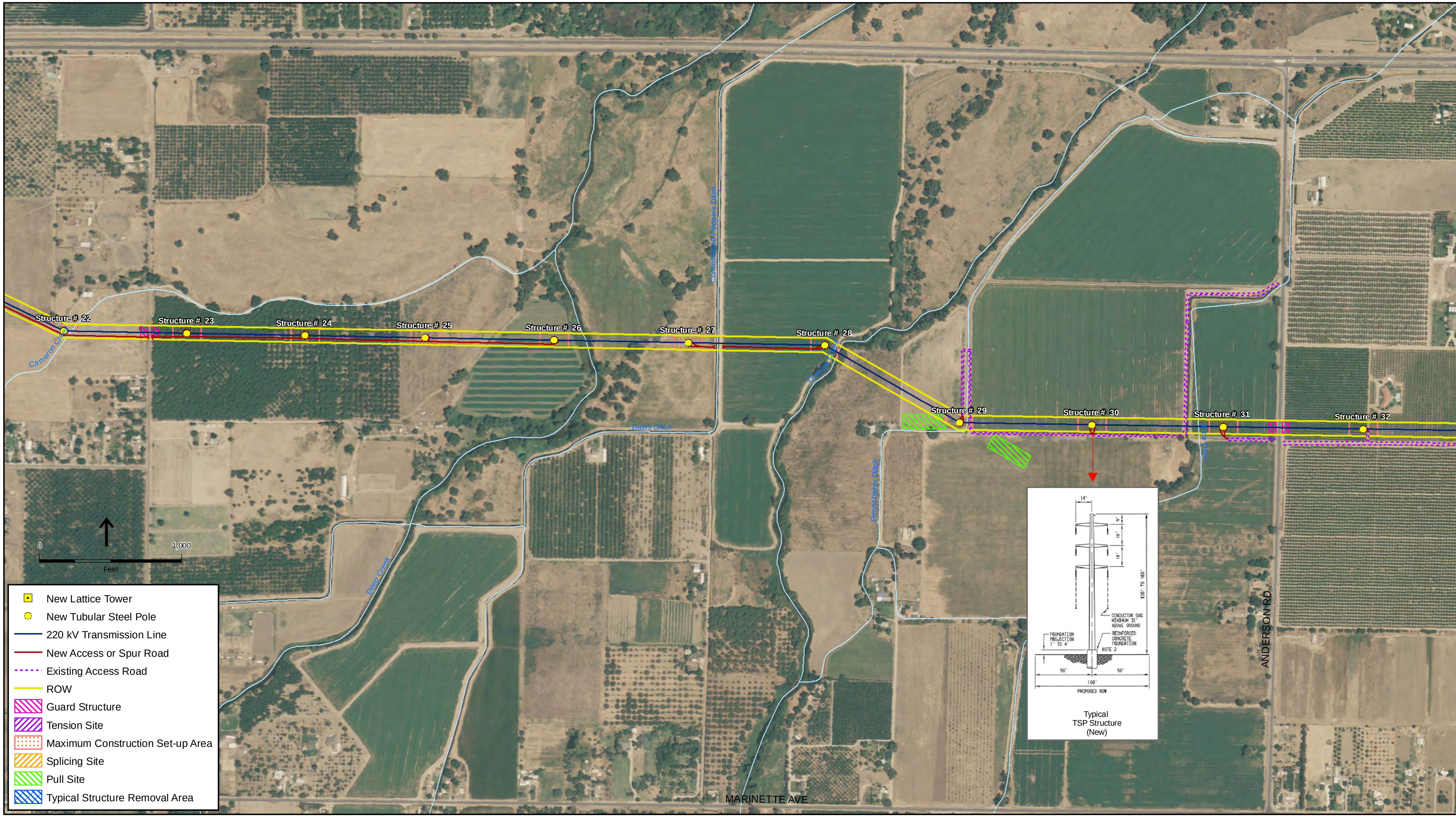
Figure 2-3b
Proposed Project



SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

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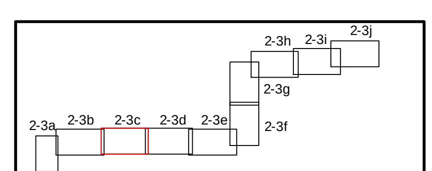
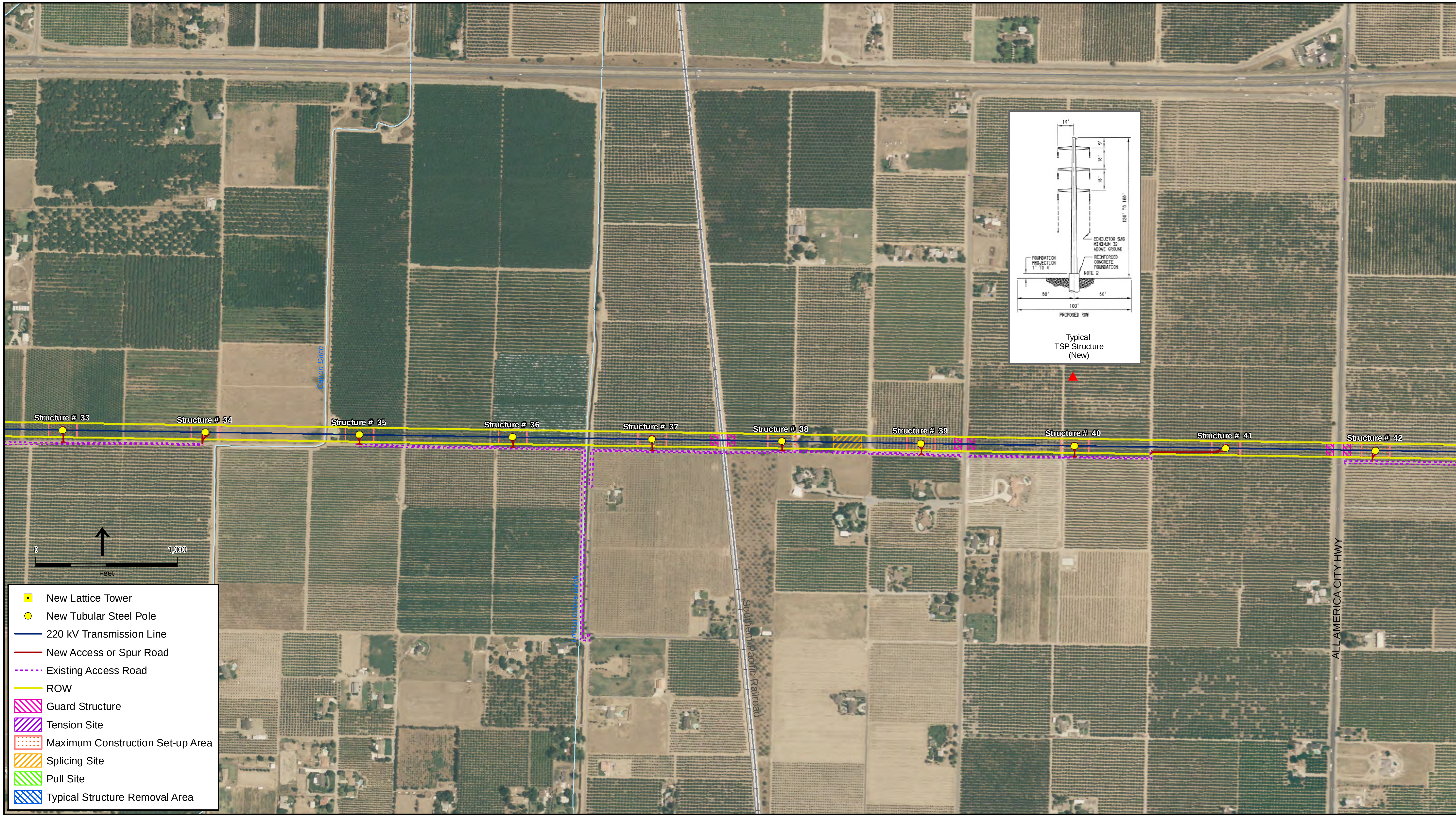
Figure 2-3c
Proposed Project





SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

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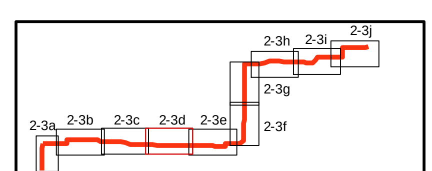
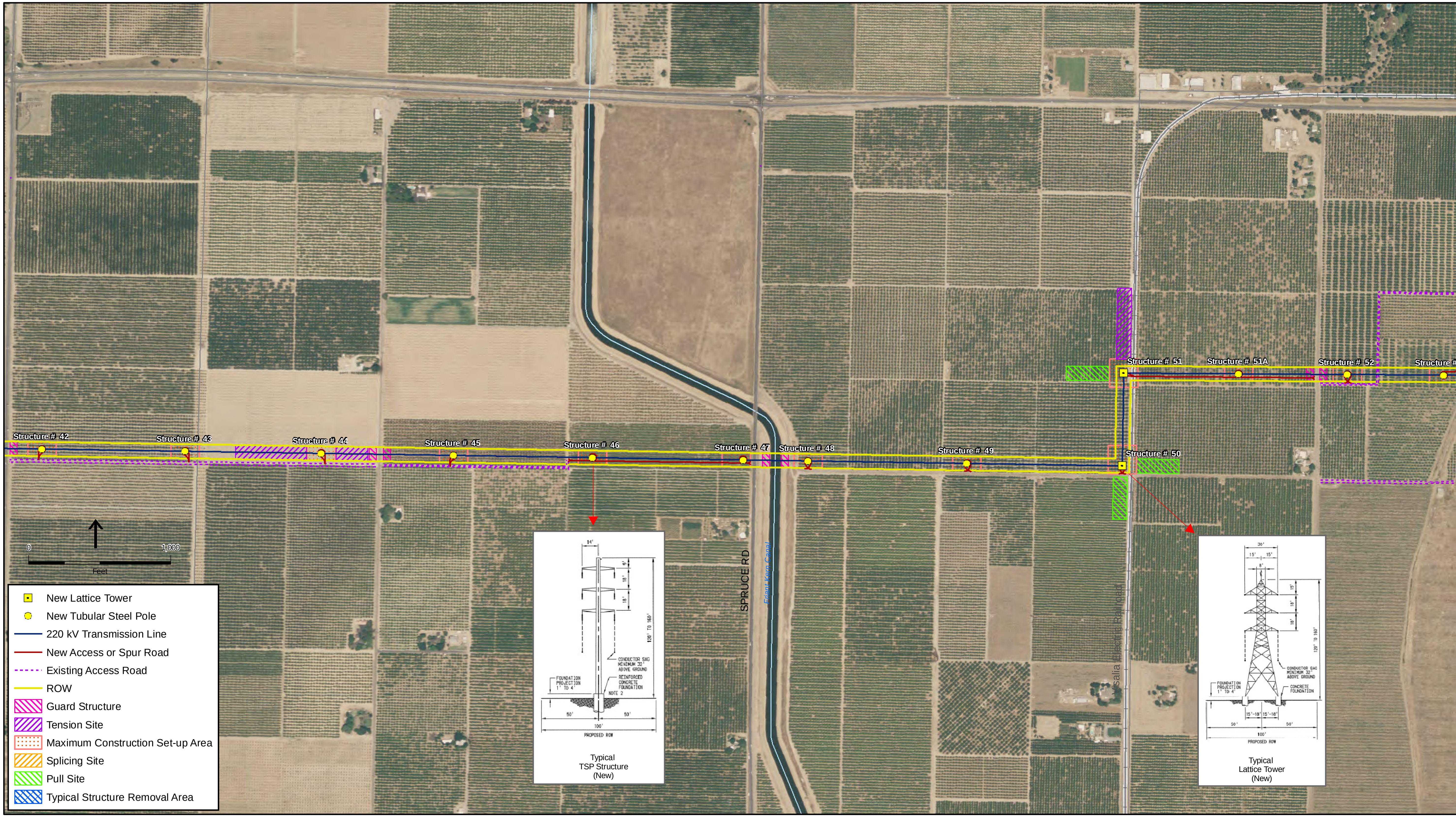
Figure 2-3d

Proposed Project





SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

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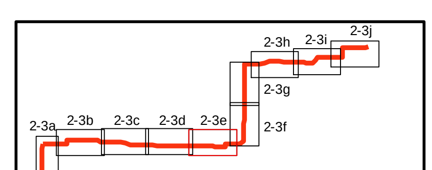
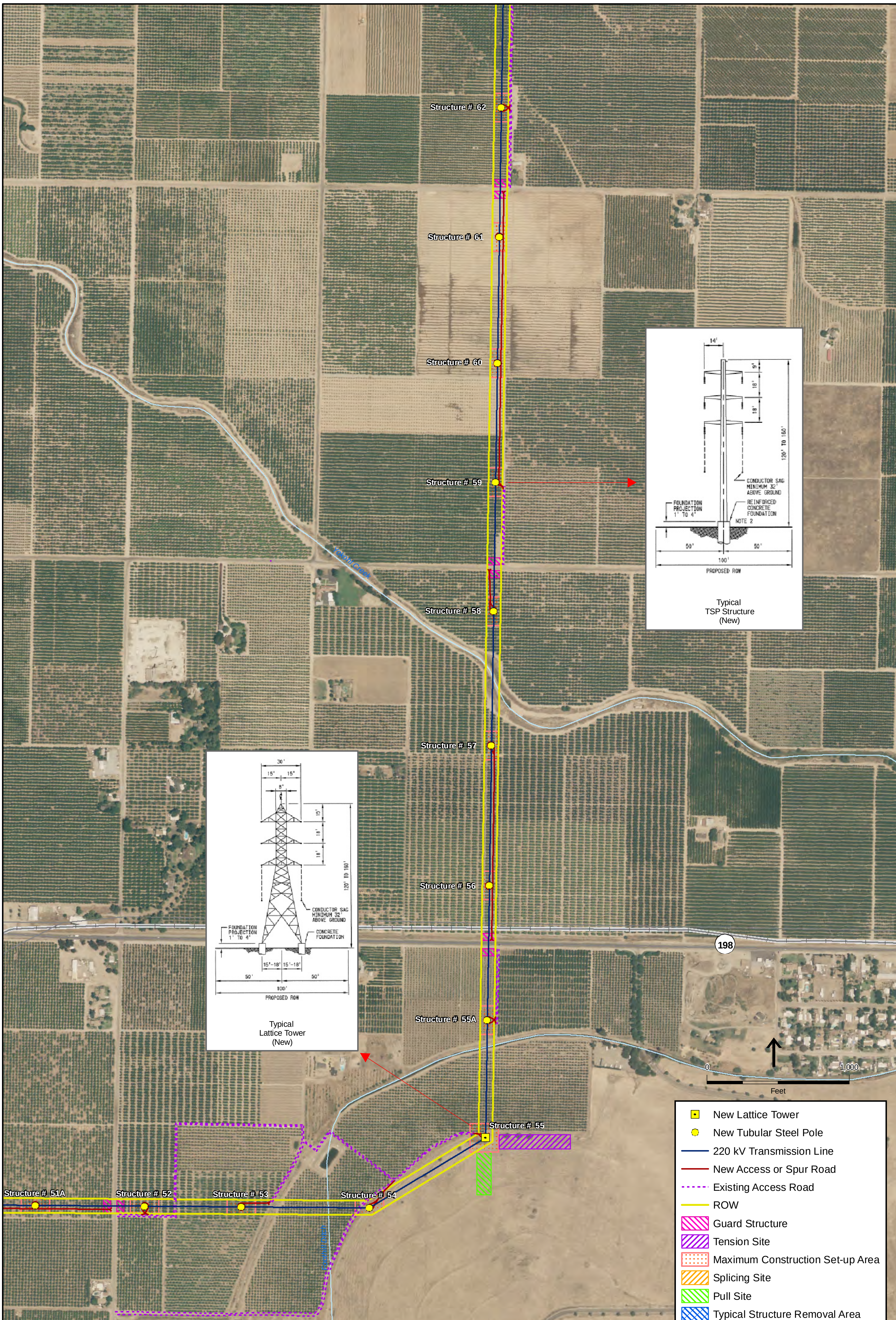
Figure 2-3e
Proposed Project





SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

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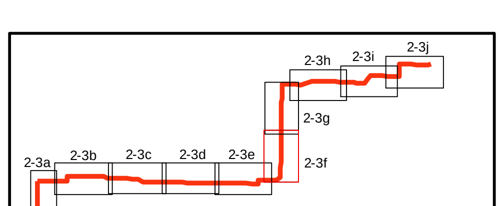
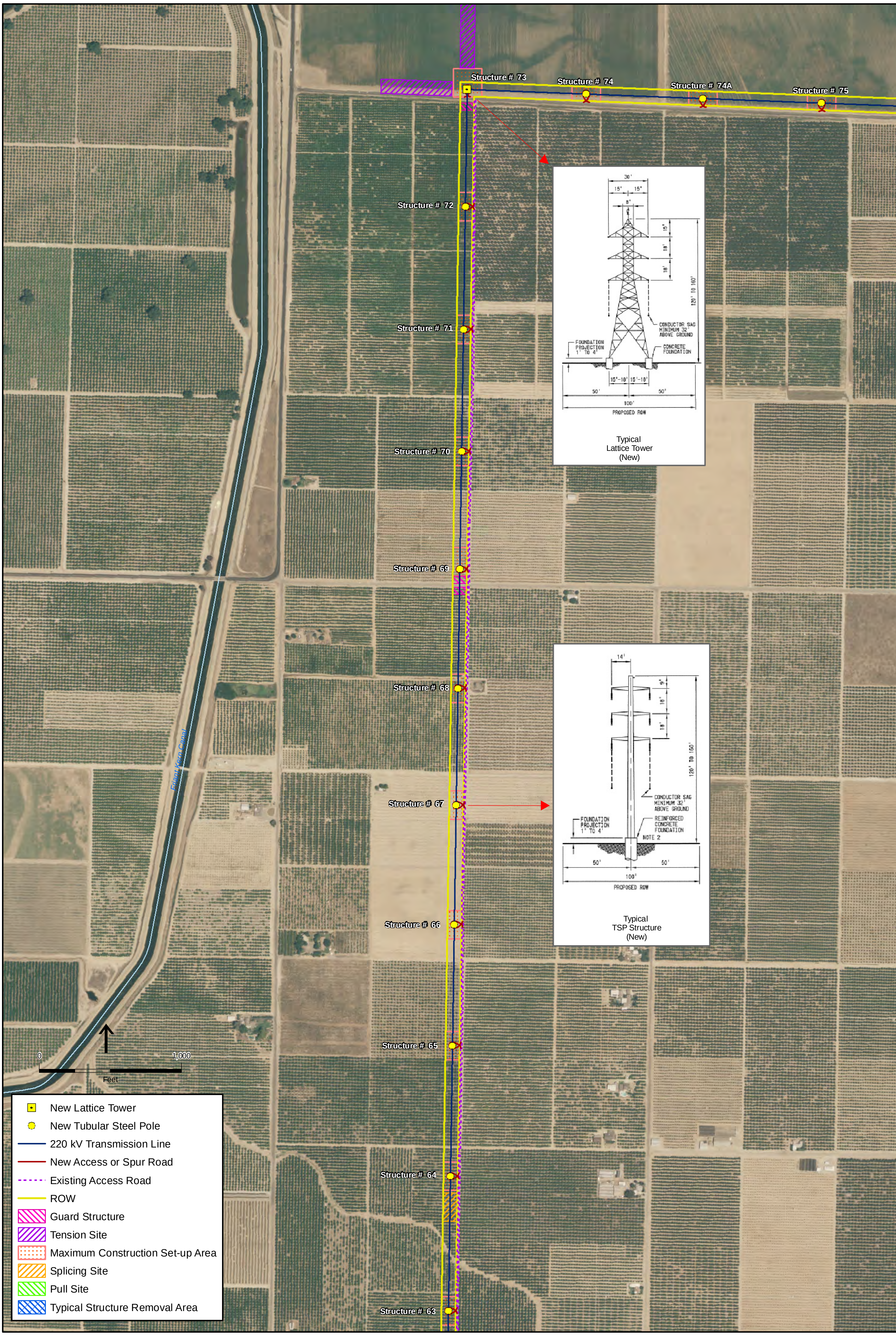
Figure 2-3f

Proposed Project





SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

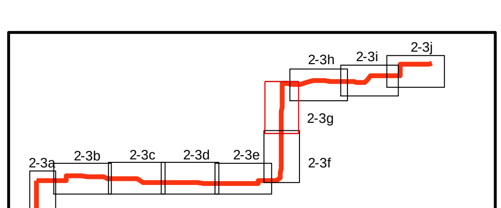


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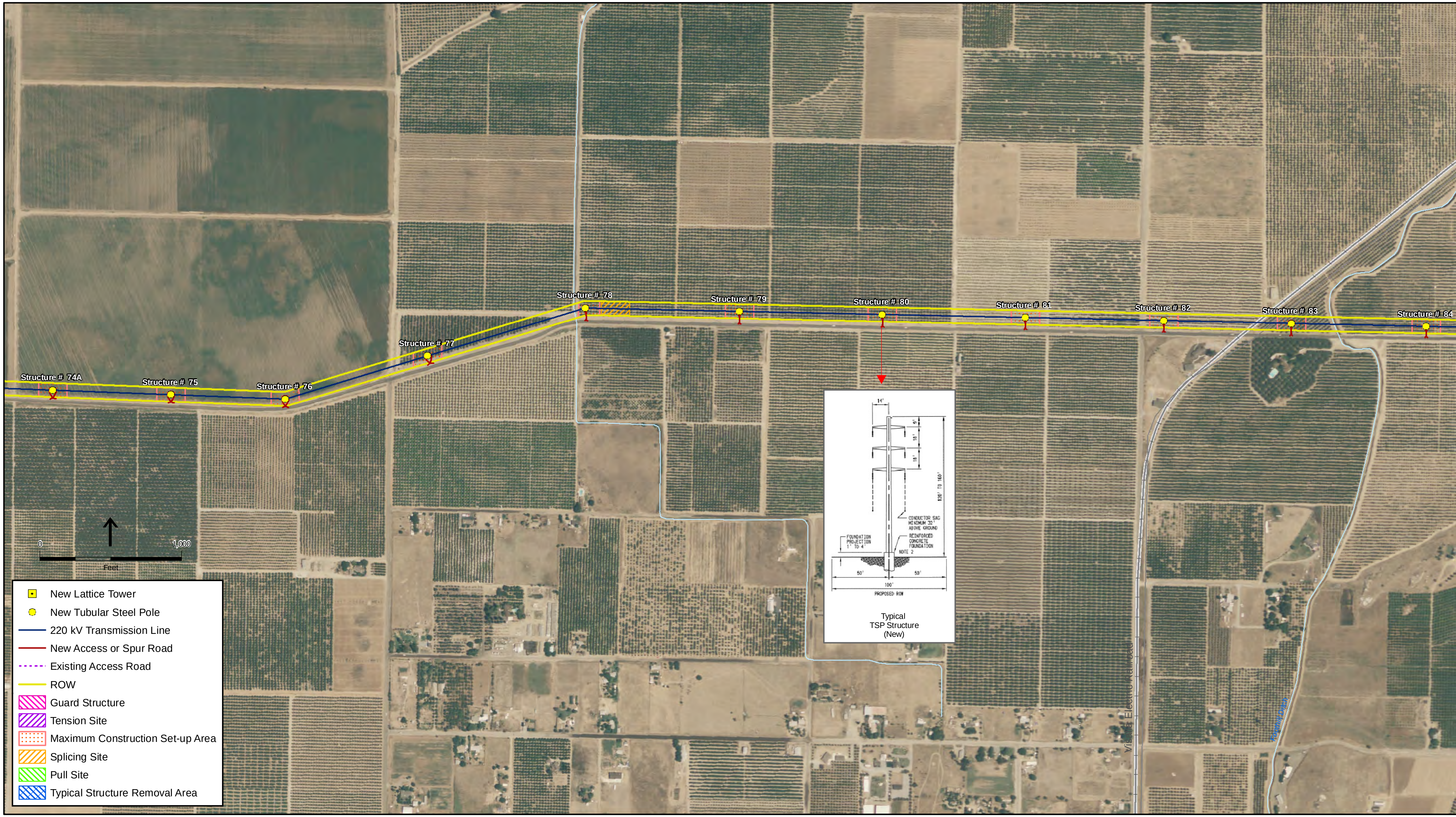
Figure 2-3g
Proposed Project



SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

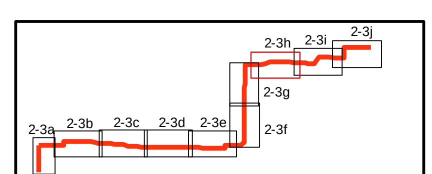


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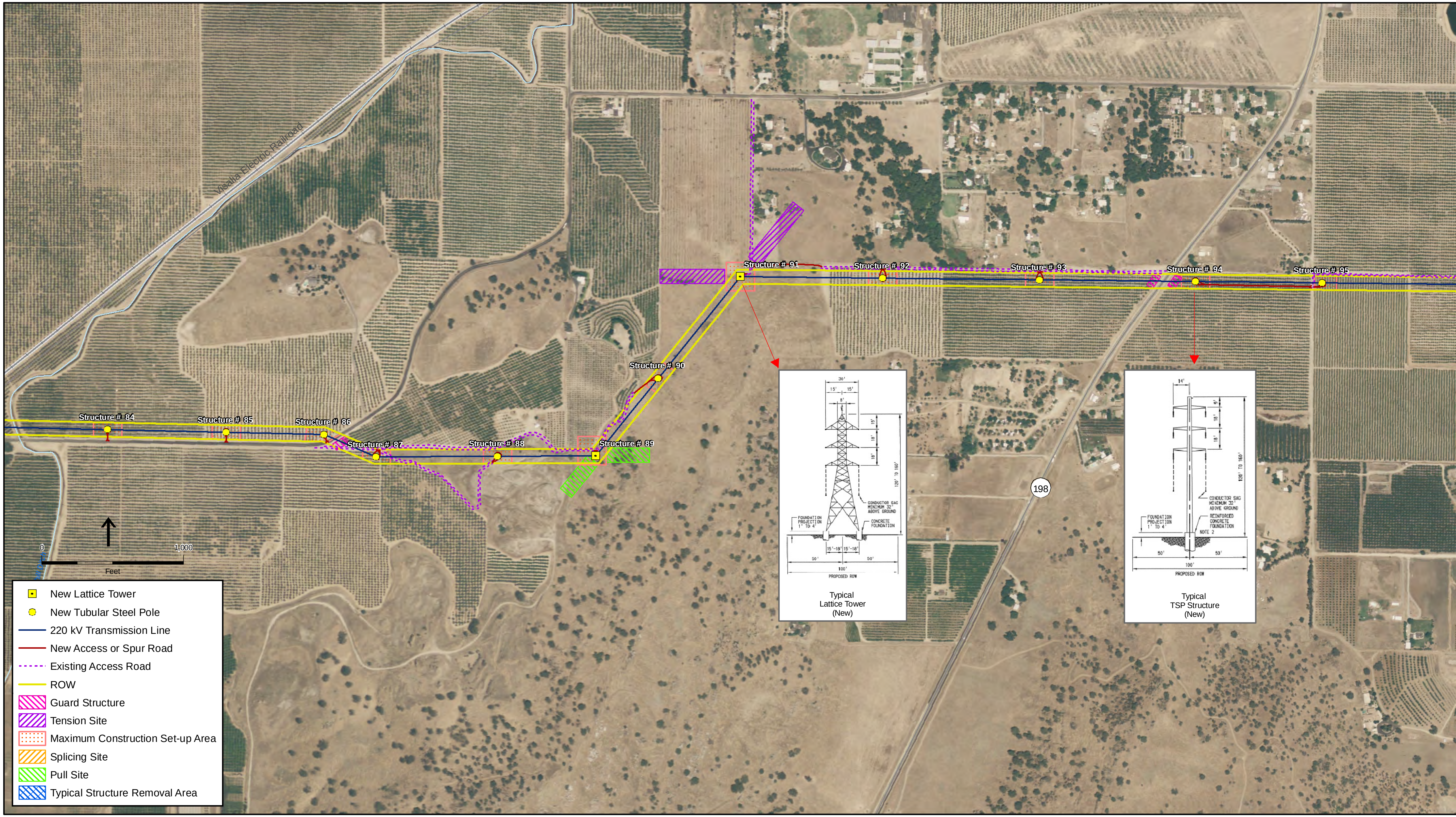
Figure 2-3h

Proposed Project



SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008

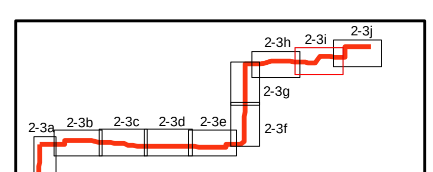


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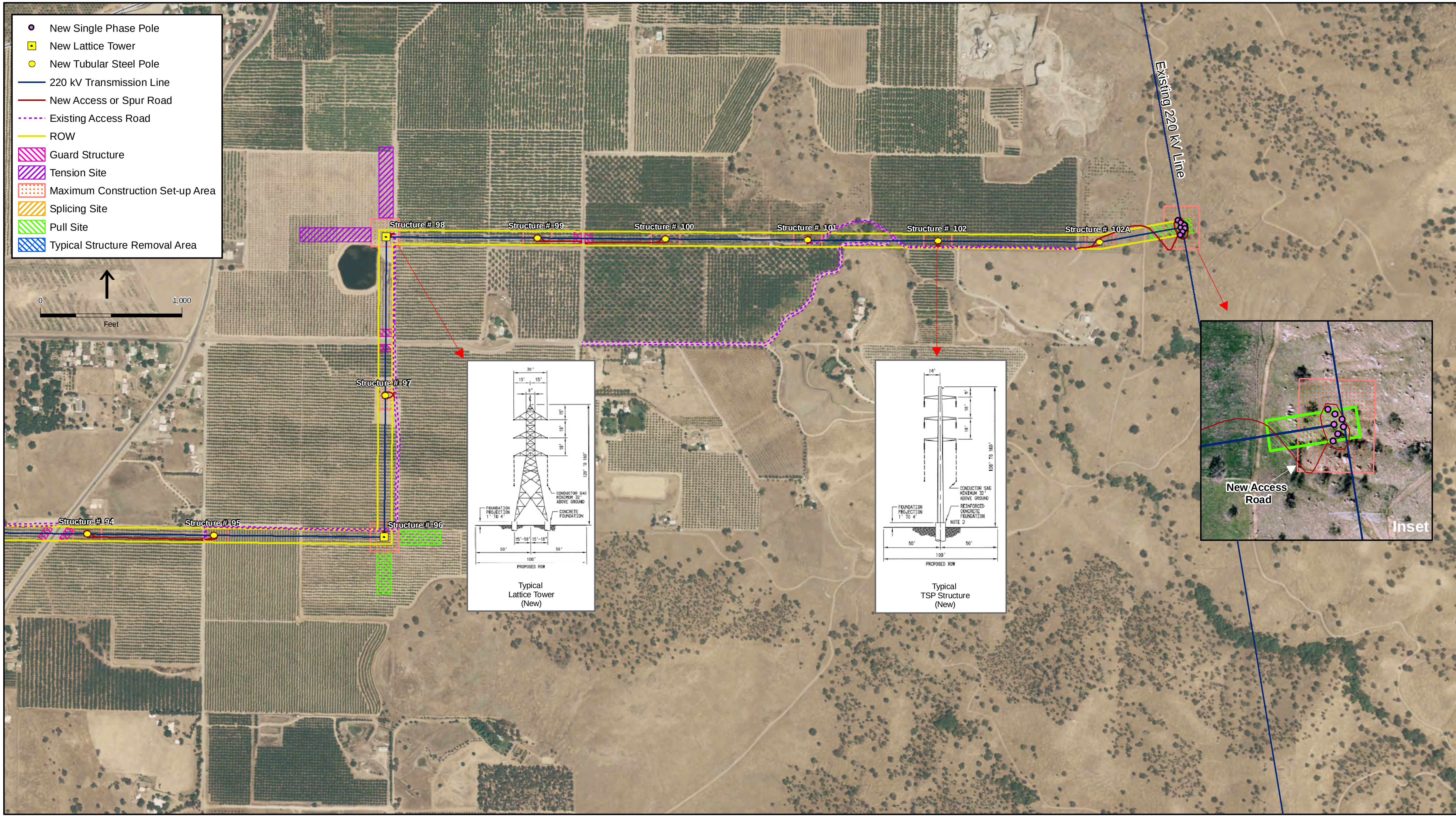
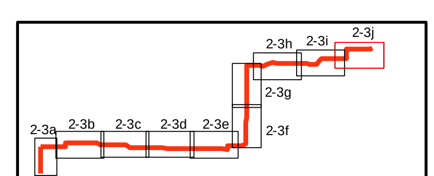
Figure 2-3i

Proposed Project



SOURCE: ESRI, 2008; SCE, 2008; TBM, 2008



San Joaquin Cross Valley Loop Transmission Project . 207584.01

Figure 2-3j

Proposed Project

2.5.1 Replacement of Single Circuit 220 kV Transmission Lines with a Double Circuit Transmission Line

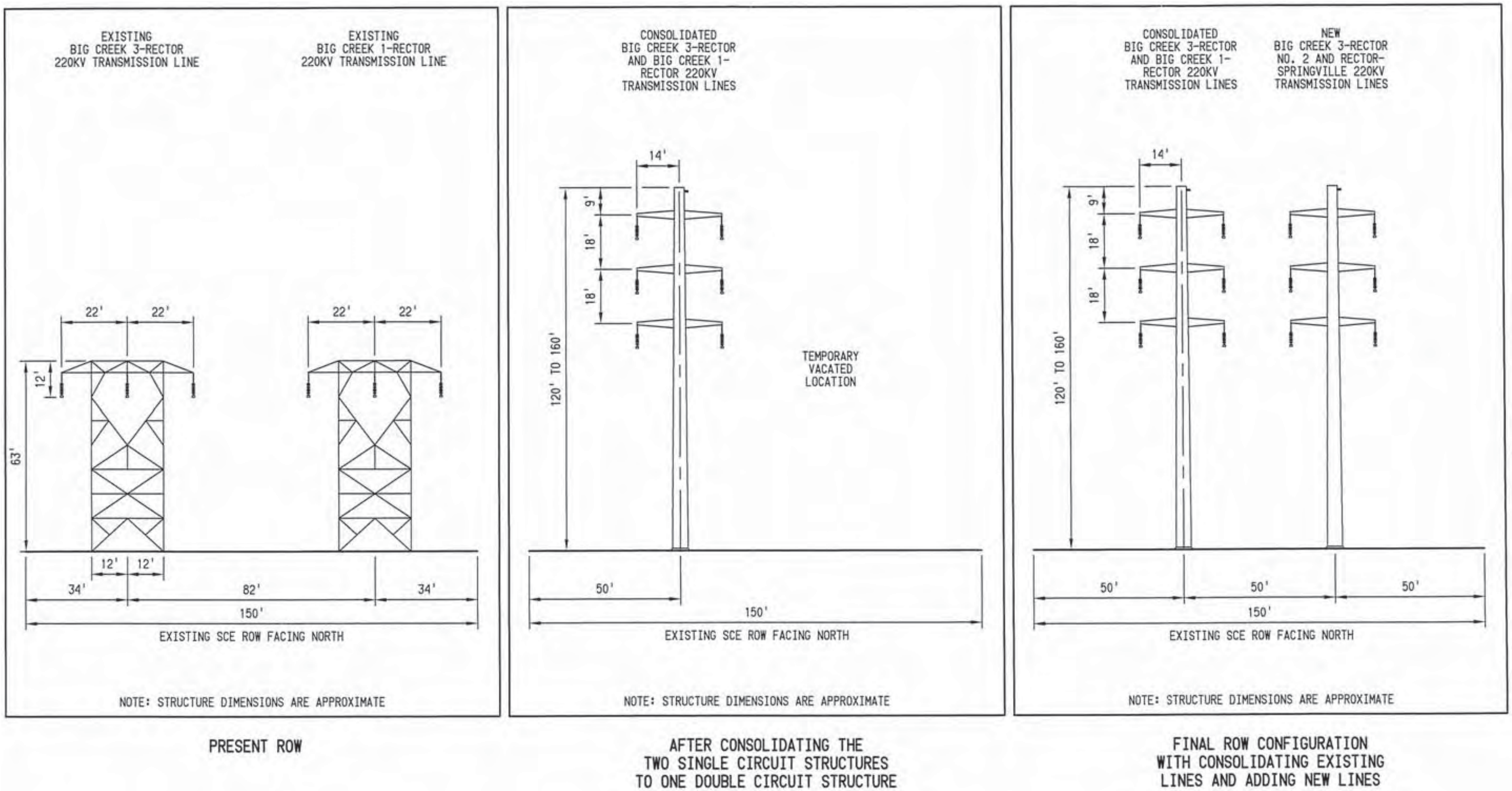
In order to provide a location within the existing SCE ROW for the first 1.1 miles of the Proposed Project, the two existing single circuit 220 kV transmission lines would be consolidated onto one double circuit 220 kV transmission line on the western side of the ROW. The first 1.1 miles of existing Big Creek 3-Rector transmission line and the Big Creek 1-Rector transmission line north of the Rector Substation is supported by 26 single circuit towers split on either side of the ROW. These towers would be removed and both of the transmission lines would be relocated onto six new double circuit tubular poles and one new lattice tower on the western side of the ROW. The lattice tower would be located at the turning point 1.1 miles north of the Rector Substation between the existing SCE ROW and the ROW to be acquired (Figure 2-4).

2.5.2 New Double Circuit 220 kV Transmission Line

The new double circuit 220 kV transmission line would connect the Rector Substation to the existing Big Creek 3-Springville 220 kV transmission line approximately 58 miles south of the Big Creek Powerhouse No. 3. The new transmission lines would be named the Big Creek 3-Rector No.2 220 kV transmission line and the Rector-Springville 220 kV transmission line.

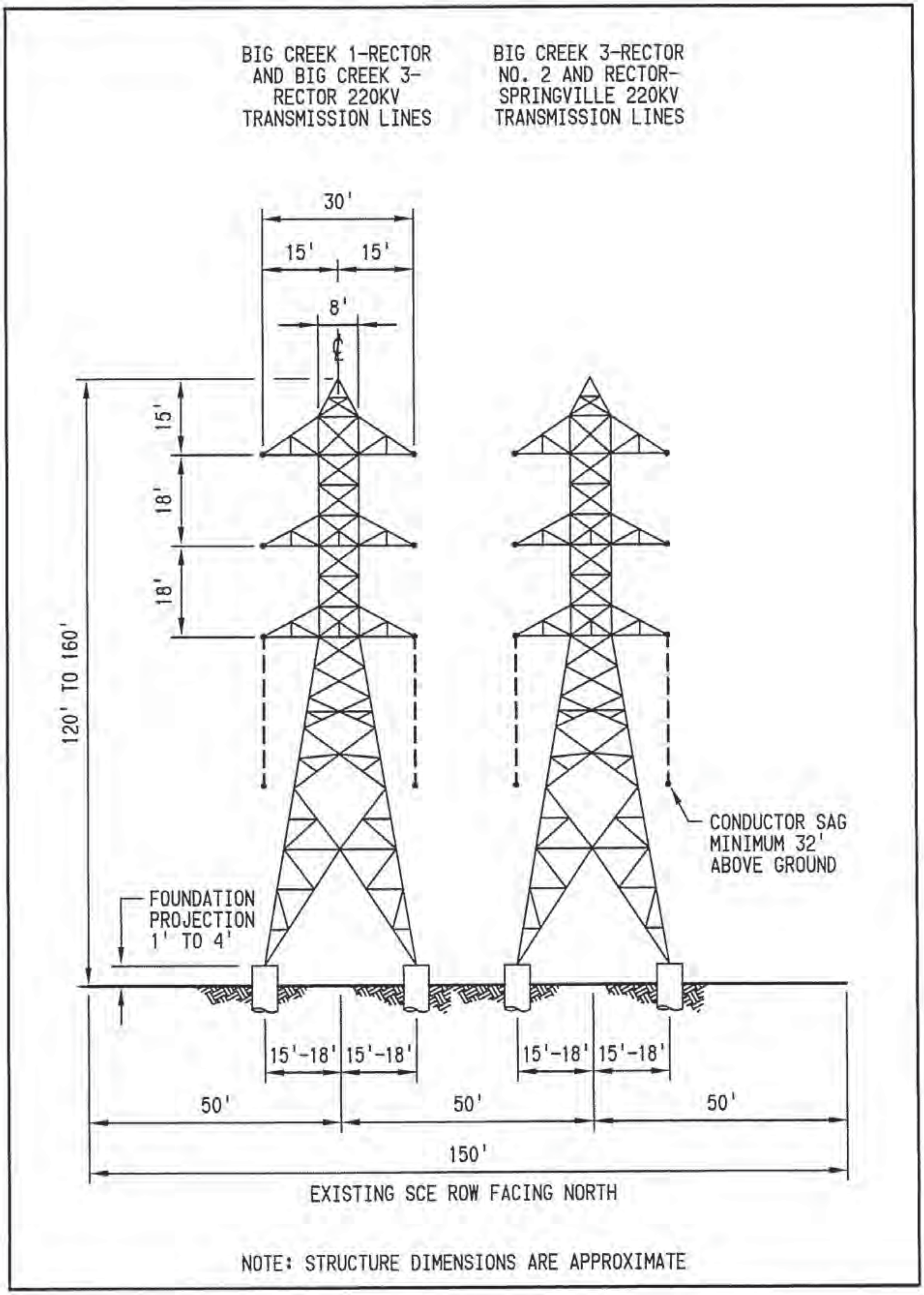
The Proposed Project alignment would begin at the Rector Substation heading north for approximately 1.1 miles within the existing SCE ROW. At mile 1.1, the Proposed Project would turn east running parallel to Avenue 292 for approximately one mile until it reaches Road 156. At Road 156, the line would head north for approximately 0.1 miles and would then head east again for approximately 6.5 miles. At approximately mile 8.8, the line would head north at the former Visalia Electric Railroad ROW for approximately 0.1 miles and then turn east for approximately 0.7 miles to the base of Badger Hill. From here, the line would head north for approximately 3.2 miles and then turn east paralleling Cottage PO Drive/Avenue 320 for approximately 2.5 miles. The line would then head southeast for approximately 0.3 miles then turn northeast to parallel an existing SCE 66 kV subtransmission line. At mile 16 the line would turn east for one mile, then north for 0.4 miles, then east for 1.1 miles until it would reach the existing Big Creek 3-Springville 220 kV transmission line at a point 58 miles south of Big Creek 3 Powerhouse No. 3. The Proposed Project alignment is shown in Figures 2-3a through 2-3j.

The Proposed Project design would allow for future upgrades to the system and increased overall service area capacity. The poles and towers to be used in the new double circuit 220 kV transmission line would support 1033.5 kcmil ACSR conductors, polymer insulators, and one optical ground wire for shielding and telecommunications. Upgrades would be possible with the addition of a second 1033.5 kcmil ACSR conductor (per phase), or other conductors to increase the system capacity and electrical transfer capability in the future.



SOURCE: SCE, 2008

Figure 2-4
Replacement of Single Circuit 220kV Structures
with Double Circuit 220kV Structures



SOURCE: SCE, 2008

Figure 2-5
Transmission Structures to be Located 1.1 miles north of Rector Substation

2.5.3 Poles and Towers

The Proposed Project would replace the existing lattice towers for the first 1.1 miles north of the Rector Substation with new double circuit tubular poles and one lattice tower at the turning point. The Proposed Project would install double circuit poles and towers for the entire 18.5-mile new transmission line. In areas along the Proposed Project alignment where additional structuring strength would be required, such as areas requiring long conductor spans or turning points along the alignment, lattice towers would be installed.

On the 1.1 mile section of existing transmission line immediately north of the Rector Substation, the Proposed Project would replace the existing 26 double lattice single circuit towers with approximately six double circuit tubular poles and one steel lattice structure. The existing configuration of parallel rows of single circuit towers which would be replaced with a single row of double circuit tubular poles on the western portion of the ROW. This process would clear the eastern portion of the ROW for the construction of the proposed new transmission line described below.

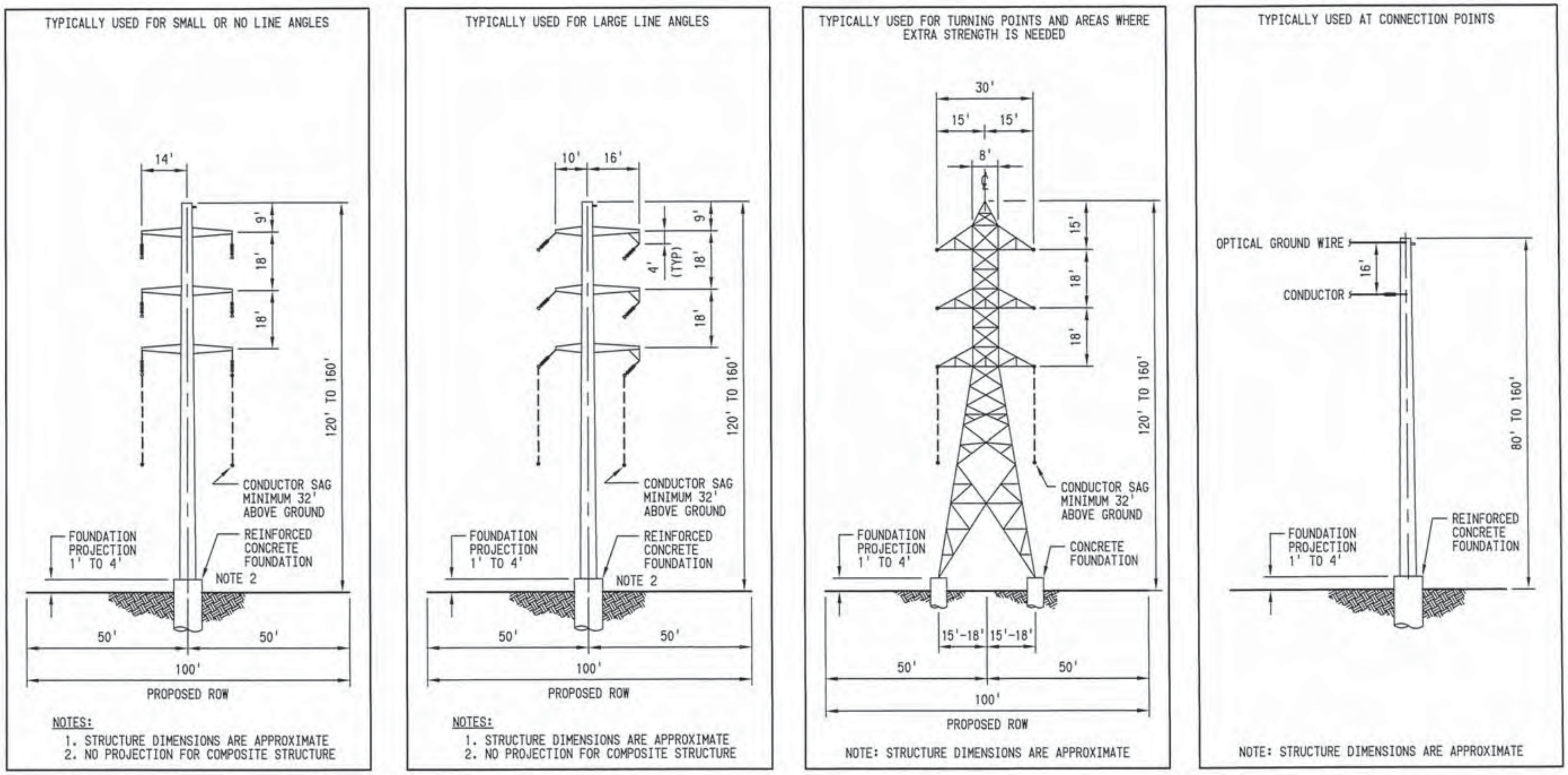
The proposed construction of a new 18.5 mile 220 kV transmission line would involve the installation of approximately 96 double circuit tubular poles and 12 double circuit lattice towers. Approximately six poles and one tower would be installed within the existing ROW in the 1.1 mile segment north of the Rector Substation. The remaining approximately 90 poles and 11 towers would be installed in newly acquired ROW (Figures 2.3a-2.3j).

The double circuit tubular poles would be constructed of either tubular steel or of a concrete/steel hybrid. The tubular steel poles consist of all steel structures with a dulled galvanized finish. Some sections of pole may be too large to galvanize; in these instances a grey protective paint or other finishing coating would be substituted. The concrete/steel hybrid poles have a tubular concrete base and lower portion and a dulled, galvanized steel upper remaining section of the pole. Pole heights would range from approximately 120 feet high to 160 feet above ground surface (ags) with span lengths between structures ranging from 840 to 1,200 feet (Figure 2-6).

TABLE 2-2
SUMMARY OF POLE INFORMATION

Pole Type	Approximate Location	Typical Pole Height (ags)	Number of Poles and Towers to be installed/Removed
Single Circuit Lattice towers	First 1.1 miles of Transmission Line north of Rector Substation (existing)	63 feet	26 single phase lattice towers to be removed
Double Circuit Poles	Throughout entire 18.5 miles of new transmission line and replacing existing structures in 1.1 miles of existing transmission line	120 to 160 feet	102
Double Circuit Lattice Towers	At turning points and areas where large spans are required throughout entire 18.5 miles of new transmission line and at end of 1.1 mile replacement section.	120 to 160 feet	12

SOURCE: SCE, 2008b.



TYPICAL TUBULAR STEEL POLE AND COMPOSITE POLE

TYPICAL TUBULAR POLE

TYPICAL LATTICE TOWER

TYPICAL SINGLE PHASE POLE ONE POLE USED PER PHASE

SOURCE: SCE, 2008

Figure 2-6
Structures for Proposed Project

2.5.4 Substation Modifications

2.5.4.1 Rector Substation Modifications

The Rector Substation is located in northwestern Tulare County, approximately one-quarter mile southeast of the City of Visalia. Modifications to the existing Rector Substation would include the relocation of the terminations of two sets of single 220 kV transmission lines, installation of two new circuit breakers, replacement of two existing circuit breakers, and the construction of a new MEER to house relay equipment. All the substation modifications would occur within the existing footprint of the substation yard. New underground conduit would be installed between the MEER and both the switchrack and the main office building. The MEER would be a prefabricated steel shed, approximately 12 feet tall, and 36 feet long by 20 feet wide. The MEER would be tan with dark brown trim and have a shielded light above the door that would be manually switched on and off.

2.5.4.2 Big Creek 3, Vestal and Springville Substation and Additional Rector Substation Modifications

The Proposed Project would involve modifications at the Rector, Big Creek 3, Vestal, and Springville Substations (Figure 2-1). All substation modifications would occur within the existing fence lines and would consist of installing new cable and conduit between the buses and the substation MEER, installing new protective relays within each MEER, and removing a wave trap and line tuner from each substation. These four substations are located at:

- Rector Substation – approximately 0.25 miles southeast of the City of Visalia in Tulare County;
- Big Creek 3 Substation – approximately 19 miles southwest of the town of Big Creek in Fresno County;
- Vestal Substation – approximately 3.5 miles northeast of the community of Richgrove in Tulare County; and
- Springville Substation – approximately 8.5 miles east of the community of Strathmore in Tulare County.

2.6 Right-of-Way Requirements

SCE has a 150-foot wide ROW associated with the existing transmission line north of the Rector Substation. The Proposed Project transmission line would occur within 1.1 miles of existing SCE ROW and 17.4 miles of acquired 100-foot wide ROW. It is estimated that 231 acres of permanent ROW would be required to construct, operate and maintain the Proposed Project, including the 20 acres of existing ROW. Approximately 211 acres of new ROW would be acquired for the transmission line, including condemnation of a 2,800 square foot residence located within the ROW to be acquired. In addition, the Proposed Project would require approximately eight miles of new 20-foot wide access roads. These roads would require the acquisition of approximately 2.1 acres of new ROW.

2.7 Construction

This section describes construction methods to be used to complete the various components of the Proposed Project including transmission line construction and replacement, and substation modifications.

2.7.1 Transmission Line Construction and Replacement

Transmission line construction and replacement would require:

- staging areas
- access roads
- removal of existing towers
- new structure installation
- site cleanup and waste disposal.

2.7.1.1 Staging Areas

Construction of the Proposed Project would require temporary staging and storage areas to store materials and equipment during the construction process. Materials and equipment typically staged at these areas would include, but would not be limited to:

- Construction materials (tower steel bundles, tubular poles, palletized bolts, rebar, conductor, optical ground wire, insulators and hardware);
- Construction vehicles and facilities (heavy equipment, light trucks, construction trailers with electrical and communications connections, and portable sanitation facilities);
- Crew vehicles; and
- Material that would be removed from the existing transmission lines (conductor, steel, concrete, and other debris). These materials would be temporarily stored in staging areas as the material awaits salvage, recycling, or disposal.

SCE would use existing commercial facilities near the Proposed Project as material staging areas. It is anticipated that at least two material areas, up to five acres in size, would be required during construction. If the existing surface is not compatible with storage and equipment requirements, the staging areas would be surfaced with crushed rock. Staging areas would also be fenced and screened from view from adjacent residences or businesses. Land disturbed at the staging areas, if any, would be restored to preconstruction conditions or to the conditions agreed upon between the landowner and SCE following the completion of construction of the Proposed Project.

2.7.1.2 Access Roads and Spur Roads

Access roads are through-roads that run between tower sites along a ROW and serve as the main transportation route along a transmission line ROW. Spur roads are roads that lead from line access roads and terminate at one or more transmission structure sites. Existing public roads and private ranching roads would be used to the maximum extent practical. Where existing roads do not provide the necessary access, new access and spur roads would be developed.

The Proposed Project would require access road/spur road construction on both the existing ROW and the ROW to be acquired. Where construction would take place on the existing ROW, it is assumed that most of the necessary access would be provided by existing roads; however, modifications to the locations of access and spur roads would be required based on new structure locations. It is also assumed that modification work would be necessary in some locations for the existing roads to support construction activities.

All access road and spur road alignments would first be cleared and grubbed of vegetation. Roads would be blade-graded to remove potholes, ruts, and other surface irregularities, and recompacted to provide a smooth and dense riding surface capable of supporting heavy construction equipment. In some locations where rock is present, blasting may be necessary. Prior to blasting a person licensed by the Federal Bureau of Alcohol, Tobacco, and Firearms would assess the area, make any required measurements, and engineer the blast for a safe and effective explosion. Pre-blast notifications would be made to the local fire department, residents, utilities, and others potentially affected by blasting operations. Once the notifications are complete, the holes would be drilled and the explosive charges loaded into the holes. If the blast is near sensitive receptors (i.e., houses, powerlines, roads), special protective measures would be installed to control flying rock. In addition, the area would be secured to avoid inadvertent entry by the public or other unauthorized personnel. After the area is secured, the appropriate pre-blast warning signals would be given and the blast detonated. After detonation, a post-blast safety inspection would be conducted to ensure that the blast completely discharged and personnel may enter safely to excavate the blasted material.

Each graded road would have a minimum drivable width of 16 feet plus two feet of berm on each side, producing 20-foot wide access roads and spur roads (see Table 2-3). There are no drainage structures or wet crossings expected to be installed in access roads for the Proposed Project; however, this would be verified prior to construction. If required, SCE would install drainage structures which may include water bars, overside drains, culverts, and other engineered structures.

TABLE 2-3
SUMMARY OF ACCESS ROAD REQUIREMENTS

Type of Road	Description	Width	Miles	Area
New Permanent	Unimproved – Dirt	20 feet total (16 feet wide with a 2 foot berm on either side)	8.0	19.4 acres
New Temporary	N/A	N/A	0.0	0.0

SOURCE: SCE, 2008b.

It is anticipated that most of the access roads and spur roads constructed for the Proposed Project would be left in place following construction, and maintained to facilitate future access for operations and maintenance purposes. Gates would be installed where required at fenced property lines to restrict unauthorized vehicular access. Existing access roads and preliminary locations of new access roads and spur roads for the Proposed Project are shown in Figures 2-3a through 2-3j.

2.7.1.3 Removal of Existing Structures

Existing structures would be removed from the first 1.1 miles of existing ROW north of the Rector Substation to prepare the area for the consolidation of existing lines and construction of the new line as proposed. Transmission line equipment to be removed includes 26 existing 220 kV lattice steel towers and associated hardware (i.e., insulators, vibration dampeners, suspension clamps, ground wire clamps, shackles, links, nuts, bolts, washers, cotter pins, insulator weights, and bond wires), as well as the transmission line primary conductors, ground wire and footings.

To remove the existing conductors, wire-stringing locations would be sited along the existing transmission line corridor to place pull and tensioning equipment (Figure 2-3a). After the wire pulling equipment is in place, the old conductor wire would be wound onto “breakaway” reels as it is removed. The removal of existing conductors would involve the use of guard structures to prevent the conductor from falling below a conventional stringing height. The use of guard structures is detailed in Section 2.7.1.4.

A 3/8-inch pulling cable would replace the old conductor as it is pulled out, thereby allowing complete control of the conductor during its removal. The 3/8-inch line would then be removed under controlled conditions to minimize ground disturbance, and all wire-pulling equipment would be removed. The conductor would be transported to a material staging yard where it would be prepared for recycling.

For each tower to be removed, an approximately 75-foot by 150-foot area (0.17 acre) would be cleared of vegetation and graded if the ground is not level. The crane would be positioned approximately 60 feet from the tower location to dismantle the tower. After the tower is dismantled, the existing tower footing would be removed to a depth of at least three feet. Holes would be filled and compacted, and then the area would be smoothed to match surrounding grade.

2.7.1.4 New Structure Installation

Site Preparation

A construction setup area would be cleared at each structure site. These construction setup areas would be at least 100-foot by 100-foot (0.23 acre) in size, but may be up to 200-foot by 200-foot (0.92 acre) in size. These construction setup areas would be cleared and grubbed of vegetation, and graded such that water would drain in the direction of the natural drainage. The grading would be done in a manner to ensure that no ponding would occur and no erosive water flow would cause damage to the new tower footings. The graded pad would be compacted to support heavy vehicles. At some sites, soil may be imported as necessary to raise the elevation of the structure pads. Where site conditions do not provide a stable ground surface to safely work utilizing existing compacted soil, crushed rock surfacing may be added. Material removed during the grading process would be spread over existing access roads and workpads as appropriate, or disposed of off-site in accordance with all applicable laws.

Foundations

The design for the foundations for each structure would vary, based on the type of structure used at each specific location. There are two basic pole structure options: a concrete/steel hybrid (concrete base) and a tubular steel pole that would be bolted on to a cast in place reinforced concrete foundation. Depending upon soil conditions, grounding may be required at the base of some structures. The grounding mechanism would typically be comprised of a metallic wire buried beneath the surface one to three feet deep, and extend between the foundation and a point approximately 50 to 100 feet from the foundation (Table 2-4).

TABLE 2-4
POLE AND TOWER INSTALLATION METRICS

	Single Circuit Lattice Tower	Double Circuit Lattice Tower	Double Circuit Tubular Pole	Single Phase Tap Pole
Poles/Towers Removed	26	0	0	0
Poles/Towers Installed	0	12	102	6
Height	63 feet (ags)	120 to 160 feet (ags)	120 to 160 feet (ags)	80 to 160 feet (ags)
Construction set up area at each structure	NA	100 x 100 foot (min) 200 x 200 ft (max)	100 x 100 foot (min) 200 x 200 ft (max)	100 x 100 foot (min) 200 x 200 ft (max)
Number of foundations required	NA	4	1	1
Excavation diameter	NA	3 to 6 feet	6 to 10 feet	6 to 10 feet
Excavation depth	NA	15 to 30 feet	20 to 60 feet	20 to 60 feet

SOURCE: SCE, 2008b.

The concrete/steel hybrid tubular poles would be direct buried. In order to install these poles, a hole six to nine feet in diameter and 20 to 60 feet deep would be excavated for each pole (up to 145 cubic yards (CY) of soil). The excavated material would either be used by the property owner or disposed of off-site. Final engineering design would determine appropriate backfill material to fill the annular space around the buried pole section. Typically, a granular backfill or slurry backfill material is used, and would be delivered to the site (up to 115 CY).

The tubular steel poles and lattice towers would be installed with reinforced concrete foundations. The concrete foundation would be completed using standard “poured in place” augered excavation techniques. Foundations that extend into groundwater would require that a mud slurry be placed in the hole after drilling to prevent the sidewalls from sloughing. The concrete for the foundation is then pumped to the bottom of the hole, displacing the mud slurry. The mud slurry brought to the surface would typically be collected in a pit adjacent to the foundation and then pumped out of the pit to be reused or discarded.

At the time of construction, foundation elevations would be established, rebar cages set, anchor bolts placed, and concrete placed. Survey positioning would be verified. Concrete strength would be verified by controlled testing of sampled concrete. Once this strength has been achieved, crews would be permitted to commence erection of steel. Depending on the footing type and depth, typically between 15 to 100 CY of concrete would be delivered to each structure site to install footings.

For tubular steel poles, a boring approximately 20 to 60 feet deep and six to 10 feet in diameter would be made (up to 175 CY of soil would be excavated), and a reinforcing steel cage with anchor bolts would be installed in the boring. The steel cages would be placed in the boring and concrete would be poured into each hole. Depending on the site-specific geotechnical and hydrological conditions, the concrete foundation would be installed to extend above ground approximately one to four feet.

Each lattice tower requires four foundations. An auger would be used to excavate holes that would typically be three to six feet in diameter and 15 to 30 feet deep (up to 130 CY of soil would be excavated). Concrete reinforcing and stub angles would be set into the hole and concrete poured to set the foundation. Similar to the tubular steel pole footings, the site-specific geotechnical and hydrological conditions would determine how high aboveground the footings would extend. Most lattice steel tower foundations would extend above ground one to four feet.

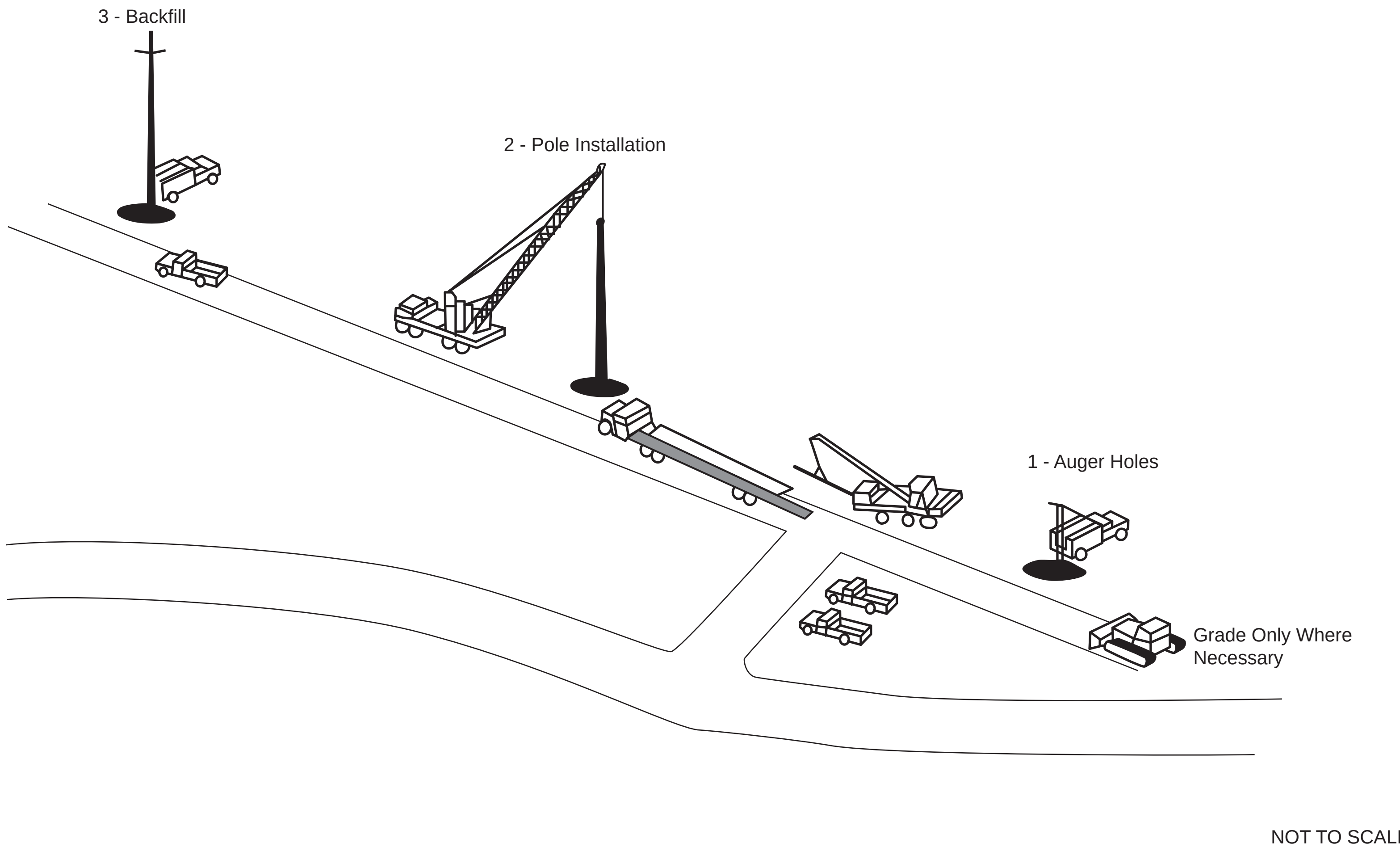
Structure Assembly

Tubular poles would be delivered in two or more sections for each structure site via flatbed truck and assembled on-site using a crane. Each pole shaft section would be joined to the section below using lap splice joints, which are pulled together with hydraulic jacking devices. After assembly, a minimum 80-ton crane would be used to lift and set the pole sections into place (Figure 2-7).

Towers would be assembled at laydown areas at each site, and then erected and bolted to the foundations. Tower assembly would begin with the hauling and stacking of bundles of steel at each tower location per engineering drawing requirements. This would require the use of two tractors with 40-foot floats on an onsite loader at each tower site. Steel would be delivered and stacked and then crews could proceed with assembly of leg extensions, body panels, boxed sections and the bridges. The steel work would be completed by a combined erection and torquing crew with a lattice boom crane. At this time, the construction crew could opt to install insulators and wire rollers (travelers) that would later facilitate conductor installation.

Guard Structures

Guard structures may be installed at transportation, flood control, and utility crossings (Figures 2.3a-2.3j). Guard structures are temporary facilities that are installed to prevent the movement of a conductor should it momentarily drop below a conventional stringing height. Temporary netting could also be installed to protect some types of under-built infrastructure, such



SOURCE: ESA, 2009

Figure 2-7
Typical Construction Sequence

as freeways, railroads, and electrical distribution lines. Typical guard structures are comprised of 60 to 80 foot tall standard wood poles depending on the horizontal extent of all conductors being installed across the feature. The number of guard poles installed on either side of a crossing would be between two and four. The guard structures are removed after the conductor is clipped into place. In some cases, the use of wood poles could be substituted with the use of specifically equipped boom-type trucks with heavy outriggers staged to prevent the conductor from dropping.

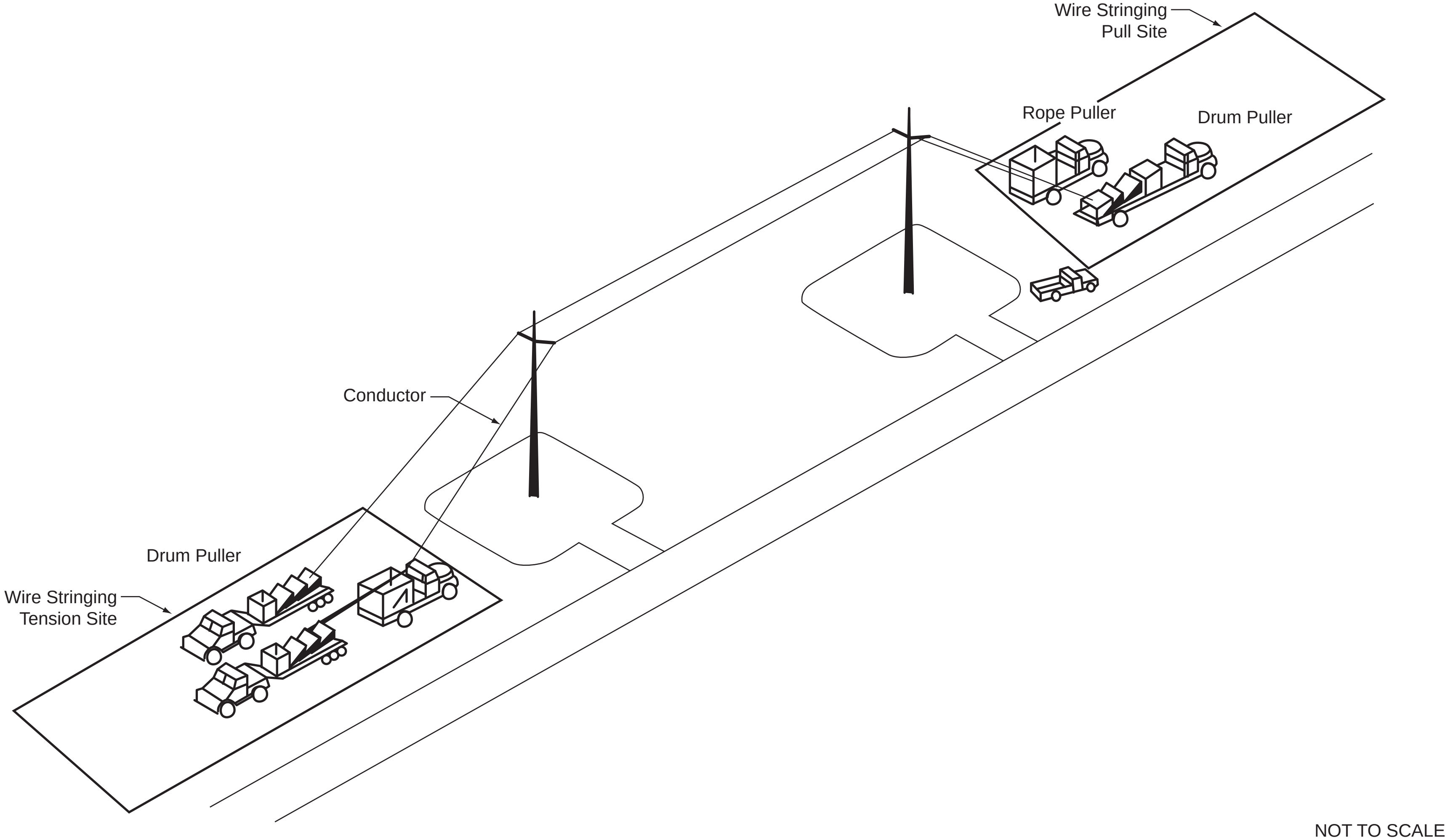
Approximately 40 guard structure sites would be required for transmission line conductor installation, depending on safety requirements. Each guard structure would be approximately 50 feet by 100 feet (0.11 acre) in size. The total land temporarily disturbed by the use of guard structures would be approximately 4.6 acres.

Conductor and Shield Wire Stringing

Conductor and shield wire stringing is an activity that includes the installation of primary conductor and shield wire, optical ground wire, vibration dampeners, weights, and suspension and dead-end hardware assemblies. These wire-stringing activities would be conducted in accordance with SCE specifications, which are similar to process methods detailed in IEEE Standard 524-1992, Guide to the Installation of Overhead Transmission Line Conductors. The wire pulling, tensioning, and splicing set-up locations require level areas to allow for maneuvering of the equipment. When possible, these locations would be located on existing level areas and existing roads to minimize the need for grading and cleanup. Circuit outages, pulling times, and safety protocols needed for wire stringing would be determined prior to work to ensure that safe and quick installation of wire is accomplished.

Conductor stringing operations begin with the installation of travelers, or rollers, on the bottom of each of the insulators using helicopters or aerial manlifts (bucket trucks). The rollers allow the conductor to be pulled through each structure until the entire line is ready to be pulled to the final tension position. Following installation of the rollers, a sock line (a small cable used to pull the conductor) would be pulled onto the rollers from structure to structure using helicopters or aerial manlifts traveling along the ROW. Once the sock line is in place, it would be attached to the conductor and used to pull or string, the conductor into place on the rollers using conventional tractor-trailer pulling equipment at pull and tension sites along the line. The conductor would be pulled through each structure under a controlled tension to keep it elevated and away from obstacles, thereby preventing third-party damage to the line and protecting the public. Conductor and shield wire installation may include the use of guard structures, as described previously (Figure 2-8).

The helicopter operation areas would be limited to helicopter staging areas such as Woodlake Airport or Rector Substation and possibly other positions near construction areas that have previously been used for helicopter activities and are considered safe locations for landing. Final siting of staging areas for the Proposed Project would be conducted with the input of a helicopter contractor, affected private landowners and land management agencies. During helicopter operations, public access to defined areas would be restricted. Flight paths would be primarily along the ROW and to and from staging areas. Helicopter use would be limited to stringing



SOURCE: ESA, 2009

San Joaquin Cross Valley Loop Transmission Project . 207584.01

Figure 2-8
Typical Construction Stringing Activity

activities and is estimated to be around six hours per day during stringing, with only two hours of flight time. Conductor stringing is estimated to take 26 days and would occur after construction of transmission line structures has been completed.

After the conductor is strung through the rollers located on each tower, the temporary pulling splices would then be removed and permanent splices would be installed. If the permanent splice could not be made at one of the pulling or tensioning sites being used, a temporary splicing location would be used and may include construction of a temporary road.

Typically, wire pulls occur every 15,000 feet on flat terrain or less in rugged terrain. Wire splices typically occur every 7,500 feet on flat terrain or less on rugged terrain. For stringing equipment that cannot be positioned at either side of a dead-end transmission tower, field snubs (i.e., anchoring and dead-end hardware) would be temporarily installed to sag conductor wire to the correct tension. Preliminary stringing sites are shown in Figures 2-3a through 2-3j.

Approximately 32 conductor stringing sites would be required for the Proposed Project transmission line conductor installation, depending on the final design and actual conductor reel lengths. These sites require reasonably level areas for maneuvering equipment.

The dimensions of the area needed for the stringing setups associated with conductor and optical ground wire installation are variable and depend upon terrain. The approximate size needed for tensioning equipment set-up sites is an area 200 feet by 500 feet (2.3 acres), the approximates size needed for pulling equipment set-up sites is an area 200 feet by 200 feet (0.92 acre), the approximate size needed for splicing equipment set-up sites is an area 150 feet by 100 feet (0.35 acre). Of the 30 acres expected for wire stringing sites, 20 acres would be outside the Proposed Project ROW. Preliminary pull sites, tension sites and splicing sites are shown in Figures 2-3a through 2-3j.

After the conductor is pulled into place, the sags between the structures would be adjusted to a pre-calculated level. The conductor would be installed with a minimum ground clearance of 32 feet. The conductor would then be clipped into the end of each insulator, rollers removed, and vibration dampeners and other accessories installed. For stringing operations, it would generally take approximately one-half day to pull three phases of conductor for approximately 9,000 feet of transmission line.

Once the conductor is in place, optical ground wire would be installed on the new double circuit transmission lines for communication and shielding. The optical ground wire would be installed in the same manner as the conductor. Fiber optic splice enclosures would be installed aboveground on the transmission line structures. The optical ground wire would be routed down the structure to the splice box (approximately three foot by three foot by one foot metal enclosure) where the optical fibers would be spliced. Spare optical ground wire is typically coiled within the enclosure. Splicing of the fibers would occur on the ground adjacent to the structure and the enclosure with the completed splices brought back up into the structure for final installation.

2.7.1.5 Land Disturbance

A summary of land that would be temporarily and permanently disturbed during construction of the Proposed Project is provided in Table 2-5. An estimated 120 acres would be disturbed during construction. Of this, 78 acres would be temporarily disturbed and restored following construction, and 42 acres would be permanently disturbed.

TABLE 2-5
LAND DISTURBANCE ESTIMATES

Proposed Project Feature	Quantity	Area Disturbed During Construction (acres)	Area to be restored (acres)	Area permanently disturbed (acres)
New Structure Sites	120	66.3	34	32.3
Existing Tower Sites	26	4	4	0
Wire Stringing Sites (including guard structures)	72	30	30	0
Access Roads and Spur Roads[a]	8 miles	9.7	0	9.7
Material Staging Yards	2	10	10	0
Total Estimated		**120**	**78**	**42**

[a] Total disturbed area for access roads (from Table 2-3) is 19.4 acres; however, half of this disturbance (9.7 acres) is included in the Structure Site disturbance above.

SOURCE: SCE, 2008b.

Land temporarily disturbed during construction would be returned to as close to pre-construction conditions as possible following completion of construction activities. The temporary land area requirements expected for the Proposed Project include temporary work areas around each structure site (66.3 acres), temporary work areas for installing conductor (30 acres), temporary guard structures at crossings (4.6 acres) and the use of temporary storage and staging yards (estimated 10 acres).

Permanent land disturbance associated with the Proposed Project include the construction of new access and spur roads (9.7 acres), and the removal of orchard vegetation along the ROW (approximately 21 acres) for electrical system maintenance, safety and reliability purposes. During the construction phase of the Proposed Project approximately 4,900 to 6,400 trees would need to be removed to provide a safe and appropriate working space for equipment, vehicles, and materials. Of these approximately 2,000 to 3,500 could be replaced but approximately 2,900 trees would need to remain permanently removed. The tree types present in the construction areas are approximately 83 percent citrus, eight percent walnut, seven percent plum, and less than one percent each of oak, olive, pine, pomegranate, and other types.

2.7.1.6 Site Cleanup and Waste Disposal

During construction, water trucks would be used to minimize the quantity of airborne dust created by construction activities. Any damage to existing roads as a result of construction would be repaired once construction is complete.

SCE would restore all areas that were temporarily disturbed by construction of the Proposed Project (including material staging yards, pull and tension sites, and splicing sites) to as near preconstruction conditions as possible following the completion of construction. Restoration would include grading to original contours and reseeding where appropriate. In addition, all construction materials would be removed from the area and recycled or properly disposed of off-site. SCE would conduct a final inspection to ensure that cleanup activities were successfully completed.

Hazardous Materials

Construction and operation of the Proposed Project would require the limited use of hazardous materials, such as fuels, lubricants, and cleaning solvents. For all hazardous materials in use at the construction site, Material Safety Data Sheets would be made available to all site workers for cases of emergency.

Stormwater Pollution and Prevention

A Stormwater Pollution and Prevention Plan would be prepared for the Proposed Project to provide detail of locations that hazardous materials may be stored during construction, and the protective measures, notifications, and cleanup requirements for any accidental spills or other releases of hazardous materials that could occur.

Waste Management

Construction of the Proposed Project would result in the generation of various waste materials that could be recycled and salvaged. These items would be gathered by construction crews and separated into roll-off boxes. Salvageable items (i.e., conductor, steel, and hardware) would be transported to the material staging yards, sorted, and baled, and then sold through available markets. Items that may be recycled include the steel from towers, the conductor wire, and hardware. The wood poles used for guard structures and possible telecommunications support would be returned to the material staging yard, and depending on the condition of each pole, may be reused, disposed of in a Class I hazardous waste landfill, or in the lined portion of a Regional Water Quality Control Board (RWQCB) certified municipal landfill.

Construction of the Proposed Project would also generate waste materials that cannot be reused or recycled (i.e., wood, soil, vegetation, and sanitation waste); local waste management facilities would be used for the disposal of these types of construction waste. The disposal of any hazardous waste would be conducted at an appropriate facility.

2.7.2 Substation Modifications and Construction

Construction activities at Rector Substation would include both electrical work and civil work. Cranes and other truck-mounted equipment would be used to install the new electrical equipment, conductor spans, jumpers, connectors, and support structures. Foundations for the MEER and breakers would be excavated with a backhoe or auger in a process similar to that described for overhead structure installation.

The installation of new cable and conduit and the removal of wave trap and line tuners at Rector, Springville, Vestal, and Big Creek 3 Substations would require cranes and other truck mounted equipment. The installation of relay protection would consist of a crew driving to the site via existing paved roads. All substation modifications would occur within the existing developed property of each substation. Construction activities at the Vestal and Springville Substations would result in approximately 2,205 square feet and 1,935 square feet of ground disturbance, respectively. No ground disturbing activities would occur at the Big Creek 3 Substation.

2.7.3 Construction Workforce and Equipment

It is estimated that 50 craft laborers per day would be required to construct the Proposed Project at its peak. It is expected that at least 30 to 40 of the craft personnel would be from the contractor's pool of experienced personnel, with the remaining construction personnel coming from local sources. The estimated number of personnel and equipment required for construction of the Proposed Project is summarized in Table 2-6.

Construction would be performed by either SCE construction crews or contractors, depending on the availability of SCE construction personnel at the time of construction. If SCE transmission construction crews are used they would be based at Santa Clarita and/or San Joaquin Valley facilities, and if SCE telecommunications crews are used, they would be based at Alhambra and/or Fullerton facilities. Contractor construction personnel would be from within the San Joaquin Valley or adjacent areas and would be managed by SCE construction management personnel. Anticipated construction personnel are summarized in Table 2-7.

Construction efforts would occur in accordance with accepted construction industry standards. Construction activities generally would be scheduled during daylight hours (7:00 am to 5:00 pm), Monday through Friday. If different hours or days are necessary, SCE would obtain variances from local noise ordinances, as necessary, from the jurisdiction within which the work would take place. If work would occur at night, artificial illumination of the work area would be required. SCE would use lighting to protect the safety of the construction workers, but orient the lights to minimize their effect on any nearby receptors.

2.7.4 Construction Schedule

Table 2-8 summarizes the length of time anticipated to construct each phase of the Proposed Project. Construction of the transmission line would take between nine and 12 months. Crews are typically expected to work five 10-hour days (7:00 am to 5:00 pm). Depending on local permit

TABLE 2-6
CONSTRUCTION EQUIPMENT REQUIREMENTS

Work Activity Primary Equipment Description	Estimated Horse-power	Probable Fuel Type	Primary Equipment Quantity	Estimated Schedule (days)	Duration of Use (Hrs/Day)
Survey				**20**	
½ Ton Pick-up Truck, 4X4	200	Gas	2	20	8
Material Staging Yard					
1 Ton Crew Cab 4X4	300	Diesel	1		2
30 Ton Crane Truck	300	Diesel	1	Duration of Project	2
10,000 lb Rough Terrain Fork Lift	200	Diesel	1		5
Truck, Semi, Tractor	350	Diesel	1		1
ROW Clearing				**14**	
1 Ton Crew Cab 4X4	300	Diesel	1	9	8
Road Grader	350	Diesel	1	9	6
Track Type Dozer	350	Diesel	1	9	6
Water Truck	350	Diesel	2	9	9
Lowboy Truck/Trailer	500	Diesel	1	9	4
Backhoe/Front Loader	350	Diesel	1	14	6
Small Loader	50	Diesel	1	4	8
10-cu. Yd. Dump Truck	350	Diesel	2	4	8
Roads & Landing Work				**16**	
1 Ton Crew Cab 4X4	300	Diesel	2	16	2
Road Grader	350	Diesel	1	16	4
Track Type Dozer	350	Diesel	1	16	6
Drum Type Compactor	250	Diesel	1	16	4
Water Truck	350	Diesel	2	Duration	9
Lowboy/Truck/Trailer	500	Diesel	1	8	2
Backhoe/Front Loader	350	Diesel	1	16	6
Guard Structure Installation				**10**	
¾ Ton Pick-up Truck, 4X4	300	Diesel	2	10	6
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	1	10	6
Compressor	120	Diesel	1	10	4
Auger Truck	500	Diesel	1	10	6
Extendable Flat Bed Pole Truck	350	Diesel	1	10	6
80ft. Hydraulic Man-lift	350	Diesel	1	10	4
30 Ton Crane Truck	500	Diesel	1	10	6
Remove Existing Conductor and OHGW				**9**	
1 Ton Crew Cab 4X4	300	Diesel	4	9	8
80ft. Hydraulic Man-lift	350	Diesel	3	9	8
Sleeving Truck 300	300	Diesel	1	9	4
30 Ton Crane Truck	300	Diesel	1	9	4
40’ Flat Bed Trailer	N/A	N/A	3	8	2
Truck, Semi, Tractor	350	Diesel	1	8	1
Bull Wheel Puller	500	Diesel	1	6	4
Hydraulic Rewind Puller	300	Diesel	1	6	4
Remove Existing Towers				**16**	
1 Ton Crew Cab, 4X4	300	Diesel	3	16	5
80 Ton Rough Terrain Crane	350	Diesel	1	8	8
30 Ton Crane Truck	300	Diesel	2	16	6
Compressor Truck	300	Diesel	2	8	8
Flat Bed Truck & Trailer	350	Diesel	1	7	8
Rough Terrain Forklift	200	Diesel	1	7	4

TABLE 2-6 (Continued)
CONSTRUCTION EQUIPMENT REQUIREMENTS

Work Activity Primary Equipment Description	Estimated Horse-power	Probable Fuel Type	Primary Equipment Quantity	Estimated Schedule (days)	Duration of Use (Hrs/Day)
Remove Exiting Foundations				**10**	
10-cu. Yd. Dump Truck	350	Diesel	2	10	10
Backhoe Front Loader	350	Diesel	1	10	8
Excavator	300	Diesel	2	10	8
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	1	10	10
Install Tower Foundations				**16**	
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	16	2
30 Ton Crane Truck	300	Diesel	1	16	5
Backhoe Front Loader	200	Diesel	1	16	8
Auger Truck	500	Diesel	1	16	8
10 Cubic yard Dump Truck	350	Diesel	2	16	8
4000 Gallon Water Truck	350	Diesel	1	16	8
10 cu. yd. Concrete Mixer Truck	425	Diesel	3	16	3
Tower Steel Haul				**12**	
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	12	2
40’ Flat Bed Truck & Trailer	350	Diesel	2	12	8
10,000 lb Rough Terrain Fork Lift	200	Diesel	1	12	6
Tower Steel Assembly				**36**	
30 Ton Crane Truck	300	Diesel	2	36	8
¾ Ton Pick-up Truck, 4X4	300	Diesel	3	36	4
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	36	4
Compressor Trailer	350	Diesel	2	36	6
Tower Erection				**12**	
¾ Ton Pick-up Truck, 4X4	300	Diesel	2	12	5
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	12	5
Compressor Trailer	350	Diesel	1	12	6
180 Rough Terrain Crane	500	Diesel	1	12	6
Install Tubular Pole Foundations				**54**	
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	3	54	2
30 Ton Crane Truck	300	Diesel	1	54	5
Backhoe/Front Loader	200	Diesel	1	54	8
Auger Truck	500	Diesel	1	54	8
10-cu. Yd. Dump Truck	350	Diesel	2	54	8
4000 Gallon Water Truck	350	Diesel	1	54	8
10cu. yd. Concrete Mixer Truck	425	Diesel	3	54	3
Tubular Pole Haul				**27**	
¾ Ton Pick-up Truck, 4X4	300	Diesel	2	27	5
40’ Flat Bed Truck & Trailer	350	Diesel	2	27	8
180 Ton Rough Terrain Crane	500	Diesel	1	27	6
Tubular Pole Assembly				**54**	
¾ Ton Pick-up Truck, 4X4	300	Diesel	2	54	5
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	54	5
Compressor Trailer	120	Diesel	1	54	5
180 Ton Rough Terrain Crane	500	Diesel	1	54	6
Tubular Pole Erection				**54**	
¾ Ton Pick-up Truck, 4X4	300	Diesel	2	54	5
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	54	5
Compressor Trailer	120	Diesel	1	54	5
180 Ton Rough Terrain Crane	500	Diesel	1	54	6

**TABLE 2-6 (Continued)
CONSTRUCTION EQUIPMENT REQUIREMENTS**

Work Activity Primary Equipment Description	Estimated Horse-power	Probable Fuel Type	Primary Equipment Quantity	Estimated Schedule (days)	Duration of Use (Hrs/Day)
Install Conductor and optical ground wire				**115**	
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	5	115	8
Wire Truck & Trailer	350	Diesel	6	115	2
Dump Truck (Trash)	350	Diesel	1	115	2
¾ Ton Pick-up Truck, 4X4	300	Diesel	6	115	10
30 Ton Manitex	350	Diesel	4	115	6
22 Ton Manitex	350	Diesel	1	115	8
Splicing Rig	350	Diesel	2	115	2
Splicing Lab	300	Diesel	2	26	2
Pole Truck & trailer	500	Diesel	1	36	6
20,000lb. Rough Terrain Fork Lift	350	Diesel	1	115	2
580 Case Backhoe	120	Diesel	1	115	2
Spacing Cart	10	Diesel	3	29	8
Static Truck	350	Diesel	1	115	2
Static Tensioner	0	Diesel	1	115	2
3 Drum Straw line Puller	300	Diesel	2	115	4
601k Puller	525	Diesel	1	115	3
Sag Cat w2 winch	350	Diesel	2	115	2
D8 Cat	300	Diesel	4	115	1
Huges 500 E Helicopter		Jet A	1	26	6
Fuel, Helicopter Support Truck	300	Diesel	1	26	2
Low Boy Truck & Trailer	500	Diesel	1	115	2
Guard Structure Removal				**10**	
¾ Ton Pick-up Truck, 4X4	300	Diesel	2	10	6
1 Ton Crew Cab Flat Bed, 4X4	300	Diesel	2	10	6
Compressor Trailer	120	Diesel	2	10	4
Extendable Flat Bed Pole Truck	350	Diesel	2	10	6
80ft. Hydraulic Man-lift	350	Diesel	1	10	4
30 Ton Crane Truck	500	Diesel	1	10	6
Rector Substation				**90**	
Crew Truck	300	Diesel	2	40	4
Dump Truck	350	Diesel	2	40	3
5 Ton Stake Bed Truck	235	Diesel	1	40	2
Trencher	85	Diesel	1	10	8
Drill Rig	500	Diesel	1	10	8
Tractor	350	Diesel	1	40	7
Forklift	200	Diesel	1	40	4
Mobile Crane	300	Diesel	1	5	8
8 Ton Stake Truck	200	Diesel	1	90	4
Crew Cab Truck	300	Diesel	2	90	6
Carryall Vehicle	300	Gasoline	2	90	6
50 ton Crane	350	Diesel	1	45	8
Lift gate Truck	300	Diesel	1	90	4
Pickup	200	Diesel	2	90	4
Forklift	200	Diesel	1	90	8
Manlift	350	Diesel	2	90	8
Support Truck	300	Diesel	2	90	4
Carry Deck Crane	300	Diesel	1	10	8
Support Truck	300	Diesel	1	15	8
Wire Truck	350	Diesel	2	60	8
Test Truck	300	Diesel	1	60	8

TABLE 2-6 (Continued)
CONSTRUCTION EQUIPMENT REQUIREMENTS

Work Activity Primary Equipment Description	Estimated Horse-power	Probable Fuel Type	Primary Equipment Quantity	Estimated Schedule (days)	Duration of Use (Hrs/Day)
Big Creek 3 Substation Modifications				**5**	
8 Ton Stake Truck	200	Diesel	1	4	4
Crew Cab Truck	300	Diesel	2	4	6
50 Ton Crane	350	Diesel	1	3	8
Lift Gate Truck	300	Diesel	1	4	4
Pickup	200	Diesel	2	4	4
Forklift	200	Diesel	1	4	8
Manlift	350	Diesel	1	2	8
Support Truck	300	Diesel	2	4	4
Test Truck	300	Diesel	1	5	8
Wire Truck	350	Diesel	1	4	8
Springville Substation Modifications				**5**	
8 Ton Stake Truck	200	Diesel	1	3	4
Crew Cab Trucks	300	Diesel	2	3	6
50 Ton Crane	350	Diesel	1	2	8
Lift Gate Truck	300	Diesel	1	3	4
Pickup	200	Diesel	2	3	4
Forklift	200	Diesel	1	3	8
Manlifts	350	Diesel	1	2	8
Support Truck	300	Diesel	2	3	4
Test Truck	300	Diesel	1	5	8
Wire Truck	350	Diesel	1	3	8
Vestal Substation Modifications				**5**	
8 Ton Stake Truck	200	Diesel	1	3	4
Crew Cab Trucks	300	Diesel	2	3	6
50 Ton Crane	350	Diesel	1	2	8
Lift Gate Truck	300	Diesel	1	3	4
Pickup	200	Diesel	2	3	4
Forklift	200	Diesel	1	3	8
Manlift	350	Diesel	1	2	8
Support Truck	300	Diesel	2	3	4
Test Truck	300	Diesel	1	5	8
Wire Truck	350	Diesel	1	3	8
Restoration				**20**	
1 Ton Crew Cab 4X4	300	Diesel	2	20	2
Road Grader	350	Diesel	1	20	6
Backhoe	350	Diesel	1	20	6
Front End Loader	350	Diesel	1	20	6
Track Type Dozer	350	Diesel	1	20	6
Drum Type Compactor	250	Diesel	1	20	6
Water Truck	350	Diesel	1	20	10
Lowboy Truck/Trailer	300	Diesel	1	20	3

SOURCE: SCE, 2008b.

TABLE 2-7
ESTIMATED CONSTRUCTION WORKFORCE

Construction Activity	Crew Size	Proposed Project Requirements	Production Rate
Survey	One 4-person crew	19.7 miles	1 mile/day
Material Staging yards	One 4-person crew	--	--
Right-of-way clearing	One 5-person crew	2.3 miles	0.25 miles/day
Roads and landing work	One 5-person crew	8.0 miles	0.5 miles/day and 4 structure pads/day
Guard structure installation	One 6-person crew	80 structures	4 structures/day
Remove existing conductor optical groundwire	One 14-person crew	2.2 circuit miles	0.25 mile/day
Remove existing towers	One 6-person crew	26 towers	1.5 towers/day
Remove existing tower foundations	Two 4-person crews	26 towers	2.5 tower foundations (10 footings)/day
Install foundations for towers	One 9-person crew	12 towers	0.75 towers/day
Tower Steel haul	One 4-person crew	12 towers	1 tower/day
Tower Steel assembly	Two 7-person crews	12 towers	0.5 towers/day
Tower erection	One 8-person crew	12 towers	1 tower/day
Install foundations for poles	One 7-person crew	108 tubular poles	2 tubular poles/day
Pole haul	One 4-person crew	108 tubular poles	4 tubular poles/day
Pole assembly	One 8-person crew	108 tubular poles	2 tubular poles/day
Pole erection	One 8-person crew	108 tubular poles	2 tubular poles/day
Conductor and optical ground wire installation	Four 8-person crews	39.4 miles	0.35 miles/day
Guard structure removal	One 6-person crew	80 structures	4 structures/day
Rector Substation	One 8-person crew	See section 2.7.2	--
Big Creek 3 Substation	One 7-person crew	See section 2.7.2	--
Springville Substation	One 7-person crew	See section 2.7.2	--
Vestal Substation	One 7-person crew	See section 2.7.2	--
Restoration	One 7-person crew	19.7 miles	1 mile/day

SOURCE: SCE, 2008b.

TABLE 2-8
PROPOSED CONSTRUCTION TIMETABLE

Proposed Project Component	Duration (months)	Estimated Schedule
Material Staging Yard preparation	Less than 1	October 2012
ROW clearing, access road and structure pad construction	3	October – December 2012
Demolition of 1.1 miles of existing Big Creek 3 – Rector 220 kV transmission facilities	1	October 2012
Construction of 1.1 miles of new Big Creek 1-Rector and Big Creek 3 – Rector 220 kV double circuit transmission line	2	November – December 2012
Demolition of 1.1 miles of existing Big Creek 1-Rector 220 kV transmission facilities	1	January 2013
Construction of 18.5 miles of new 220 kV double circuit transmission line	10	January – October 2013
Post construction clean-up and restoration	1	November 2013

SOURCE: SCE, 2008b.

requirements, weekend, evening, and night work may also be required due to the scheduling of system outages and construction schedules. Construction would commence following CPUC approval, final engineering and procurement activities. The Proposed Project is currently scheduled to begin operation in October 2012.

2.8 Operation and Maintenance

2.8.1 220 kV Transmission Lines

The transmission facilities associated with the Proposed Project would be inspected, maintained, and repaired following completion of construction in a manner consistent with good maintenance and repair practices. This involves both routing preventative maintenance and emergency procedures to maintain service continuity. Aerial and ground inspections of project facilities would be performed. Components would be inspected annually, at a minimum, for corrosion, equipment misalignment, loose fittings and other common mechanical problems.

The access and spur roads constructed as part of the Proposed Project would be inspected, maintained, and repaired following the completion of construction in a manner consistent with SCE's road maintenance and repair practices. This involves both routine preventive maintenance and emergency response procedures to maintain continuity of access to SCE's transmission facilities. At a minimum, during the annual aerial and/or ground inspections of the transmission facilities, the roads would also be inspected for damage.

Maintenance of the transmission facilities would include limitations on certain land uses and maintenance of vegetation height within the ROW. Land uses that would typically be permitted within the ROW after project completion include agricultural and landscaping, underground facilities, biking and hiking trails, and automotive vehicle parking. Specific requirements associated with these activities include:

Agricultural and landscaping

- Vegetation must maintain standard clearances from structures (typically 50 feet);
- Shrubs and trees must be maintained not to exceed 15 feet maximum height;
- Some trees (i.e., walnut) and shrubs would be subject to species limitations specified by SCE.

Underground facilities, such as utility services and irrigation systems

- A minimum of 36 inches of cover measured from the top of the conduit or pipe to the surface of the ground must be maintained;
- Facility must be able to withstand a gross load of 40 tons on three axles;
- No valves or controllers of any type would be permitted in the ROW
- No parallel or longitudinal encroachments would be permitted;
- All underground improvements crossing in the ROW must be perpendicular to the centerline of the ROW.

<u>*Biking and Hiking Trails*</u>

- Permitted at low intensity use.

<u>*Automotive vehicle parking*</u>

- Reviewed on a case-by-case basis.

2.8.2 Substations

Rector Substation, Big Creek 3 Substation, Springville Substation, and Vestal Substation are all existing substations. The Rector Substation is a staffed substation. Current on-going routine operations and maintenance activities would be sufficient and no additional activities would be required under the Proposed Project.

2.9 Electric and Magnetic Fields Summary

2.9.1 Electric and Magnetic Fields

This EIR does not consider electric and magnetic fields (EMF) in the context of the CEQA analysis of potential environmental impacts because [1] there is no agreement among scientists that EMF creates a potential health risk, and [2] there are no defined or adopted CEQA standards for defining health risk from EMF. However, recognizing that there is a great deal of public interest and concern regarding potential health effects from human exposure to EMF from transmission lines, this document does provide information regarding EMF associated with electric utility facilities and human health and safety. Thus, the EMF information in this EIR is presented for the benefit of the public and decision makers.

Potential health effects from exposure to *electric fields* from transmission lines (i.e., the effect produced by the existence of an electric charge, such as an electron, ion, or proton, in the volume of space or medium that surrounds it) typically do not present a human health risk since electric fields are effectively shielded by materials such as trees, walls, etc. Therefore, the majority of the following information related to EMF focuses primarily on exposure to *magnetic fields* (i.e., the invisible fields created by moving charges) from transmission lines. Additional information on electric and magnetic fields generated by transmission lines is presented in Appendix D.

After several decades of study regarding potential public health risks from exposure to power line EMF, research results remains inconclusive. Several national and international panels have conducted reviews of data from multiple studies and state that there is not sufficient evidence to conclude that EMF causes cancer. Most recently the International Agency for Research on Cancer (IARC) and the California Department of Health Services (DHS) both classified EMF as a *possible* carcinogen.

Presently, there are no applicable federal, State or local regulations related to EMF levels from power lines or related facilities, such as substations. However, the California Public Utilities Commission has implemented a decision (D.06-01-042) requiring utilities to incorporate "low-cost" or "no-cost" measures for managing EMF from power lines up to approximately four percent of total project cost. Using the four percent benchmark, SCE has incorporated low-cost and no-cost measures to reduce magnetic field levels along the transmission corridor.

2.9.2 EMF and the Proposed Project

SCE has conducted a design comparison of calculated magnetic field levels for both the 1.1 mile replacement section and the 17.4 miles of new transmission line. Figure 2-9 and Table 2-9 show a comparison of magnetic field levels for the existing design and the Proposed Project within the existing 1.1 miles of ROW and the calculated magnetic field levels for the Proposed Project within the new 17.4 miles of ROW.

TABLE 2-9
COMPARISON OF CALCULATED MAGNETIC FIELDS AT EDGES OF RIGHT OF WAY

Design Options	Left ROW (mG)	% Reduction	Right ROW (mG)	% Reduction
1.1-Mile Replacement Segment (Existing ROW)				
Existing 220 kV Design	85.9	Base	77.6	Base
Proposed 220 kV Design	15.8	81.6	17.0	78.1
Proposed 220 kV Design + 10 Feet	12.9	18.4	14.7	13.5
17.4-Mile New Transmission Line Segment (New ROW)				
Proposed 220 kV Design	12.3	Base	35.7	Base
Proposed 220 kV Design + 10 Feet	11.0	10.6	26.2	26.6

NOTE: This table lists calculated magnetic field levels for design comparison only and is not meant to predict actual magnetic field levels.

SOURCE: SCE, 2008b.

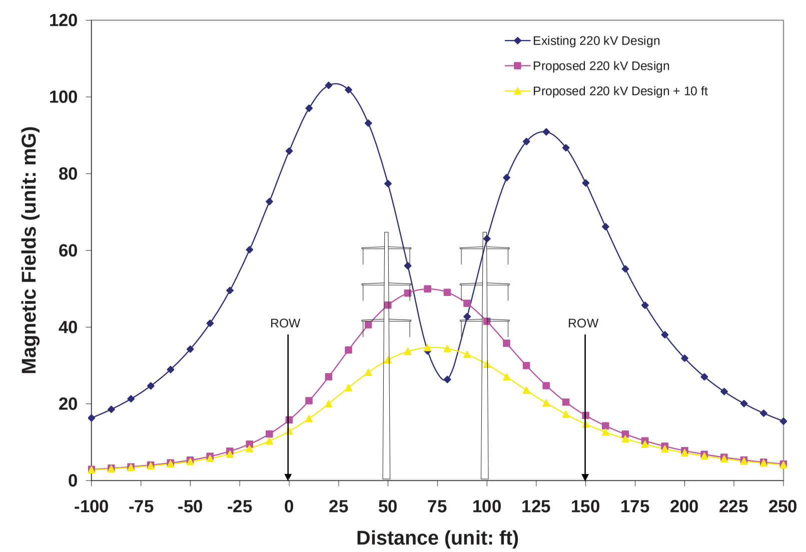
In accordance with the EMF Design Guidelines, filed with the CPUC in compliance with CPUC Decisions 93-11-013 and 06-01-042, the proposed project would implement the following "no-cost and low-cost" magnetic field reduction measures. The field reduction measures would include:

For the 220 kV Transmission Line Alignment (first 1.1 miles north of Rector Substation, existing ROW)

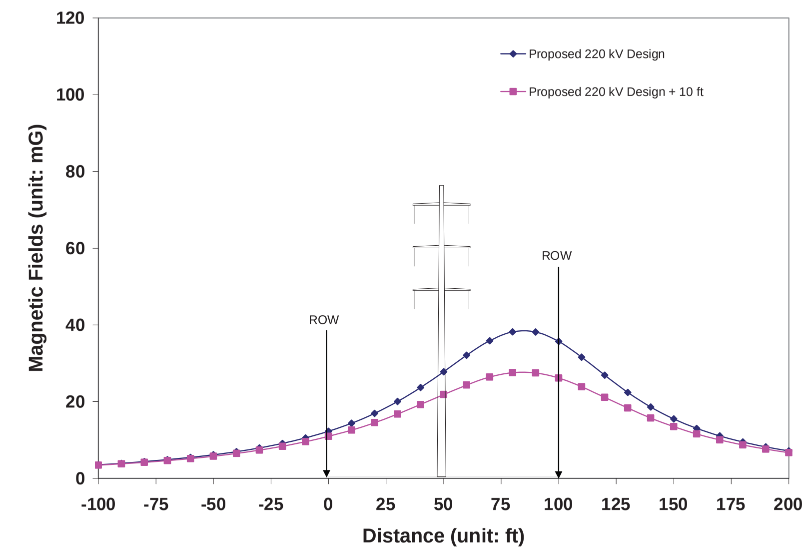
- Using a double circuit pole-head configuration for the proposed 220 kV lines.
- Using poles which are 10 feet taller where homes are immediately adjacent to the edges of the ROW; and
- Implementing phasing arrangements to reduce magnetic field levels at edge(s) of ROW. Recommended phasing arrangements are as follows:
  - Big Creek 3-Rector No 1 220 kV : A-C-B (top to bottom)
  - Big Creek 1-Rector 220 kV : B-C-A (top to bottom)
  - Big Creek 3-Rector No. 2 220 kV – B-A-C (top to bottom)
  - Rector-Springville 220 kV : C-A-B (top to bottom)

A Design Comparison of Calculated Magnetic Field Level[1] from Rector Substation to Mile 1.1

Existing 220kV Transmission Line vs the Proposed Project



A Design Comparison of Calculated Magnetic Field Level[1] from Mile 1.1
to the Big Creek-Springville Transmission Line tie-in point



[1] This graph depicts calculated magnetic field levels for design comparison only and is not meant to predict actual magnetic field levels.

SOURCE: SCE, 2008

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Figure 2-9
EMF Levels

For the 220 kV Transmission Line Alignment (17.4 miles of new ROW)

- Using a double circuit pole-head configuration for the proposed 220 kV transmission lines.
- Using poles which are 10 feet taller where homes are immediately adjacent to the edges of the ROW.
- Implementing phasing arrangements to reduce magnetic field levels at edges of ROW. Recommended phasing arrangements are as follows:
  - Big Creek 3-Rector No. 2 220 kV : B-A-C (top-to-bottom)
  - Rector-Springville 220 kV : C-A-B (top-to-bottom)

2.10 Required Permits and Approvals

The CPUC is the CEQA lead agency for the Proposed Project. SCE would obtain permits, approval or licenses as need from, and would participate in reviews and consultation as needed with, federal, State and local agencies as show in Table 2-10.

TABLE 2-10
SUMMARY OF PERMITS REQUIREMENTS

Permit/Approval/Consultation	Agency	Jurisdiction/Purpose
Federal Agencies		
Section 7 Consultation, Endangered Species Act	U.S. Fish and Wildlife Service	Construction, operation, and maintenance on land that may affect a federally listed species or its habitat; incidental take authorization (if required)
Section 10 of the Rivers and Harbors Act	U.S. Army Corps of Engineers	Construction across Navigable Waters
Nationwide or Individual Permit (Section 404 of the Clean Water Act)	U.S. Army Corps of Engineers	Construction impacting Waters of the United States, including wetlands
Section 106 Review, National Historic Preservation Act	Advisory Council on Historic Preservation	Construction, operation, and maintenance on land that may affect cultural or historic resources
State Agencies		
Certificate of Public Convenience and Necessity	California Public Utilities Commission	Overall project approval and California Environmental Quality Act review
National Pollutant Discharge Elimination System Construction Storm water Permit	RWQCB	Storm water discharges associated with construction activities disturbing more than one acre of land
Section 401 Water Quality Certification (or waiver)	RWQCB	Certifies that project is consistent with state water quality standards
Encroachment Permit	California Department of Transportation	Construction, operation, and maintenance within, under, or over state highway ROW
Endangered Species Consultation	California Department of Fish and Game	Construction, operation, and maintenance that may affect a state-listed species or its habitat; incidental take authorization (if required)
Local Agencies		
Encroachment Permit (ministerial)	City of Visalia City of Farmersville Tulare County	Construction, operation, and maintenance within, under, or over city road ROW

References – Project Description

Southern California Edison Company (SCE) 2008a. Application of Southern California Edison Company for a Certificate of Public Convenience and Necessity to Construct the San Joaquin Cross Valley Loop Transmission Project. Filed May 30, 2008.

SCE 2008b. Proponent's Environmental Assessment San Joaquin Cross Valley Loop Project. Filed May 30, 2008.

SCE 2008c. Response to Data Request #1. June 17, 2008.

SCE 2008d. Response to Data Request #2. June 23, 2008.

SCE 2008e. Response to Data Request #3. August 7, 2008.

SCE 2008f. Response to Data Request #4. August 21, 2008.

SCE 2008g. Response to Data Request #5. November 26, 2008.

SCE 2009. Response to Data Request #6. February 6, 2009.