PUBLIC UTILITIES COMMISSION OF THE

STATE OF CALIFORNIA

In the Matter of the Application of SOUTHERN CALIFORNIA EDISON COMPANY (U 338-E) for a Permit to Construct Electrical Facilities With Voltages Between 50kV and 200 kV: Ivanpah-Control Project.	Application No. 19-07-xxx (Filed July 17, 2019)

PROPONENT'S ENVIRONMENTAL ASSESSMENT IVANPAH-CONTROL PROJECT

VOLUME 1 (CHAPTER 1-3)

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IVANPAH-CONTROL PROJECT

PROPONENT'S ENVIRONMENTAL ASSESSMENT

Prepared for
California Public Utilities Commission

Prepared by

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL® Company

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Common Acronyms and Abbreviations

A	ampere
AB	Assembly Bill
ACCC	aluminum conductor composite core
ACEC	Area of Critical Environmental Concern
ACSR	aluminum conductor steel-reinforced
ADSS	all-dielectric self-supporting
AGL	above ground level
amsl	above mean sea level
APE	area of potential effects
APM	applicant-proposed measure
BLM	U.S. Bureau of Land Management
BMP	best management practices
BP	before present
C	centigrade
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAISO	California Independent System Operator
CALFIRE	California Department of Forestry and Fire Protection
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CATTCH	California Temporary Traffic Control Handbook
CCR	California Code of Regulations
CCR	California Code of Regulations
CDCA	California Desert Conservation Area
CDFW	California Department of Fish and Wildlife
CDWR	California Department of Water Resources
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGS	California Geological Survey
CHSC	California Health and Safety Code
CLNAWS	China Lake Naval Air Weapons Station
CLUP	Comprehensive Land Use Plan
CMA	conservation management action
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CRMP	Cultural Resource Management Plan
CWA	Clean Water Act

DOC	Department of Conservation
DoD	Department of Defense
DOI	United States Department of the Interior
DRECP	Desert Renewable Energy Conservation Plan
EKAPCD	Eastern Kern Air Pollution Control District
EOP	Emergency Operations Plan
EPA	United States Environmental Protection Agency
ERMA	Extensive Recreation Management Area
ESA	Environmentally Sensitive Area
F	Fahrenheit
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FLPMA	Federal Land Policy and Management Act of 1976
FTA	Federal Transit Administration
GBUAPCD	Great Basin Unified Air Pollution Control District
GBVAB	Great Basin Valleys Air Basin
GIS	geographic information system
GO	General Order
GPS	global positioning system
HMMP	Hazardous Materials Management Plan
HRMP	Habitat Restoration Management Plan
IC Project	Ivanpah-Control Project
IWMP	Integrated Weed Management Plan
km	kilometer
kV	kilovolt
LADWP	Los Angeles Department of Water and Power
LIDAR	Light Detection and Ranging
LUPA	Land Use Plan Amendment
LWS	lightweight steel
MCLB	Marine Corps Logistics Base
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MDPA	Mojave Desert Planning Area
MEER	mechanical electrical equipment room
MUTCD	Manual on Uniform Traffic Control Devices
MVA	mega-volt ampere
MW	megawatt
NEPA	National Environmental Policy Act
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
NRCS	Natural Resources Conservation Service

NWP	Nationwide Permit
O&M	operation and maintenance
OHGW	overhead groundwire
OHV	off-highway vehicle
OPGW	optical groundwire
PEA	Proponent’s Environmental Assessment
PRC	California Public Resources Code
PTC	Permit to Construct
RMP	Resource Management Plan
ROD	Record of Decision
ROW	right of way
RWQCB	Regional Water Quality Control Board
SAA	Streambed Alteration Agreement
SAC	stranded aluminum conductor
SCADA	Supervisory Control and Data Acquisition
SCE	Southern California Edison
SLF	Sacred Lands File
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route
SRMA	Special Recreation Management Area
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TLRR	Transmission Line Rating Remediation
TSP	tubular steel pole
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USGS	United States Geological Survey
WEAP	Worker’s Environmental Awareness Training Program
WECC	Western Electricity Coordinating Council

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Chapter 1 PEA Summary

In accordance with California Public Utilities Commission (CPUC) General Order 131-D (GO 131-D), Southern California Edison Company (SCE) is submitting this Proponent's Environmental Assessment (PEA) as part of its application for a Permit to Construct (PTC) for the Ivanpah-Control Project (IC Project) in unincorporated portions of Inyo County, Kern County, and San Bernardino County, and in the City of Barstow. Figure 1.1-1, IC Project Location, shows the location of the IC Project in relation to the larger regional area.

SCE has analyzed several alternatives to fulfill the purpose and need of the IC Project. For purposes of providing the most conservative environmental analysis of all potential environmental impacts associated with the IC Project, this PEA describes and analyzes a project that would involve a complete rebuild of five existing 115 kilovolt (kV) electrical subtransmission line segments between SCE's Ivanpah Substation and SCE's Control Substation (the "Full Rebuild Concept").[1] Nevertheless, as described in further detail in Chapter 5 of this PEA as well as in the PTC application filed concurrently with this PEA, SCE proposes to construct a lesser-scope alternative (identified in Chapter 5 as "Alternative E") that would involve derating some existing components of the electrical system and thereby avoid the need for a full rebuild of that 115 kV infrastructure.

1.1 Project Components

The Full-Rebuild Concept consists of the following major components:

- Subtransmission. Rebuild 358 miles of existing 115 kV subtransmission circuits[2] by:
    - Removing existing subtransmission towers and poles and replacing them with tubular steel poles (TSPs), lightweight steel (LWS) poles, LWS pole H-frames, and multi-pole TSP and LWS pole structures.
    - Removing existing conductor and installing new Aluminum Conductor Composite Core (ACCC) 'Dove' conductor on replacement structures.
    - Installing overhead groundwire (OHGW) in some locations for system protection.
- Distribution
    - Remove existing distribution conductor and appurtenances and install new distribution conductor and appurtenances on replacement structures.
- Telecommunications/System Protection
    - Install approximately 360 miles of optical groundwire (OPGW) and/or All-Dielectric Self-Supporting (ADSS) fiber optic cable overhead on replacement structures and new structures.
    - Install approximately 2,500 feet of fiber optic cable underground within existing substations, and approximately 5,000 feet underground outside of existing substations.
    - Install system protection and telecommunications-associated equipment at existing substations.

[1] Throughout this PEA document, the term "Full-Rebuild Concept" is used to refer to the scope of work described in Chapter 3, analyzed in Chapter 4 and further discussed in Chapter 5. The term "IC Project Alignment" is used to describe the physical location of the area in which either the Full Rebuild Concept or any of the Alternatives described in Chapter 5 would be located.

[2] SCE identifies electrical lines operated at voltages between 50 kilovolts (kV) and 200 kV as subtransmission lines or subtransmission circuits. Electrical lines operated at voltages greater than 200 kV are identified as transmission lines.

- Substations
  - Disconnect existing conductor from existing positions at substations and connect new conductor to those existing positions.
  - Install new OHGW and make minor modifications to the existing racks to accommodate the new OHGW.
  - Install cabling between existing breakers to the existing mechanical electrical equipment room (MEER)/communication room/telecommunications cabinet and install new relay and protection racks in the existing MEER/communication room/telecommunications cabinet.

1.2 Project Location

The IC Project is located wholly in southern California. The subtransmission lines included in the IC Project are located in Inyo County, northeast Kern County, northern San Bernardino County, and in the City of Barstow (see Figure 1.1-1, IC Project Location). The IC Project's northern/western terminus is at Control Substation, located approximately 5 miles west of the City of Bishop in Inyo County. The IC Project's eastern terminus is at Ivanpah Substation, located in California approximately 6 miles southwest of Primm, Nevada. The IC Project is divided into five geographic Segments as shown in Figureset 1.1-2.

1.3 Project Objectives and Alternatives

California Public Utilities Commission GO 95 Rules 37 through 39 specify minimum vertical and horizontal clearances that must be maintained between an electrical conductor and other conductors, or between a conductor and the ground, buildings, and a variety of other objects.

In 2006, SCE identified discrepancies along many of its circuits where minimum clearances are not being met compared to what is required by GO 95. In response, SCE established its Transmission Line Rating Remediation (TLRR) Program. The TLRR Program is focused on developing and implementing engineering solutions for each identified discrepancy, and thus to bring the circuits into compliance with CPUC GO 95 and the California Independent System Operator (CAISO) 2008 Transmission Register. SCE is planning to remediate all discrepancies on its bulk electric system facilities by 2025 and to fix all discrepancies on its 115 kV radial lines by 2030. All subtransmission lines, which make up the IC Project are 115 kV and also a part of the bulk electric system, and as such, are expected to be corrected prior to January 1, 2025.

As described further in *Chapter 2 – Project Purpose and Need and Objectives*, the IC Project is being proposed to meet the following objectives:

- Ensure compliance with CPUC General Order 95 and North American Electric Reliability Corporation (NERC) Facility Ratings for this project by 2025
- Continue to provide safe and reliable electrical service
- Meet IC Project needs while minimizing environmental impacts
- Design and construct the physical components of the IC Project in conformance with industry and/or SCE's approved engineering, design, and construction standards for substation and subtransmission system projects.

As presented in Chapter 5, six types of corrective actions through which discrepancies may be remediated have been analyzed: Rebuild; Decommission and Remove; Operating Voltage Increase; Energy Storage; Derate Only; and Derate and Remediate Remaining GO 95 Discrepancies. The feasibility of these corrective actions is summarized in Chapter 5. Based on the results of the feasibility of each corrective action for each Segment, six Comprehensive Project Alternatives were developed.

SCE has engaged in discussions with the CAISO regarding the viability of the Comprehensive Project Alternatives. SCE requested-the CAISO line rating for certain circuits be lowered (i.e. derated) with certain upgrades; that is, SCE requested that these circuits operate at a reduced amperage. Operating these circuits at a lower amperage would reduce the maximum operating temperature at which the conductors that comprise these circuits operate. The reduction in the operating temperature would cause the conductors to 'sag' less; that is, the distance between the ground and the conductor would be increased. The reduction in 'sag' would, in and of itself, allow for a reduced scope of work. Late in the first quarter of 2019, SCE received the results of the CAISO review: the CAISO review did not identify any concerns regarding the suitability of the SCE-proposed Comprehensive Project Alternatives A, C, and E. SCE has identified Comprehensive Project Alternative E as described in Chapter 5 as its preferred project.

In addition, as described further in Section 5.2 of this PEA, SCE continues to develop and evaluate alternatives, and SCE expects to supplement this PEA with an additional report regarding the potential feasibility and environmental impacts associated with such additional alternatives. However, in order to not delay the CPUC's analysis and permitting processes, SCE developed this PEA document to describe the most-comprehensive scope of work that could be employed to remediate discrepancies along the circuits included under the Full-Rebuild Concept.

1.4 Agency Coordination

SCE has met, consulted with, and/or communicated with representatives from the U.S. Bureau of Land Management (BLM), CPUC, the counties of Inyo, Kern, and San Bernardino, and the City of Barstow as well as a number of other agencies in the project area.

1.4.1 United States Bureau of Land Management

In February 2018, SCE provided an in-depth presentation of the IC Project during a joint meeting with the CPUC and BLM in which GO 131-D, California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) scheduling were discussed. Following the February 2018 meeting, SCE began holding monthly Proponent meetings with the CPUC and BLM to discuss coordination of the CEQA and NEPA review processes.

In August 2018, SCE met with the BLM NEPA Program Manager for the IC Project, BLM staff from the Desert District and associated field offices, and representatives from the Inyo National Forest and CPUC to discuss a range of topics including project scope and schedule, permitting/licensing approaches, and other topics.

In September 2018, SCE met with the BLM National Project Manager, BLM Desert District leadership and representatives from Desert District field offices, and the CPUC to provide an update on the revised grouping of the CPUC-licensed projects that cross BLM-managed lands (i.e. Control-Silver Peak, Ivanpah-Control, and Eldorado-Pisgah-Lugo) and the proposed timelines for each of the projects.

In addition to these CEQA/NEPA coordination meetings, SCE staff have been and are coordinating with BLM staff in the Bishop, Ridgecrest, and Needles Field Offices to obtain Field Work Authorizations for cultural resources surveys and permissions for geotechnical investigations along the IC Project Alignment.

1.4.2 China Lake Naval Air Warfare Station

SCE initiated consultation with the Navy on December 13, 2018 regarding pole heights on the IC Project and additional emails were sent throughout January 2019. SCE would continue consultation with the Navy throughout project development.

1.4.3 Edwards Air Force Base

SCE initiated consultation with the Air Force in the fourth quarter of 2018 and would continue consultation throughout project development.

1.4.4 Marine Corps Logistics Base Barstow

SCE initiated consultation with the Marine Corps in the fourth quarter of 2018 and would continue consultation throughout project development.

1.4.5 California Public Utilities Commission

Beginning in April 2016, SCE included in its quarterly presentations to the CPUC a high-level description of the TLRR Program projects that were expected to be licensed under GO 131-D; included in these presentations was information regarding the components of the IC Project.

In February 2018, SCE provided an in-depth presentation of the components of the IC Project during a joint meeting with the CPUC and BLM in which GO 131-D, CEQA and NEPA scheduling were discussed. Following the February 2018 meeting, SCE began holding monthly Proponent meetings with the CPUC and BLM to discuss coordination of the CEQA and NEPA review processes.

In August 2018, SCE met with staff from the CPUC, the BLM NEPA Program Manager for the IC Project, BLM staff from the Desert District and associated field offices, and representatives from the Inyo National Forest to discuss a range of topics including project scope and schedule, permitting/licensing approaches, and other topics.

In September 2018, SCE met with the BLM National Project Manager, BLM Desert District leadership and representatives from Desert District field offices, and the CPUC to provide an update on the revised grouping of the CPUC-licensed projects that cross BLM-managed lands (i.e. Control-Silver Peak, Ivanpah-Control, and Eldorado-Pisgah-Lugo) and the proposed timelines for each of the projects.

1.4.6 California Department of Transportation

SCE staff met with California Department of Transportation, District 9 staff in December 2018 to discuss the IC Project.

1.4.7 Inyo County

SCE Local Public Affairs staff briefed County officials on the TLRR Program, including components of the IC Project, in 2017 and 2018 and would continue providing briefings throughout project development.

1.4.8 Kern County

SCE Local Public Affairs staff have provided annual briefings in 2017 and 2018 to the Kern County Planning Director on the TLRR Program, including components of the IC Project, and would continue providing briefings throughout project development.

1.4.9 San Bernardino County

SCE Local Public Affairs staff briefed County staff on the TLRR Program, including components of the IC Project, in 2017 and 2018 and would continue providing briefings throughout project development.

1.4.10 City of Barstow

SCE Local Public Affairs staff discussed the TLRR Program, including components of the IC Project, as part of their regular briefings with City staff in 2017 and 2018 and would continue providing briefings throughout project development.

1.4.11 Los Angeles Department of Water and Power

SCE staff met with Los Angeles Department of Water and Power (LADWP) staff in June 2018 to discuss the IC Project in general; in July 2018 to discuss construction of the IC Project; and in September 2018 to discuss real properties topics and inter-utility communications protocols. SCE would continue discussions with LADWP throughout project development.

1.5 PEA Contents

This PEA, which was prepared in accordance with the November 24, 2008 WORKING DRAFT Proponent's Environmental Assessment (PEA) Checklist for Transmission Line and Substation Projects issued by the CPUC, is divided into five Chapters. *Chapter 1 – PEA Summary* discusses the contents and conclusions of the PEA and describes SCE's ongoing and past coordination efforts. *Chapter 2 – Project Purpose and Need and Objectives* outlines the IC Project's objectives.

A detailed description of the Full-Rebuild Concept is provided in *Chapter 3 – Project Description*. This discussion includes specifics regarding the IC Project location, existing system, the Full-Rebuild Concept's components, permanent and temporary land/ROW requirements, construction methods, construction schedule, anticipated operations and maintenance activities, and federal, state, and local ministerial permits that would be obtained for the Full-Rebuild Concept.

Chapter 4 – Environmental Impact Assessment Summary includes an environmental impact assessment summary and a discussion of the existing conditions and potential anticipated impacts of the Full-Rebuild Concept for each of the resource areas identified by the CEQA Guidelines. The CPUC's Checklist indicates that the environmental setting section can be provided separately or combined with the impacts and applicant-proposed measures (APMs). SCE has elected to combine the environmental setting, impacts, and APMs for each resources area in Chapter 4.

Chapter 5 – Detailed Discussion of Significant Impacts identifies the potentially significant impacts resulting from the Full-Rebuild Concept, evaluates alternatives to the Full-Rebuild Concept, describes the justification for the preferred alternative (Alternative E) and discusses the Full-Rebuild Concept's potential to induce growth in the area.

Chapter 6 – Other Process-Related Data Needs includes a list of all parcels within 300 feet of the IC Project Alignment.

Throughout this PEA, SCE has addressed all items in the CPUC PEA Checklist. To facilitate confirmation of this and review of the PEA, Table 1.5-1: PEA Checklist Key, which identifies the section in which each checklist item is addressed, has been included at the end of this section.

1.6 PEA Conclusions

This PEA analyzes the potential environmental impacts associated with construction of the Full-Rebuild Concept. The following thirteen resource areas would not be impacted by the Full-Rebuild Concept or would experience less-than-significant impacts:

- Aesthetics
- Agriculture and Forestry Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Utilities and Service Systems
- Wildfire

Although the Full-Rebuild Concept would result in potentially significant impacts to the following seven resource areas, impacts to these resource areas would be reduced with the implementation of APMs. The APMs that would be implemented to reduce impacts are discussed in detail in the relevant sections of Chapter 4. The impacts associated with the alternatives are addressed in Chapter 5. The Full-Rebuild Concept impacts which would be reduced are summarized as follows:

Air Quality. Annual emissions from construction of the Full-Rebuild Project, in total and ensuring compliance with applicable air district regulations, would potentially exceed applicable significance thresholds for nitrogen oxides (NO_x) and carbon monoxide (CO). Annual emissions from construction of the Full-Rebuild Project would exceed the applicable significance threshold for NO_x. These exceedances would be unavoidable, and therefore, the Full-Rebuild Project would violate an air quality standard.

The Full-Rebuild Project is located in air basins that are classified as nonattainment for ozone and particulate matter (PM_{10}). NO_x (an ozone precursor) emissions would exceed the applicable significance thresholds. Thus, construction of the Full-Rebuild Project would result in a cumulatively considerable net increase of a criteria pollutant; this impact would be significant and unavoidable.

Biological Resources. Construction of the Full-Rebuild Project would result in potential permanent and temporary impacts to special-status plant and wildlife species. In addition, construction of the Full-Rebuild Project would result in impacts to designated critical habitat for the desert tortoise and proposed critical habitat for the yellow-billed cuckoo. Construction of the Full-Rebuild Project would also result in permanent and temporary impacts to aquatic resources under the jurisdiction of the United States Army Corps of Engineers, the Regional Water Quality Control Boards, and the California Department of Fish and Wildlife. With the implementation of APMs, the Full-Rebuild Project's impacts to biological resources would be reduced to less-than-significant levels.

Cultural Resources. SCE has performed cultural resource records searches for the IC Project Alignment, which traverses an area of potentially significant historical and archaeological resources. Completion of the Cultural Resources evaluation is pending the completion of pedestrian surveys along the length of the IC Project Alignment.

SCE sent a letter to the Native American Heritage Center (NAHC) regarding the IC Project in December 2018. The NAHC responded on December 28, 2018, stating that the Sacred Lands File (SLF) database includes previously identified sacred sites in the vicinity of the IC Project. In consideration of these culturally significant sacred sites, the NAHC suggested contacting two Native American tribes for more information. The NAHC also forwarded a list of 12 Native American groups or individuals that are culturally affiliated with the project area. The results of the NAHC SLF search would be provided to the CPUC and BLM for use in their respective Native American consultation efforts.

Further, the IC Project Alignment would also need to be evaluated for paleontological resources. Pedestrian surveys are pending agency approval.

Hazards and Hazardous Materials. Construction of the Full-Rebuild Project could potentially create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials, and components of the Full-Rebuild Project would also be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. However, impacts would be reduced to a less-than-significant level with development and implementation of a Hazardous Materials Management Plan (HMMP) per APM HAZ-1, a Soil Management Plan per APM HAZ-2, and the training of workers in the Worker's Environmental Awareness Training Program per APM WEAP.

Noise. Construction of the Full-Rebuild Project could temporarily and intermittently expose persons to, or generate, noise levels in excess of standards established in the local general plan or noise ordinance. With implementation of noise-related APM NOI-1, the Full-Rebuild Project would avoid or minimize impacts associated with noise.

Transportation. Construction of the Full-Rebuild Concept could impact the movement of vehicles, including emergency service vehicles, along public roads across the breadth of the IC Project Alignment. Per APM TRA-1, SCE would follow its standard safety practices, including installing appropriate traffic control devices between work zones and transportation facilities, posting adequate signs, and using proper construction techniques. SCE is a member of the California Inter-Utility Coordinating Committee, which published the Manual on Uniform Traffic Control Devices, as amended for the state of California (CA MUTCD; CALTRANS 2018) and using standard templates from the California Temporary Traffic Control Handbook. (CATTCH 2018) SCE would follow the recommendations in this manual regarding basic standards for the safe movement of traffic on highways and streets in accordance with Section 21400 of the CVC. These recommendations include provisions for safe access of police, fire, and other rescue vehicles.

Tribal Cultural Resources. SCE has performed cultural resource records searches for the IC Project Alignment, which traverses an area of significant historical and archaeological resources. Completion of the Tribal Cultural Resources evaluation is pending the completion of pedestrian surveys along the length of the IC Project Alignment.

The APMs that would be implemented to reduce impacts are discussed in detail in their relevant sections in Chapter 4, Environmental Impact Assessment Summary.

1.7 Public Outreach

Public outreach and communications are critical elements of SCE's planning process. SCE identified and reached out to key stakeholders in the IC Project area to solicit input and provide information about the IC Project. SCE Local Public Affairs staff met with staff from the Desert Mountain Resource Conservation and Development Council in 2017 to discuss the IC Project. Following that meeting, SCE staff met with the Executive Director of the Council later in 2017. The Council communicated that it will work with

SCE to communicate information to the sparsely populated areas traversed by the IC Project. SCE would include the Council in its upcoming initial public information mailing regarding the IC Project.

SCE plans to provide periodic updates to local jurisdictions at key milestones throughout the IC Project process, such as prior to filing an application for a Permit to Construct, immediately after a final decision, and prior to the start of construction (assuming the IC Project is approved).

SCE sent to local residents and local government officials a mailer in December 2018. This mailer included a summary of the Full-Rebuild Concept, a figure illustrating the IC Project Alignment, and a summary of potential project activities and impacts. A copy of this mailer is provided in Appendix D to this PEA, and is available on SCE's Project website at https://www.sce.com/about-us/reliability/upgrading-transmission/Ivanpah-Control.

1.7.1 Controversy and/or Major Issues

No areas of controversy or major issues related to the IC Project, including the Full-Rebuild Concept, have been communicated to SCE by representatives from Inyo County, Kern County, San Bernardino County, the City of Barstow, or the Desert Mountain Resource Conservation and Development Council.

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
Chapter 1: PEA Summary		
	Include major conclusions of the PEA	Section 1.6, PEA Conclusions
	List any areas of controversy	Section 1.7.1, Controversy and/or Major Issues
	Include a description of public outreach efforts, if any	Section 1.7, Public Outreach
	Include a description of inter-agency coordination, if any	Section 1.4, Agency Coordination
	Identify any major issues that must be resolved, including the choice among reasonably feasible alternatives and mitigation measures, if any	Section 1.7.1, Controversy and/or Major Issues
Chapter 2: Project Purpose and Need		
2.1 Overview	Include an analysis of Project objectives and purpose and need that is sufficiently detailed so that the Commission can independently evaluate the Project need and benefits in order to accurately consider them in light of the potential environmental impacts	Section 2.1, Overview Section 2.2, Project Objectives
	Explain the objective(s) and/or purpose and need for implementing the Project	Section 2.2, Project Objectives
2.2 Project Objectives	Include an analysis of the reason why attainment of these objectives is necessary or desirable. Such analysis must be sufficiently detailed to inform the Commission in its independent formulation of Proposed Project objectives which will aid any appropriate CEQA alternatives screening process	Section 2.2, Project Objectives
Chapter 3: Project Description		
3.1 Project Location	Identify geographical location: county, city (provide Proposed Project location map[s])	Section 3.1, Project Location; Figure 1.1-1, IC Project Location
	Provide a general description of land uses within the Proposed Project site (e.g., residential, commercial, agricultural, recreation, vineyards, farms, open space, number of stream crossings, etc.)	Section 3.1, Project Location Section 4.10, Land Use
	Describe if the Proposed Project is located within an existing property owned by the applicant, traverses existing ROW, or requires new ROW. Provide the approximate area of the property or the length of the Proposed Project that is in an existing ROW or which requires new ROWs	Section 3.1, Project Location Section 3.6, Right-of-Way Requirements
3.2 Existing System	Describe the local system to which the Proposed Project relates. Include all relevant information about substations, transmission lines, and distribution circuits	Section 3.2, Existing System
	Provide a schematic diagram and map of the existing system	Figure 3.2-1, Existing System
	Provide a schematic diagram that illustrates the system as it would be configured with the implementation of the Proposed Project	NA; no change to system
3.3 Project Objectives	Can refer to Chapter 2 Project Purpose and Need, if already described there	Section 2.2, Project Objectives

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
		Section 3.3, Project Objectives
3.4 Proposed Project	Describe the whole of the Proposed Project. Is it an upgrade, a new line, new substations, etc.?	Section 3.4, Full-Rebuild Concept
	Describe how the Proposed Project fits into the regional system. Does it create a loop for reliability, etc.?	Section 3.2, Existing System
	Describe all reasonably foreseeable future phases or other reasonably foreseeable consequences of the Proposed Project	Section 3.4.1, Project Capacity
	Provide the capacity increase in megawatts (MW). If the Proposed Project does not increase capacity, state that	Section 3.4.1, Project Capacity
	Provide geographic information system (GIS) (or equivalent) data layers for the Proposed Project preliminary engineering, including estimated locations of all physical components of the Proposed Project, as well as those related to construction	GIS for the Full-Rebuild Concept would be provided under separate cover
3.5 Project Components 3.5.1 Transmission Line	Describe what type of line exists and what type of line is proposed (e.g., single-circuit, double-circuit, upgrade 69 kV to 115 kV)	Section 3.5, Project Components
	Identify the length of the upgraded alignment, the new alignment, etc.	Section 3.5, Project Components
	Describe whether construction would require one-for-one pole replacement, new poles, steel poles, etc.?	Section 3.5, Project Components
	Describe what would occur to other lines and utilities that may be collocated on the poles to be replaced (e.g., distribution, communication, etc.)	Section 3.5.1.3, Distribution Description
3.5.2 Poles/Towers	Provide information for each pole/tower that would be installed and for each pole/tower that would be removed	Section 3.5.2, Poles/Towers
	Provide a unique identification number to match GIS database information	GIS for the Full-Rebuild Concept would be provided under separate cover
	Provide a structural diagram and, if available, photos of existing structure. Preliminary diagram or “typical” drawings and, if possible, photos of proposed structure. Also provide a written description of the most common types of structures and their use (e.g., tangent poles would be used when the run of poles continues in a straight line, etc.). Describe if the pole/tower design meets raptor safety requirements	Section 3.5.2, Poles/Towers Figureset 3.5-1, Typical Structure Design
	Provide the type of pole (e.g., wood, steel, etc.) or tower (e.g., self- supporting, lattice, etc.)	Section 3.5.2, Poles/Towers
	Provide “typical” drawings of poles with approximate diameter at the base and the	Section 3.5.2, Poles/Towers

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
	tip; for towers, estimate the width at base and top	Figureset 3.5-1, Typical Structure Design
	Identify typical total pole lengths, the approximate length to be embedded, and the approximate length that would be above ground surface; for towers, identify the approximate height above ground surface and approximate base footprint area	Section 3.5.2, Poles/Towers
	Describe any specialty poles or towers; note where they would be used (e.g., angle structures, heavy angle lattice towers, stub guys, etc.); make sure to note if any guying would likely be required across a road	Section 3.5.2, Poles/Towers
	If the Proposed Project includes pole-for-pole replacement, describe the approximate location of where the new poles would be installed relative to the existing alignment	Section 3.5.2, Poles/Towers
	Describe any special pole types (e.g., poles that require foundations, transition towers, switch towers, microwave towers, etc.) and any special features	Section 3.5.2, Poles/Towers
3.5.3 Conductor/Cable 3.5.3.1 Above-Ground Installation	Describe the type of line to be installed on the poles/tower (e.g. single-circuit with distribution, double circuit, etc.)	Section 3.5.3, Conductor/Cable
	Describe the number of conductors required to be installed on the poles or tower and the number on each side, including applicable engineering design standards	Section 3.5.3, Conductor/Cable
	Provide the size and type of conductor (e.g., aluminum conductor, steel reinforced, non-specular, etc.) and insulator configuration	Section 3.5.3, Conductor/Cable
	Provide the approximate distance from the ground to the lowest conductor and the approximate distance between the conductors (i.e., both horizontally and vertically). Provide specific information at highways, rivers, or special crossings	Section 3.5.3, Conductor/Cable
	Provide the approximate span lengths between poles or towers, note where different if distribution is present or not if relevant	Section 3.5.3, Conductor/Cable
	Determine whether other infrastructure would likely be collocated with the conductor (e.g., fiber optics, etc.); if so, provide conduit diameter of other infrastructure	Section 3.5.3, Conductor/Cable
3.5.3.2 Below Ground Installation	Describe the type of line to be installed (e.g., single circuit crosslinked polyethylene-insulated solid-dielectric, copper-conductor cables)	Section 3.5.3.2, Below Ground Installation
	Describe the type of casing the cable would be installed in (e.g., concrete- encased duct bank system); provide the dimensions of the casing	Section 3.7.2.32, Below Ground
	Provide an engineering “typical” drawing of the duct bank and describe what types of infrastructure would likely be installed within the duct bank (e.g., transmission, fiber optics, etc.)	Figure 3.7-3: Conduit Install Details

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
3.5.4 Substation	Provide “typical” plan and profile views of the proposed substation and the existing substation if applicable	NA; no new substations included in the Full-Rebuild Concept
	Describe the types of equipment that would be temporarily or permanently installed and provide details as to what the function/use of said equipment would be. Include information such as, but not limited to mobile substations, transformers, capacitors, and new lighting	NA; no temporary or permanent substation-related equipment included in the Full-Rebuild Concept
	Provide the approximate or “typical” dimensions (width and height) of new structures including engineering and design standards that apply	NA; no new substation structures to be installed under the Full-Rebuild Concept
	Describe the extent of the Proposed Project. Would it occur within the existing fence line, existing property line or would either need to be expanded?	Section 3.5.4.2, Modification to Existing Substations
	Describe the electrical need area served by the distribution substation	NA; no distribution substation included in the Full-Rebuild Concept
3.6 Right-of-Way Requirements	Describe the ROW location, ownership, and width. Would the existing ROW be used, or would new ROW be required?	Section 3.6, Right-of-Way Requirements
	If a new ROW is required, describe how it would be acquired and approximately how much land would be required (length and width)	Section 3.6, Right-of-Way Requirements
	List the properties likely to require acquisition	Section 3.6, Right-of-Way Requirements
3.7 Construction 3.7.1 For All Projects 3.7.1.1 Staging Areas	Where would the main staging area(s) likely be located?	Section 3.7.1.1, Staging Yards
	Approximately how large would the main staging area(s) be?	Section 3.7.1.1, Staging Yards Table 3.7-1: Potential Staging Yard Locations
	Describe any site preparation required, if known, or generally describe what might be required (i.e., vegetation removal, new access road, installation of rock base, etc.)	Section 3.7.1.1, Staging Yards
	Describe what the staging area would be used for (e.g., material and equipment storage, field office, reporting location for workers, parking area for vehicles and equipment, etc.)	Section 3.7.1.1, Staging Yards
	Describe how the staging area would be secured; would a fence be installed? If so, describe the type and extent of the fencing	Section 3.7.1.1, Staging Yards
	Describe how power to the site would be provided if required (e.g., tap into existing distribution, use of diesel generators, etc.)	Section 3.7.1.1, Staging Yards
	Describe any grading activities and/or slope stabilization issues	Section 3.7.1.1, Staging Yards
3.7.1.2 Work Areas	Describe known work areas that may be required for specific construction activities (i.e., pole assembly, hill side construction, etc.)	Section 3.7.1.2, Work Areas

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	**Checklist Item**	**Location in PEA**
	For each known work area, provide the area required (include length and width) and describe the types of activities that would be performed	Section 3.7.1.2, Work Areas
	Identify the approximate location of known work areas in the GIS database	GIS for the Full-Rebuild Concept would be provided under separate cover
	Describe how the work areas would likely be accessed (e.g., construction vehicles, walk-in, helicopter, etc.)	Section 3.7.1.2, Work Areas
	If any site preparation is likely required, generally describe what and how it would be accomplished	Section 3.7.1.2, Work Areas
	Describe any grading activities and/or slope stabilization issues	Section 3.7.1.2, Work Areas
	Based on the information provided, describe how the site would be restored	Section 3.7.1.2, Work Areas
3.7.1.3 Access Roads and/or Spur Roads	Describe the types of roads that would be used and/or would need to be created to implement the Proposed Project. Road types may include, but are not limited to: new permanent road; new temporary road; existing road that would have permanent improvements; existing road that would have temporary improvements; existing paved road; existing dirt/gravel road; and overland access	Section 3.7.1.3, Access Roads and/or Spur Roads
	For road types that require preparation, describe the methods and equipment that would be used	Section 3.7.1.3, Access Roads and/or Spur Roads
	Identify approximate location of all access roads (by type) in the GIS database	GIS for the Full-Rebuild Concept would be provided under separate cover
	Describe any grading activities and/or slope stabilization issues.	Section 3.7.1.3, Access Roads and/or Spur Roads
3.7.1.4 Helicopter Access	Identify which proposed poles/towers would be removed and/or installed using a helicopter	Information contained in GIS, which would be provided under separate cover
	If different types of helicopters are to be used, describe each type (e.g., light, heavy, or sky crane) and what activities they would be used for	Section 3.7.1.4, Helicopter Access
	Provide information as to where the helicopters would be staged, where they would refuel, and where they would land within the Proposed Project site	Section 3.7.1.1, Staging Yards Section 3.7.1.4, Helicopter Access
	Describe any Best Management Practices (BMPs) that would be employed to avoid impacts caused by use of helicopters, for example: air quality and noise considerations	Section 3.7.1.4, Helicopter Access
	Describe flight paths, payloads, hours of operations for known locations, and work types	Section 3.7.1.4, Helicopter Access
3.7.1.5 Vegetation	Describe the types of vegetation clearing that may be required (e.g., tree removal,	Section 3.7.1.5, Vegetation Clearance

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	**Checklist Item**	**Location in PEA**
Clearance	brush removal, flammable fuels removal) and why (e.g., to provide access, etc.)	
	Identify the preliminary location and provide an approximate area of disturbance in the GIS database for each type of vegetation removal	Section 3.7.1.5, Vegetation Clearance
	Describe how each type of vegetation removal would be accomplished	Section 3.7.1.5, Vegetation Clearance
	For removal of trees, distinguish between tree trimming as required under GO 95 and tree removal	Section 3.7.1.5, Vegetation Clearance
	Describe the types and approximate number and size of trees that may need to be removed	Section 3.7.1.5, Vegetation Clearance
	Describe the type of equipment typically used	Section 3.7.1.5, Vegetation Clearance Section 3.7.5, Construction Workforce and Equipment
3.7.1.6 Erosion and Sediment Control and Pollution Prevention during Construction	Describe the areas of soil disturbance including estimated total areas and associated terrain type and slope. List all known permits required. For project sites of less than one acre, outline the BMPs that would be implemented to manage surface runoff. Things to consider include, but are not limited to: Erosion and sedimentation BMPs, vegetation removal and restoration, and/or hazardous waste, and spill prevention plans	Section 3.7.1.6, Erosion and Sediment Control and Pollution Prevention during Construction
	Describe any grading activities and/or slope stabilization issues	Section 3.7.4.1, Site Preparation and Grading Section 3.7.1.2, Work Areas
	Describe how construction waste (i.e., refuse, spoils, trash, oil, fuels, poles, pole structures, etc.) would be disposed	Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management
3.7.1.7 Cleanup and Post-Construction Restoration	Describe how cleanup and post-construction restoration would be performed (i.e., personnel, equipment, and methods). Things to consider, but are not limited to, restoration of natural drainage patterns, wetlands, vegetation, and other disturbed areas (i.e. staging areas, access roads, etc.)	Section 3.7.1.11, Cleanup and Post-Construction Restoration
3.7.2 Transmission Line Construction (Above Ground) 3.7.2.1 Pull and Tension Sites	Provide the general or average distance between pull and tension sites	Section 3.7.2, Subtransmission Line Construction (Above Ground)
	Provide the area of pull and tension sites including the estimated length and width	Section 3.7.1.2, Work Areas
	According to the preliminary plan, identify the number of pull and tension sites that would be required, and their locations. Provide the location information in GIS	Section 3.7.2, Subtransmission Line Construction (Above Ground) GIS for the Full-Rebuild Concept would be provided under separate cover
	Describe the type of equipment that would be required at these sites	Section 3.7.2.1, Pull and Tension Sites

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
		Table 3.7-8: Construction Equipment and Workforce Estimates
	If conductor is being replaced, describe how it would be removed	Section 3.7.2.1, Pull and Tension Sites Section 3.7.2.2.1, Construction Sequence
3.7.2.2 Pole Installation and Removal	Describe how the construction crews and their equipment would be transported to and from the pole site locations. Provide vehicle type, number of vehicles, estimated number of trips, and hours of operation	Section 3.7.2.2, Pole (Structure) Installation and Removal Table 3.7-8: Construction Equipment and Workforce Estimates Table 3.7-9: Construction Equipment Vehicles
	Describe the process of removing the poles and foundations	Section 3.7.2.2.1, Construction Sequence
	Describe what happens to the holes that the poles were in (i.e., reused or backfilled)?	Section 3.7.2.2.1, Construction Sequence
	If the holes are to be backfilled, what type of fill would be used and where would it come from?	Section 3.7.2.2.1, Construction Sequence
	Describe any surface restoration that would occur at the pole sites	Section 3.7.1.11, Cleanup and Post-Construction Restoration
	Describe how the poles would be removed from the sites	Section 3.7.2.2.1, Construction Sequence
	If topping is required to remove a portion of an existing transmission pole that would now only carry distribution lines, describe the methodology to access and remove the tops of these poles. Describe any special methods that would be required to top poles that may be difficult to access, etc.	Section 3.7.2.2.2, Top Removal
	Describe the process of how the new poles/towers would be installed; specifically identify any special construction methods (e.g., helicopter installation) for specific locations or for different types of poles/towers	Section 3.7.2.2, Construction Sequence
	Describe the types of equipment and their use as related to pole/tower installation	Table 3.7-8: Construction Equipment and Workforce Estimates Table 3.7-9: Construction Equipment Description
	Describe the actions taken to maintain a safe work environment during construction (e.g., covering of holes/excavation pits, etc.)	Section 3.9.2, Worker Environmental Awareness Training
	Describe what would be done with soil that is removed from a hole/foundation site	Section 3.7.1.9, Reusable, Recyclable, and Waster Material Management
	For any foundations required, provide a description of the construction method(s),	Section 3.7.2.2.3.1, Foundation Installation

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
	approximate average depth and diameter of excavation, approximate volume of soil to be excavated, approximate volume of concrete or other backfill required, etc.	
	Describe briefly how poles/towers and associated hardware are assembled	Section 3.7.2.2.3.3, TSP Installation Section 3.7.2.2.3.5, LWS Pole/LWS H-Frame Installation
	Describe how the poles/towers and associated hardware would be delivered to the site; would they be assembled off site and brought in or assembled on site?	Section 3.7.1.1, Staging Yards
	Provide the following information about pole/tower installation and associated disturbance area estimates: pole diameter for each pole type (e.g., wood, self-supporting steel, lattice, etc.), base dimensions for each pole type, auger hole depth for each pole type, permanent footprint per pole/tower, number of poles/towers by pole type, average work area around poles/towers by pole type (e.g., for old pole removal and new pole installation), and total permanent footprint for poles/towers	Section 3.5.2.2, 115kV Subtransmission Poles/Towers Table 3.7-2: Approximate Laydown/Work Area Dimensions Table 3.7-4: Subtransmission Land Disturbance Table
3.7.2.3 Conductor/Cable Installation	Provide a process-based description of how new conductor/cable would be installed and how old conductor/cable would be removed, if applicable	Section 3.5.3.1.2, Subtransmission
	Generally describe the conductor/cable splicing process	Section 3.5.3, Conductor/Cable
	If vaults are required, provide their dimensions and approximate location/spacing along the alignment	N/A; no underground conductor installation included in the Full-Rebuild Concept
	Describe in what areas conductor/cable stringing/installation activities would occur	Section 3.7.2.1, Pull and Tension Sites
	Describe any safety precautions or areas where special methodology would be required (e.g., crossing roadways, stream crossing, etc.)	Section 3.7.2.3.3, Guard Structures
3.7.3 Transmission Line Construction (Below Ground)	Describe the approximate dimensions of the trench (e.g., depth, width)	Section 3.7.3, Subtransmission Line Construction (Below Ground) describe underground fiber optic cable installation
	Describe the methodology of making the trench (e.g., saw cutter to cut the pavement, backhoe to remove, etc.)	Section 3.7.3.1.4, Fiber Optic Installation
3.7.3.1 Trenching	Provide the total approximate cubic yardage of material to be removed from the trench, the amount to be used as backfill and the amount to subsequently be removed/disposed of off-site	Section 3.7.3.1.4, Fiber Optic Installation Section 3.7.4.9.1, Independence Amplifier Site Section 3.7.4.9.2, Transmission Line Crossings
	Provide off-site disposal location, if known, or describe possible option(s)	Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management
	If engineered fill would be used as backfill, provide information as to the type of engineered backfill and the amount that would be typically used (e.g., top two feet	N/A; no engineered fill included in the Full-Rebuild Concept

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
	would be filled with thermal-select backfill)	
	Describe if dewatering would be anticipated and, if so, how the trench would be dewatered, what the anticipated flows of the water are, whether there would be treatment, and how the water would be disposed of	All dewatering would be accomplished per Section 3.7.2.2.3.1, Foundation Installation
	Describe the process for testing excavated soil or groundwater for the presence of pre-existing environmental contaminants that could be exposed as a result of trenching operations	Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management
	If pre-existing hazardous waste was encountered, describe the process of removal and disposal	Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management
	Describe any standard BMPs that would be implemented	Section 3.7.1.6, Erosion and Sediment Control and Pollution Prevention during Construction
3.7.3.2 Trenchless Techniques: Microtunnel, Bore and Jack, Horizontal Directional Drilling	Provide the approximate location of the sending and receiving pits	GIS for the Full-Rebuild Concept would be provided under separate cover
	Provide the length, width and depth of the sending and receiving pits	Section 3.7.3.2, Trenchless Techniques: Microtunnel, Bore, Horizontal Directional Drilling
	Describe the methodology of excavating and shoring the pits	Section 3.7.3.2, Trenchless Techniques: Microtunnel, Bore, Horizontal Directional Drilling
	Describe the methodology of the trenchless technique	Section 3.7.3.2, Trenchless Techniques: Microtunnel, Bore, Horizontal Directional Drilling
	Provide the total cubic yardage of material to be removed from the pits, the amount to be used as backfill and the amount to subsequently be removed/disposed of off-site	Section 3.7.3.2, Trenchless Techniques: Microtunnel, Bore, Horizontal Directional Drilling
	Describe the process for safe handling of drilling mud and bore lubricants	Section 3.7.3.2, Trenchless Techniques: Microtunnel, Bore, Horizontal Directional Drilling
	Describe the process for detecting and avoiding "fracturing-out" during horizontal directional drilling operations	Section 3.7.3.2, Trenchless Techniques: Microtunnel, Bore, Horizontal Directional Drilling
	Describe the process for avoiding contact between drilling mud/lubricants and streambeds	N/A; no streambeds proximate to potential HDD locations

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
	If engineered fill would be used as backfill, provide information as to the type of engineered backfill and the amount that would be typically used (e.g., top two feet would be filled with thermal-select backfill)	Section 3.7.3.2, Trenchless Techniques: Microtunnel, Bore, Horizontal Directional Drilling
	If dewatering is anticipated, describe how the pit would be dewatered, what the anticipated flows of the water are, whether there would be treatment, and how the water would be disposed of	N/A; no dewatering anticipated
	Describe the process for testing excavated soil or groundwater for the presence of pre-existing environmental contaminants	Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management
	If a pre-existing hazardous waste was encountered, describe the process of removal and disposal	Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management
	Describe any grading activities and/or slope stabilization issues	N/A; no grading activities or slope stabilization needed at potential HDD location
	Describe any standard BMPs that would be implemented	Section 3.7.1.6, Erosion and Sediment Control and Pollution Prevention during Construction
3.7.4 Substation Construction	Describe any earth-moving activities that would be required; what type of activity and, if applicable, estimate cubic yards of materials to be reused and/or removed from the site for both site grading and foundation excavation	Section 3.7.4.1, Site Preparation and Grading Section 3.7.4.2, Ground Surface Improvements
	Provide a conceptual landscape plan in consultation with the municipality in which the substation is located	N/A; no new substations included in the Full-Rebuild Concept
	Describe any grading activities and/or slope stabilization issues	Section 3.7.4.1, Site Preparation and Grading Section 3.7.4.2, Ground Surface Improvements
	Describe possible relocation of commercial or residential property, if any	N/A; no new substations included in the Full-Rebuild Concept
3.7.5 Construction Workforce and Equipment	Provide the estimated number of construction crew members	Section 3.7.5, Construction Workforce and Equipment
	Describe the crew deployment, whether crews would work concurrently (i.e., multiple crews at different sites), if they would be phased, etc.	Section 3.7.5, Construction Workforce and Equipment
	Describe the different types of activities to be undertaken during construction, the number of crew members for each activity (i.e., trenching, grading, etc.), and the number and types of equipment expected to be used for said activity. Include a written description of the activity	Section 3.7.5, Construction Workforce and Equipment Table 3.7-8: Construction Equipment and Workforce Estimates
	Provide a list of the types of equipment expected to be used during construction of the Proposed Project as well as a brief description of the use of the equipment	Table 3.7-9: Construction Equipment Description

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	**Checklist Item**	**Location in PEA**
3.7.6 Construction Schedule	Provide a preliminary project construction schedule; include contingencies for weather, wildlife closure periods, etc.	Section 3.7.6, Construction Schedule
3.8 Operation and Maintenance	Describe the general system monitoring and control (i.e., use of standard monitoring and protection equipment, use of circuit breakers and other line relay protection equipment, etc.)	Section 3.8, Operation and Maintenance
	Describe the general maintenance program of the Proposed Project including timing of inspections (i.e., monthly, every July, as needed), type of inspection (i.e., aerial inspection, ground inspection), and a description of how the inspection would be implemented. Things to consider: who/how many crew members, how would they access the site (i.e., walk to site, vehicle, all-terrain vehicle), would new access be required, would restoration be required, etc.)	Section 3.8, Operation and Maintenance
	If additional full-time staff would be required for operation and/or maintenance, provide the number of workers and for what purpose they are required	Section 3.8, Operation and Maintenance
3.9 Applicant-Proposed Measures	If there are measures that the Applicant would propose to be part of the Proposed Project, include those measures and reference plans or implementation descriptions	Section 3.9, Applicant-Proposed Measures
Chapter 4: Environmental Setting		
	For each resource area discussion within the PEA, include a description of the physical environment in the vicinity of the Proposed Project (e.g., topography, land use patterns, biological environment, etc.), including the local environment (site-specific) and regional environment	Combined with Chapter 4 – Environmental Impact Assessment Summary
	For each resource area discussion within the PEA, include a description of the regulatory environment/context (federal, state, and local)	Combined with Chapter 4 – Environmental Impact Assessment Summary
	Limit detailed descriptions to those resource areas which may be subject to a potentially significant impact	Combined with Chapter 4 – Environmental Impact Assessment Summary
Chapter 5: Environmental Impact Assessment Summary		
5.1 Aesthetics	Provide visual simulations of prominent public view locations, including scenic highways, to demonstrate the views before and after project implementation. Additional simulations are highly recommended	Section 4.1, Aesthetics
5.2 Agriculture Resources	Identify the types of agricultural resources affected	Section 4.2, Agriculture and Forestry Resources

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
5.3 Air Quality	Provide supporting calculations/ spreadsheets/technical reports that support emission estimates in the PEA	Appendix F: Air Quality Calculations
	Provide documentation of the location and types of sensitive receptors that could be impacted by the Project (e.g., schools, hospitals, houses, etc.). Critical distances to receptors are dependent on type of construction activity	Section 4.3, Air Quality
	Identify Proposed Project GHG emissions	Section 4.8, Greenhouse Gas Emissions
	Quantify GHG emissions from a business as usual snapshot. That is, what the GHG emissions will be from the Proposed Project if no mitigations were used	Section 4.8, Greenhouse Gas Emissions
	Quantify GHG emission reductions from every APM that is implemented. The quantifications will be itemized and placed in tabular format	N/A; no APMs for GHGs proposed
	Identify the net emissions of the Proposed Project after mitigation have been applied	Section 4.3, Air Quality Section 4.8, Greenhouse Gas Emissions
	Calculate and quantify GHG emissions (CO2 equivalent) for the Proposed Project, including construction and operation	Section 4.8, Greenhouse Gas Emissions
	Calculate and quantify the GHG reduction based on reduction measures proposed for the Proposed Project	N/A; no reduction measures proposed
	Propose APMs to implement and follow to maximize GHG reductions. If sufficient, CPUC will accept them without adding further mitigation measures	N/A; no APMs proposed
	Discuss programs already in place to reduce GHG emissions on a system- wide level. This includes the Applicant's voluntary compliance with the U.S. Environmental Protection Agency (EPA) SF6 reduction program, reductions from energy efficiency, demand response, long-term procurement plan, etc.	N/A
	Ensure that the assessment of air quality impacts is consistent with PEA Section 3.7.5, as well as with the PEA's analysis of impacts during construction, including traffic and all other emissions	Section 4.3, Air Quality
5.4 Biological Resources	Provide a copy of the Wetland Delineation and supporting documentation (i.e., data sheets). If verified, provide supporting documentation. Additionally, GIS data of the wetland features should be provided as well	Appendix I; GIS for the Full-Rebuild Concept would be provided under separate cover
	Provide a copy of special-status surveys for wildlife, botanical and aquatic species, as applicable. Any GIS data documenting locations of special- status species should be provided	Appendix G; GIS for the Full-Rebuild Concept would be provided under separate cover
5.5 Cultural Resources	Cultural Resources Report documenting a cultural resources investigation of the Proposed Project. This report should include a literature search, pedestrian survey,	Appendix H, which would be provided once survey approval is granted by the BLM and

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
	and Native American consultation	surveys are complete
	Provide a copy of the records found in the literature search	Appendix H, which would be provided once approved for release by the BLM
	Provide a copy of all letters and documentation of Native American consultation	Letters and documentation of Native American consultation would be provided under separate cover when available
5.6 Geology, Soils, and Seismic Potential	Provide a copy of the geotechnical investigation if completed, including known and potential geologic hazards such as ground shaking, subsidence, liquefaction, etc.	Geotechnical report(s) would be provided under separate cover when available
5.7 Hazards and Hazardous Materials	Include an Environmental Data Resources report	Section 4.9, Hazards and Hazardous Materials and references thereto
	Include a Hazardous Substance Control and Emergency Response Plan, if required	N/A
	Include a Health and Safety Plan, if required	N/A
	Describe the Worker Environmental Awareness Program	Section 3.9.2, Worker Environmental Awareness Training
	Describe which chemicals would be used during construction and operation of the Proposed Project. For example, fuels for construction, naphthalene to treat wood poles before installation, etc.	Section 4.9, Hazards and Hazardous Materials
5.8 Hydrology and Water	Describe impacts to groundwater quality including increased runoff due to construction of impermeable surfaces, etc.	Section 4.10, Hydrology and Water Quality
	Describe impacts to surface water quality including the potential for accelerated soil erosion, downstream sedimentation, and reduced surface water quality	Section 4.10, Hydrology and Water Quality
5.9 Land Use and Planning	Provide GIS data of all parcels within 300 feet of the Proposed Project with the following data: APN number, mailing address, and parcel’s physical address	GIS for the Full-Rebuild Concept would be provided under separate cover
5.10 Mineral Resources	Data needs already specified under Chapter 3 would generally meet the data needs for this resource area	Section 4.12, Mineral Resources
5.11 Noise	Provide long-term noise estimates for operational noise (e.g., corona discharge noise, and station sources such as substations, etc.)	Section 4.13, Noise
5.12 Population and Housing	Data needs already specified under Chapter 3 would generally meet the data needs for this resource area	Section 4.14, Population and Housing
5.13 Public Services	Data needs already specified under Chapter 3 would generally meet the data needs for this resource area	Section 4.15, Public Services
5.14 Recreation	Data needs already specified under Chapter 3 would generally meet the data needs for this resource area	Section 4.16, Recreation

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
5.15 Transportation and Traffic	Discuss traffic impacts resulting from construction of the Proposed Project including ongoing maintenance operations	Section 4.17, Transportation and Traffic
	Provide a preliminary description of the traffic management plan that would be implemented during construction of the Proposed Project	Section 4.17, Transportation and Traffic
5.16 Utilities and Services Systems	Describe how treated wood poles would be disposed of after removal, if applicable	Section 3.7.1.9, Reusable, Recyclable, and Waster Material Management Section 4.9, Hazards and Hazardous Materials
5.17 Cumulative Analysis	Provide a list of projects (i.e., past, present, and reasonably foreseeable future projects) within the Proposed Project area that the applicant is involved in	Section 4.21, Cumulative Analysis
	Provide a list of projects that have the potential to be proximate in space and time to the Proposed Project. Agencies to be contacted include, but are not limited to, the local planning agency, Caltrans, etc.	Section 4.21, Cumulative Analysis
5.18 Growth-Inducing Impacts, If Significant	Provide information on the Proposed Project's growth-inducing impacts, if any	Section 5.3, Growth-Inducing Impacts
	Provide information on any economic or population growth in the surrounding environment that will, directly or indirectly, result from the Proposed Project	Section 5.3, Growth-Inducing Impacts
	Provide information on any increase in population that could further tax existing community service facilities (e.g., schools, hospitals, fire, police, etc.), that will directly or indirectly result from the Proposed Project	Section 4.15, Public Services Section 5.3, Growth-Inducing Impacts
	Provide information on any obstacles to population growth that the Proposed Project would remove	Section 5.3, Growth-Inducing Impacts
	Describe any other activities, directly or indirectly encouraged or facilitated by the Proposed Project, that would cause population growth that could significantly affect the environment, either individually or cumulatively	Section 4.14, Population and Housing; Section 5.3, Growth-Inducing Impacts
Chapter 6: Detailed Discussion of Significant Impacts		
6.1 Mitigation Measures Proposed to Minimize Significant Effects	Discuss each mitigation measure and the basis for selecting a particular mitigation measure should be stated	Section 5.1, Applicant-Proposed Measures to Minimize Significant Effects
6.2 Description of Project Alternatives and Impact Analysis	Provide a summary of the alternatives considered that would meet most of the objectives of the Proposed Project and an explanation as to why they were not chosen as the Proposed Project	Section 5.2, Description of Project Alternatives and Impact Analysis
	Alternatives considered and described by the Applicant should include, as appropriate, system or facility alternatives, route alternatives, route variations, and	Section 5.2, Description of Project Alternatives and Impact Analysis

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
	alternative locations	
	A description of a "No Project Alternative" should be included	Section 5.2, Description of Project Alternatives and Impact Analysis
	If significant environmental effects are assessed, the discussion of alternatives shall include alternatives capable of substantially reducing or eliminating any said significant environmental effects, even if the alternative(s) substantially impede the attainment of the Proposed Project objectives and are more costly	Section 5.2, Description of Project Alternatives and Impact Analysis
6.3 Growth- Inducing Impacts	Discuss if the Proposed Project would foster economic or population growth, either directly or indirectly, in the surrounding environment	Section 4.14, Population and Housing; Section 5.3, Growth-Inducing Impacts
	Discuss if the Proposed Project would cause an increase in population that could further tax existing community services (e.g., schools, hospitals, fire, police, etc.)	Section 4.15, Public Services Section 5.3, Growth-Inducing Impacts
	Discuss if the Proposed Project would remove obstacles to population growth	Section 5.3, Growth-Inducing Impacts
	Discuss if the Proposed Project would encourage and facilitate other activities that would cause population growth that could significantly affect the environment, either individually or cumulatively	Section 5.3, Growth-Inducing Impacts
6.4 Suggested Applicant-Proposed Measures to address GHG Emissions	Include a menu of suggested APMs that applicants can consider addressing GHG emissions. Suggested APMs include, but are not limited to:	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	1. If suitable park-and-ride facilities are available in the Project vicinity, construction workers will be encouraged to carpool to the job site to the extent feasible. The ability to develop an effective carpool program for the Proposed Project would depend upon the proximity of carpool facilities to the job site, the geographical commute departure points of construction workers, and the extent to which carpooling would not adversely affect worker show-up time and the Project's construction schedule	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG
	2. To the extent feasible, unnecessary construction vehicle and idling time will be minimized. The ability to limit construction vehicle idling time is dependent upon the sequence of construction activities and when and where vehicles are needed or staged. Certain vehicles, such as large diesel-powered vehicles, have extended warm-up times following start-up that limit their availability for use following startup. Where such diesel-powered vehicles are required for repetitive construction tasks, these vehicles may require more idling time. The Proposed Project will apply a "common sense" approach to vehicle use; if a vehicle is not required for use immediately or continuously for construction activities, its engine will be shut off.	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
	Construction foremen will include briefings to crews on vehicle use as part of pre-construction conferences. Those briefings will include discussion of a "common sense" approach to vehicle use	
	3. Use low-emission construction equipment. Maintain construction equipment per manufacturing specifications and use low emission equipment described here. All off road construction diesel engines not registered under the California Air Resources Board (CARB) Statewide Portable Equipment Registration Program shall meet at a minimum the Tier 2 California Emission Standards for Off-Road Compression-Ignition Engines as specified in California Code of Regulations, Title 13, Sec. 2423(b)(1)	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	4. Diesel Anti-Idling: In July 2004, the CARB adopted a measure to limit diesel-fueled commercial motor vehicle idling	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	5. Alternative Fuels: CARB would develop regulations to require the use of one to four percent biodiesel displacement of California diesel fuel	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	6. Alternative Fuels: Ethanol, increased use of ethanol fuel	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	7. Green Buildings Initiative	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	8. Facility wide energy efficiency audit	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	9. Complete GHG emissions audit. The audit will include a review of the GHG emitted from those facilities (substations), including carbon dioxide, methane, CFC, and HFC compounds (SF6)	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	10. There is an EPA approved SF6 emissions protocol (http://www.epa.gov/electricpowersf6/resources/index.html#three)	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	11. SF6 program wide inventory. For substations, keep inventory of leakage rates	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	12. Increase replacement of breakers once leakage rates exceed one percent within 30 days of detection	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	13. Increased investment in current programs that can be verified as being in addition to what the utility is already doing	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	14. The SF6 Emission Reduction Partnership for the Electric Power Systems was launched in 1999 and currently includes 57 electric utilities and local governments	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions

Table 1.5-1: PEA Checklist Key

Location in CPUC PEA Checklist	Checklist Item	Location in PEA
	across the U.S.	
	15. SF6 is used by this industry in a variety of applications, including that of dielectric insulating material in electrical transmission and distribution equipment, such as circuit breakers. Electric power systems that join the Partnership must, within 18 months, establish an emission reduction goal reflecting technically and economically feasible opportunities within their company. They also agree to, within the constraints of economic and technical feasibility, estimate their emissions of SF6, establish a strategy for replacing older, leakier pieces of equipment, implement SF6 recycling, establish and apply proper handling techniques, and report annual emissions to the EPA. The EPA works as a clearinghouse for technical information, works to obtain commitments from all electric power system operators and will be sponsoring an international conference in 2000 on SF6 emission reductions	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	16. Quantify what comes into the system and track programmatically SF6	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
	17. Applicant can propose other GHG reducing mitigations	Section 5.4, Suggested Applicant-Proposed Measures to Address GHG Emissions
Chapter 7: Other Process-Related Data Needs		
Noticing	Include an excel spreadsheet that identifies all parcels within 300 feet of any Proposed Project component with the following data: APN number, owner mailing address, and parcels physical address	Chapter 6, Other Process-Related Data Needs

Legend

IC Project Alignment

County

IVANPAH-CONTROL PROJECT

IC PROJECT LOCATION

ARCADIS | SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURE 1.1-1

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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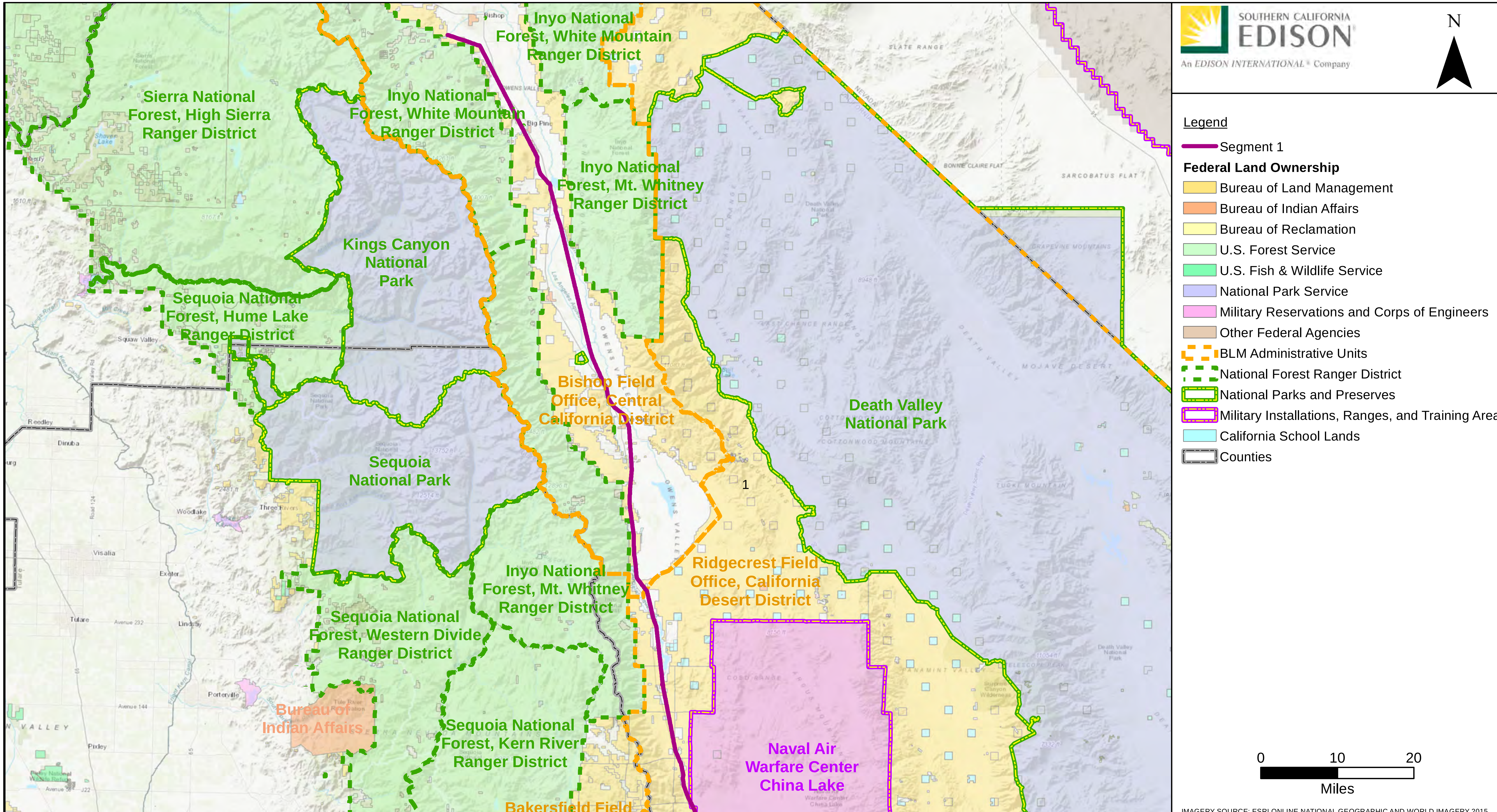

IVANPAH-CONTROL PROJECT

PROJECT OVERVIEW, SEGMENT 1

ARCADIS Design & Consultancy for natural and built assets

FIGURESET: 1.1-2

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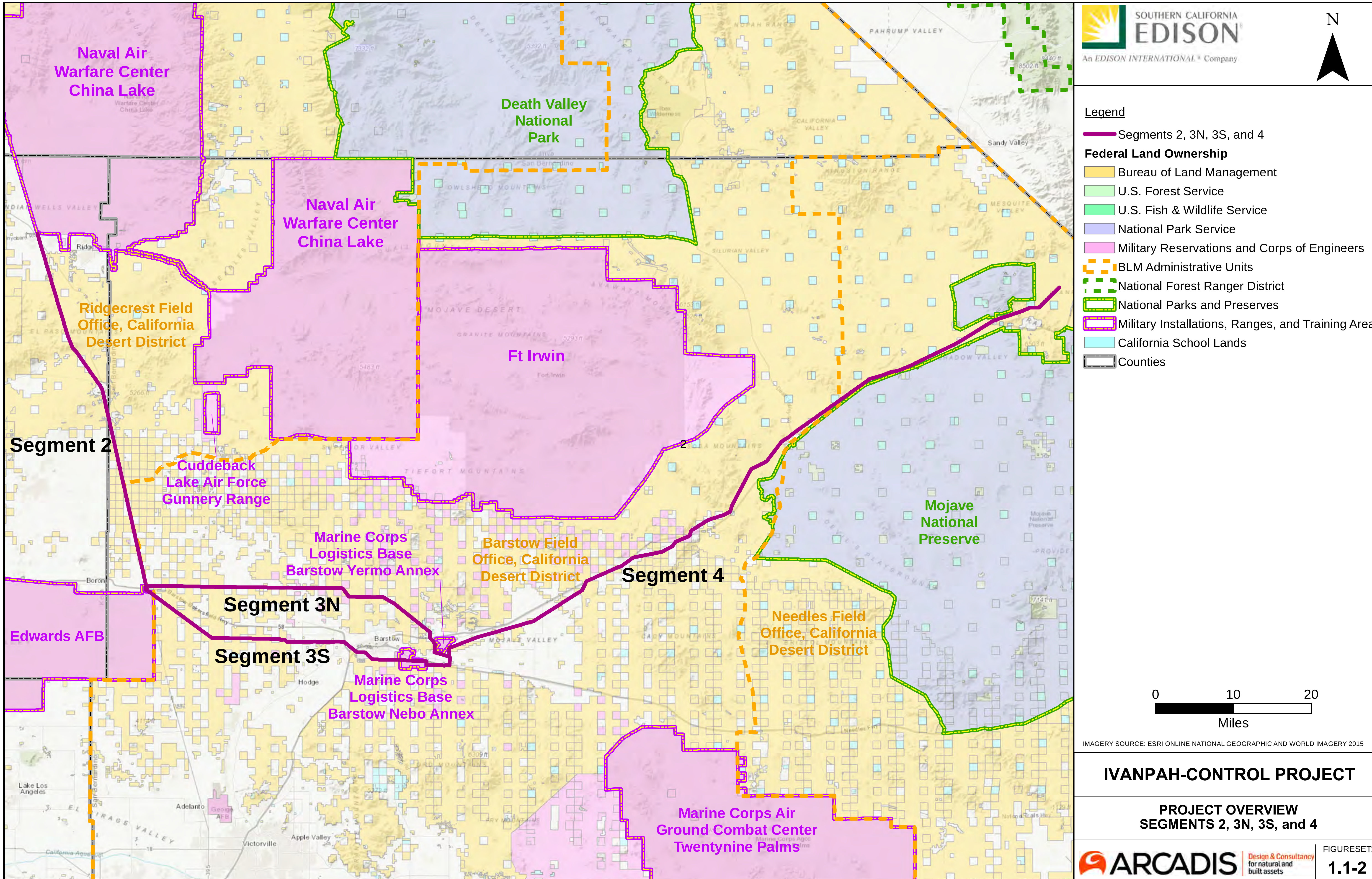
Coordinate System: NAD 1983 UTM Zone 11N



\\corparcgis\Data\ArcGisData\GISPROJECTS_ENV Z:\GISProjects_ENV\SCE\SCE_TLLR\ArcGIS_Desktop\PEA_Figures\IC\Figure1-1-2_FederalLands_IC.mxd 1/23/2019 msi01059
Coordinate System: NAD 1983 UTM Zone 11N

Chapter 2 Project Purpose and Need and Objectives

This section defines the objectives, purpose, and need for the Southern California Edison (SCE)-proposed Ivanpah-Control Project (IC Project), as required by the California Public Utilities Commission's (CPUC) Proponent's Environmental Assessment (PEA) Guidelines (CPUC Information and Criteria List, Appendix B, Section V) and the California Environmental Quality Act (CEQA) Guidelines (Section 15000 *et seq*). Additional information regarding the IC Project's purpose and need is provided in SCE's application to the CPUC in accordance with CPUC General Order 131-D (GO 131-D).

2.1 Overview

SCE is a public utility that provides electric service to a population of approximately 15 million people within a 50,000-square-mile service area that encompasses 180 cities throughout Southern California. SCE owns and operates approximately 5,000 miles of bulk power facilities (500 kilovolt [kV] and 220 kV transmission lines) and 1,500 miles of subtransmission (55 kV to 115 kV) lines. SCE also owns and operates 1,200 miles of radial 115 kV subtransmission lines.

The design of electric lines in California is governed by CPUC GO 95, *Rules for Overhead Electric Line Construction*. The purpose of the Rules contained within CPUC GO 95 is to "formulate, for the State of California, requirements for overhead line design, construction, and maintenance, the application of which will ensure adequate service and secure safety to persons engaged in the construction, maintenance, operation or use of overhead lines and to the public in general."

General Order 95 Rules 37 through 39 specify minimum vertical and horizontal clearances that must be maintained between an electric line (referred to as a conductor) and other conductors, or between a conductor and the ground, buildings, and a variety of other objects. Conductor clearance in the field (e.g., between a conductor and the ground) is not a static value—it changes depending upon the operational characteristics of the line. As greater amounts of electricity are transmitted by a conductor, the conductor material heats up and expands, resulting in greater sag (and a lesser clearance) in a given span.

In 2006, SCE identified that the clearances along some of its circuits were not compliant with the clearances required by CPUC GO 95 due to the installation of additional infrastructure under SCE lines over time; survey, engineering, and construction inaccuracies; the growth of vegetation; and changes in topography. This information was communicated to both the CPUC and the California Independent System Operator (CAISO). SCE then initiated a Light Detection and Ranging (LiDAR) study and engineering modeling work to confirm these discrepancies.[3,4] The discrepancies were reported to the North American Electric Reliability Corporation (NERC) by SCE as the GO 95 discrepancies result in reduction to line ratings, and a mitigation plan to address these discrepancies was filed with and accepted by the Western Electricity Coordinating Council (WECC).[5]

The collective effort to identify and remediate these discrepancies across SCE's system is referred to as the Transmission Line Rating Remediation (TLRR) Program. Based on the LiDAR and engineering

3 An individual instance of non-compliance with CPUC GO 95 is referred to as a discrepancy. Discrepancies are defined as potential clearance problems between an energized conductor and its surroundings, such as the structure, another energized conductor on the same structure, a different line, or the ground, among others.

4 Light Detection and Ranging (LiDAR) technology uses ultraviolet or near infrared light to image objects and map physical features. SCE uses aircraft equipped with LiDAR equipment to identify locations throughout SCE's service territory that do not meet the minimum required clearances for overhead lines established in CPUC GO 95.

5 The rating of transmission lines depends on many factors including the electrical rating of elements, the thermal rating of elements, and conductor clearance.

modeling work, SCE's TLRR Program is developing a remediation plan for each discrepancy to ensure compliance with CPUC GO 95. SCE is committed to fixing all discrepancies on its bulk electric system facilities by 2025 and to fixing all discrepancies on its 66 kV and 115 kV radial lines by 2030. All subtransmission lines which make up the IC Project are 115 kV and also a part of the bulk electric system, and as such are expected to be corrected prior to January 1, 2025.

Therefore, the purpose of the IC Project is to ensure compliance with CPUC GO 95 by remediating approximately 2,950 discrepancies identified through SCE's TLRR Program along the following 115 kV circuits:

- Control-Haiwee-Inyokern
- Control-Coso-Haiwee-Inyokern
- Kramer-Inyokern Randsburg No. 1
- Kramer-Coolwater
- Kramer-Tortilla
- Coolwater-SEGS2-Tortilla
- Ivanpah-Baker-Coolwater-Dunn Siding-Mountain Pass

These circuits are located in portions of unincorporated Inyo County, Kern County, and San Bernardino County, and within the City of Barstow. Figure 1.1-1, IC Project Location, shows the location of the IC Project in relation to the larger regional area.

The IC Project is planned to be completed by 2024 in order to meet SCE's commitment for completion by 2025. If the Full-Rebuild Concept were implemented, it would include the following major components:

- Subtransmission. Rebuild 358 miles of existing 115 kV subtransmission circuits by:
    - Removing existing subtransmission towers and poles and replacing them with tubular steel poles (TSPs), lightweight steel (LWS) poles, LWS pole H-frames, and multi-pole LWS pole and TSP structures.
    - Removing existing conductor and installing new Aluminum Conductor Composite Core (ACCC) 'Dove' conductor on replacement structures.
    - Installing overhead groundwire (OHGW) in some locations for system protection.

- Distribution
    - Remove existing distribution conductor and appurtenances and install new distribution conductor and appurtenances on replacement structures.

- Telecommunications/System Protection
    - Install approximately 360 miles of optical groundwire (OPGW) and/or All-Dielectric Self-Supporting (ADSS) fiber optic cable overhead on replacement structures and new structures.
    - Install approximately 2,500 feet of fiber optic cable underground within existing substations, and approximately 5,000 feet underground outside of existing substations.
    - Install system protection and telecommunications-associated equipment at existing substations.

- Substations
    - Disconnect existing conductor from existing positions at substations and connect new conductor to those existing positions.

- o Install new overhead groundwire (OHGW) and make minor modifications to the existing racks to accommodate the new OHGW.
- o Install cabling between existing breakers to the existing MEER/communication room/telecommunications cabinet and install new relay and protection racks in the existing MEER/communication room/telecommunications cabinet.

2.2 Project Objectives

The IC Project is being proposed to meet the following objectives:

- Ensure compliance with CPUC General Order 95 and NERC Facility Ratings for this project by January 1, 2025
- Continue to provide safe and reliable electrical service
- Meet IC Project needs while minimizing environmental impacts
- Design and construct the physical components of the IC Project in conformance with industry and/or SCE's approved engineering, design, and construction standards for substation and subtransmission system projects.

The Full-Rebuild Concept's components, location, preliminary configuration, and the existing and proposed components, are presented in *Chapter 3 – Project Description*. Each of the IC Project objectives is more thoroughly described as follows.

Ensure compliance with CPUC General Order 95 and NERC Facility Ratings for this project by January 1, 2025. The purpose of the Rules contained within CPUC GO 95 is to "formulate, for the State of California, requirements for overhead line design, construction, and maintenance, the application of which will ensure adequate service and secure safety to persons engaged in the construction, maintenance, operation or use of overhead lines and to the public in general." One of the objectives of the IC Project is to remediate the identified discrepancies in order to ensure compliance by 2025 with CPUC GO 95 Rule 37, Minimum Clearances of Wires above Railroads, Thoroughfares, Buildings, Etc., Table 1; Rule 38, Minimum Clearances of Wires from Other Wires, Table 2; and Rule 39, Minimum Clearance of Wires from Signs, Table 2-A.[6]

Remediating the identified discrepancies would also bring the lines into compliance with the NERC Facility Rating for the lines, including NERC Standard FAC-009-1, which requires that SCE ensure that Facility Ratings used in the reliable planning and operation of the Bulk Electric System (BES) are determined based on an established methodology or methodologies.[7] Remediating the identified discrepancies would also ensure compliance with applicable WECC reliability planning criteria; the work would be completed as detailed in the mitigation plan filed in 2007 by SCE and accepted by WECC.

Continue to provide safe and reliable electrical service. Under the Federal Energy Regulatory Commission (FERC), NERC, WECC, and CPUC rules, guidelines and regulations, SCE has the responsibility to ensure that electrical transmission, subtransmission, and distribution systems have sufficient capacity to maintain safe, reliable, and adequate service to customers. To ensure the availability of safe and reliable electric service, SCE has established a set of criteria by which it determines when new projects are needed. The safety and reliability of the systems must be maintained under normal conditions when all facilities are in service, and also maintained under abnormal

[6] Where a GO-specified clearance is exceeded by an SCE clearance standard, the more-conservative SCE clearance standard is used in the design.

[7] The rating of transmission lines depends on many factors including the electrical rating of elements, the thermal rating of elements, and conductor clearance.

conditions when facilities are out of service due to equipment or line failures, maintenance outages, or outages that cannot be predicted or controlled which are caused by weather, earthquakes, traffic accidents, and other unforeseeable events.

The IC Project would provide safe and reliable electrical service by remediating the identified discrepancies. Discrepancies may contribute to unplanned outages and thus decreased electric service reliability; remediating the identified discrepancies would thus allow SCE to continue to provide reliable electric service to its customers. Further, the engineering solutions employed to remediate the identified discrepancies, including installation of new poles, towers, and conductor that meet current SCE standards, would serve to increase safety and reliability by modernizing the lines' infrastructure.

Meet IC Project needs while minimizing environmental impacts. CEQA and the CEQA Guidelines – Title 14 of the California Code of Regulations, Section 15000, *et seq*. – require that an environmental impact report describe a reasonable range of alternatives to a proposed project, or the location of the proposed project that would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project. CEQA Guidelines Section 15126.6(d) requires that sufficient information about each alternative be included to allow meaningful evaluation and analysis.

Consistent with Section 15126.6 (d) of the CEQA Guidelines, this PEA document analyzes alternatives to the Full-Rebuild Concept. Section 5.2, Description of Project Alternatives and Impact Analysis, identifies and compares the construction and operation of the Full-Rebuild Concept with its alternatives, including alternatives that did not meet IC Project objectives and were not carried forward.

Design and construct the physical components of the IC Project in conformance with industry standards and/or SCE's approved engineering, design, and construction standards for substation and subtransmission system projects. SCE strives to construct electrical facilities in a consistent manner, meaning that the substation designs, transmission line designs, subtransmission line designs, distribution facility designs, and operating requirements for each type of facility are consistent and familiar to the field personnel that are required to operate and maintain the facilities. These standards are developed and revised as necessary based on experience to ensure SCE constructs safe, reliable, and operable facilities on a consistent basis. In addition, the consistent design ensures that upgrades to existing facilities are completed in a manner that provides the lowest total cost of ownership.

SCE's and industry standards provide a base to evaluate the merits of proposed changes which are evaluated to determine impact on safety, reliability, operations, maintenance, construction and cost.

Chapter 3 Project Description

For purposes of disclosing the most comprehensive potential scope of work that could be undertaken to complete the IC Project, this Chapter provides a detailed description of the Full-Rebuild Concept. As previously discussed, the actual project proposed by SCE is the reduced scope Alternative E, as described in detail in Chapter 5. All alternatives of the IC Project involve five distinct Segments:

- Segment 1 includes the Control-Coso-Haiwee-Inyokern 115 kV circuit and the Control-Haiwee-Inyokern 115 kV circuit. Segment 1 spans approximately 126 miles from the existing Control Substation in the north to the existing Inyokern Substation in the south.
- Segment 2 includes the Kramer-Inyokern-Randsburg No.1 115 kV circuit. This is a 'box loop' circuit, whereby two sets of conductors (six wires) are operated as a single circuit. Segment 2 spans approximately 48 miles from the existing Inyokern Substation in the north to the existing Kramer Substation in the south and includes the existing Randsburg Substation between the two.
- Segment 3 North (3N) includes the Kramer-Coolwater 115 kV circuit. Segment 3N spans approximately 44 miles from the existing Kramer Substation in the west to the existing Coolwater Substation in the east.
- Segment 3 South (3S) includes the Kramer-Tortilla 115 kV circuit and a portion of the Coolwater-SEGS2-Tortilla 115 kV circuit. Segment 3S spans approximately 44 miles from the existing Kramer Substation in the west to the existing Coolwater Substation in the east and includes the existing Tortilla Substation between the two.
- Segment 4 includes the Ivanpah-Baker-Coolwater-Dunn Siding-Mountain Pass 115 kV circuit. Segment 4 spans approximately 96 miles from the existing Coolwater Substation in the west to the existing Ivanpah Substation in the east, and includes the existing Dunn Siding, Baker, and Mountain Pass substations between the two.

These Segments are displayed graphically in Figure 3.1-1, Project Segments.

3.1 Project Location

The IC Project is located in southern California. The subtransmission lines included in the IC Project are located in Inyo County, northeast Kern County, northern San Bernardino County, and the City of Barstow (see Figure 1.1-1, IC Project Location).

3.1.1 Geographical Location

The IC Project is located within portions of unincorporated Inyo County, Kern County, and San Bernardino County, and in the City of Barstow (see Figure 1.1-1, IC Project Location).

3.1.2 General Land Use

The existing land use along the IC Project Alignment is primarily open space, with scattered residential uses. Widely-dispersed industrial uses are found in the eastern portions of Segment 4 (mining and solar electric generating facilities). Institutional uses, primarily military facilities, are located adjacent to Segments 1, 2, 3S and 4 and adjacent to Inyokern Substation and Coolwater Substation. Portions of the IC Project Alignment are located on lands managed by the Bureau of Land Management, China Lake Naval Air Weapons Station, Edwards Air Force Base, and Marine Corps Logistics Base-Barstow.

3.1.3 Property Description

The Full-Rebuild Concept would be built within existing and new rights-of-way (ROWs), including existing and new easements, fee-owned property, and public ROWs. The subtransmission lines traverse a diverse topography from the relatively homogenous, flat topography in the bottom of the Owens River Valley to large alluvial fans to mountainous areas. Project elevations range from approximately 930 feet above sea level near Baker Substation to approximately 5,400 feet above sea level near Mountain Pass Substation. The IC Project Alignment parallels and spans the perennial Owens River, the Mojave River, and the Los Angeles Aqueduct.

3.1.4 Segment 1

Control Substation, located approximately 5 miles southwest of the City of Bishop near the intersection of California State Route 168 (SR-168) and East Bishop Creek Road in unincorporated Inyo County, defines the northern terminus of the IC Project Alignment and Segment 1. From Control Substation, the IC Project Alignment runs south through the Owens River Valley to the Haiwee Substation and Coso Substation; both are located in unincorporated Inyo County approximately 1.5 and 3.5 miles, respectively, south of South Haiwee Reservoir. From Coso Substation, the IC Project Alignment continues south to Inyokern Substation in unincorporated Kern County, which defines the southern terminus of Segment 1. Segment 1 includes the Control-Haiwee-Inyokern 115 kV Subtransmission Line and the Control-Coso-Haiwee-Inyokern 115 kV Subtransmission Line.

3.1.5 Segment 2

The existing Inyokern Substation defines the northern/western terminus of Segment 2; Inyokern Substation is located approximately 6 miles west-northwest of the City of Ridgecrest at the intersection of US Highway 395 (US 395) and SR-178/West Inyokern Road in unincorporated Kern County. From Inyokern Substation, the IC Project Alignment runs south-southeast through unincorporated Kern County to the existing Randsburg Substation (located adjacent to the Randsburg Cutoff Road, east of the unincorporated community of Randsburg) and then through unincorporated San Bernardino County to the existing Kramer Substation (located adjacent to the intersection of US 395 and SR-58/Barstow-Bakersfield Highway in unincorporated San Bernardino County). The existing Kramer Substation defines the southern terminus of Segment 2.

3.1.6 Segments 3N and 3S

The existing Kramer Substation defines the western terminus of Segments 3N and 3S. From the existing Kramer Substation, the IC Project Alignment splits into two west-east alignments. The northern alignment (Segment 3N) runs east through unincorporated San Bernardino County to the existing Coolwater Substation (located approximately 1.5 miles east of the unincorporated community of Daggett). The southern alignment (Segment 3S) runs east to the existing Tortilla Substation (located in the southcentral portion of the City of Barstow) and then to the existing Coolwater Substation. The Coolwater Substation defines the eastern terminus of both Segment 3N and Segment 3S.

3.1.7 Segment 4

The existing Coolwater Substation defines the western terminus of Segment 4. From the existing Coolwater Substation, Segment 4 runs northeast, generally paralleling Interstate 15 (I-15) to its eastern terminus at the existing Ivanpah Substation, which is located in Ivanpah Valley approximately 2 miles west of the Primm Valley Golf Club. Between the existing Coolwater Substation and the existing Ivanpah Substation, the alignment in Segment 4 taps off into (from west to east) the existing Dunn Siding Substation (located approximately 0.15 miles south of I-15 midway between Exit 217 and Exit 221 (Afton Road); the existing Baker Substation (located at the intersection of SR-127/Death Valley Road and Silver Lane in the unincorporated community of Baker); and the existing Mountain Pass Substation, located approximately 2 miles north of the unincorporated community of Mountain Pass.

3.2 Existing System

The IC Project-related System is comprised of twelve existing substations: the Control, Haiwee, Coso, Inyokern, Randsburg, Kramer, Tortilla, Coolwater, Dunn Siding, Baker, Mountain Pass, and Ivanpah substations. Figure 3.2-1, Existing System provides a schematic diagram of the existing IC Project-related System; the System would be unchanged by the remediation of discrepancies under the IC Project.[8] The existing 115 kV subtransmission lines do not have telecommunication infrastructure installed; the substations included in the IC Project are connected to SCE's Supervisory Control and Data Acquisition (SCADA) system by a variety of means.

The IC Project consists of addressing clearance infractions on multiple 115 kV subtransmission lines. These lines are grouped into five Segments and include the Control-Haiwee-Inyokern 115 kV and Control-Coso-Haiwee-Inyokern 115 kV subtransmission lines within Segment 1; the Kramer-Inyokern-Randsburg No.1 115 kV Subtransmission Line in Segment 2; the Coolwater-Kramer 115 kV Subtransmission Line in Segment 3N; the Kramer-Tortilla 115 kV and Coolwater-SEGS2-Tortilla 115 kV subtransmission lines in Segment 3S; and the Coolwater-Baker-Dunn Siding-Ivanpah-Mountain Pass 115 kV Subtransmission Line in Segment 4. Details corresponding to each of these lines is provided in the sections below.

3.2.1 Segment 1—Control-Haiwee-Inyokern 115 kV and Control-Coso-Haiwee-Inyokern 115 kV Subtransmission Lines

The Control-Haiwee-Inyokern 115 kV and Control-Coso-Haiwee-Inyokern 115 kV Subtransmission Lines, constructed in 1912, are predominately supported on double-circuit towers and poles. Each subtransmission line is rated at 415A/530A (normal/emergency) in the CAISO Registry, which translates to 82.7/105.6 MVA per line (normal/emergency).

3.2.2 Segment 2—Kramer-Inyokern-Randsburg No.1 115 kV Subtransmission Line

The Kramer-Inyokern-Randsburg No.1 115 kV Subtransmission Line was constructed in 1913. Except for the last few spans into Kramer Substation, this circuit predominately consists of two 115 kV subtransmission lines operated in a box-loop configuration (a total of six phases arranged in three sets of split phase configuration thereby operating as a single circuit) with a combined rating of 930A/1060A (normal/emergency), which translates to 185.2/211.1 MVA (normal/emergency). The box-loop configuration is predominately supported on double-circuit towers and poles.

3.2.3 Segment 3N—Coolwater-Kramer 115 kV Subtransmission Line

The Coolwater-Kramer 115 kV Subtransmission Line was constructed in 1913. The line predominately consists of a single-circuit H-Frame structures and is rated at 950A/1280A (normal/emergency), which translates to 189.2/255.0 MVA (normal/emergency).

3.2.4 Segment 3S—Kramer-Tortilla 115 kV Subtransmission Line

The Kramer-Tortilla 115 kV Subtransmission Line, constructed in 1969, predominately consists of a single-circuit H-Frame structures. The line is rated at 975A/1320A (normal/emergency), which translates to 194.2/262.9 MVA (normal emergency).

8 The Kramer-Inyokern-Randsburg No.1 115 kV circuit consists of two 115 kV lines operated in a box-loop configuration (total of six phases arranged in three sets of split phase configuration thereby operating as a single circuit). Therefore, although it is referenced as a single 115 kV circuit, two lines are illustrated on Figure 3.2-1 to represent the two sets of conductors installed on the existing structures.

3.2.5 Segment 3S—Coolwater-SEGS2-Tortilla 115 kV Subtransmission Line

The Coolwater-SEGS2-Tortilla 115 kV Subtransmission Line was constructed in 1969. This line predominately consists of single-circuit H-Frame structures, and is rated at 975A/1320A (normal/emergency), which translates to 194.2/262.9 MVA (normal/emergency).

3.2.6 Segment 4—Coolwater-Baker-Dunn Siding-Ivanpah-Mountain Pass 115 kV Subtransmission Line

The Coolwater-Baker-Dunn Siding-Ivanpah-Mountain Pass 115 kV Subtransmission Line, constructed between 1918 and 1931, predominately consists of single-circuit H-Frame structures and is rated at 415A/530A (normal/emergency), which translates to 82.7/105.6 MVA (normal/emergency).

3.3 Project Objectives

As described further in *Chapter 2 – Project Purpose and Need and Objectives*, the IC Project is being proposed to meet the following objectives:

- Ensure compliance with CPUC General Order 95 and NERC Facility Ratings for this project by 2025
- Continue to provide safe and reliable electrical service
- Meet IC Project needs while minimizing environmental impacts
- Design and construct the physical components of the IC Project in conformance with industry and/or SCE's approved engineering, design, and construction standards for substation and subtransmission system projects.

3.4 Full-Rebuild Concept

As described in *Chapter 1 – PEA Summary*, the purpose of the IC Project is to ensure compliance with CPUC GO 95 by remediating discrepancies identified through SCE's TLRR Program.

Although the description of the components of the Full-Rebuild Concept are set forth in this Chapter 3 for bounding purposes, the actual project proposed by SCE is Alternative E as described in greater detail in Chapter 5.

The Full-Rebuild Concept consists of reconstructing existing 115 kV subtransmission line elements; no new substations would be constructed as part of the Full-Rebuild Concept. The Full-Rebuild Concept includes the following elements:

- Subtransmission. Rebuild 358 miles of existing 115 kV subtransmission circuits by:
  - Removing existing subtransmission towers and poles and replacing them with tubular steel poles (TSPs), lightweight steel (LWS) poles, LWS pole H-frames, and multi-pole LWS pole and TSP structures.
  - Removing existing conductor and installing new Aluminum Conductor Composite Core (ACCC) 'Dove' conductor on replacement structures.
  - Installing overhead groundwire (OHGW) in some locations for system protection.
- Distribution
  - Remove existing distribution conductor and appurtenances and install new distribution conductor and appurtenances on replacement structures
- Telecommunications/System Protection
  - Install approximately 360 miles of optical groundwire (OPGW) and/or All-Dielectric Self-Supporting (ADSS) fiber optic cable overhead on replacement structures and new structures.

  - Install approximately 2,500 feet of ADSS fiber optic cable underground within existing substations, and approximately 5,000 feet underground outside of existing substations.
  - Install system protection and telecommunications-associated equipment at existing substations.

- Substations
  - Disconnect existing conductor from existing positions at substations and connect new conductor to those existing positions.
  - Install new overhead groundwire (OHGW) and make minor modifications to the existing racks to accommodate the new OHGW.
  - Install cabling between existing breakers to the existing MEER/communication room/telecommunications cabinet and install new relay and protection racks in the existing MEER/communication room/telecommunications cabinet.

Most existing subtransmission structures would be replaced with TSPs, LWS poles, LWS H-frames, or multi-pole LWS pole or TSP structures. New conductor would be installed on the replacement structures. OPGW and/or ADSS fiber optic cable (collectively referred to as fiber optic cable) would be installed on the replacement structures and new structures, and underground. Replaced structures and conductor would be removed.

The Full-Rebuild Concept description is based on planning level assumptions. Actual work scope would be determined following completion of final engineering, identification of field conditions, and compliance with applicable environmental and permitting requirements.

3.4.1 Project Capacity

The Full-Rebuild Concept is designed to remediate discrepancies; it is not designed to increase the capacity of SCE’s electrical system. However, some increased capacity would be realized due to the installation of more-efficient conductor. No future phases are currently anticipated.

3.5 Project Components

The components of the Full-Rebuild Concept are described in more detail below.

3.5.1 115 kV Subtransmission Line Description

The Full-Rebuild Concept consists of mitigating existing GO 95 discrepancies by rebuilding existing subtransmission lines as described in the sections below.

3.5.1.1 Segment 1

Construction activities for the Full-Rebuild Concept within Segment 1 include:

- Install approximately 384 double-circuit TSPs.
- Install approximately 125 multi-pole TSP structures.
- Install approximately 391 double-circuit LWS poles.
- Install approximately 6 multi-pole LWS structures.
- Remove approximately 1,159 existing subtransmission structures.
- Replace existing 4/0 aluminum conductor steel-reinforced (ACSR) and 330.4 ACSR conductor with new conductor along the 126-mile length of Segment 1.
- Install approximately 126 miles of OPGW and/or ADSS fiber optic cable and install system protection and telecommunications-associated equipment at existing substations.

- Disconnect existing conductor from existing positions at substations and connect new conductor to those existing positions.
- Install marker balls on overhead wire where determined to be appropriate.

3.5.1.2 Segment 2

Construction activities for the Full-Rebuild Concept within Segment 2 include:

- Install approximately 342 double-circuited TSPs with a single circuit installed.
- Install, and then remove, approximately 108 temporary LWS poles with a single circuit installed.
- Install, and then remove, approximately 2 temporary multi-pole LWS structures.
- Remove approximately 389 existing subtransmission structures.
- Rebuild the split bundled Kramer-Inyokern-Randsburg No.1 115 kV Subtransmission Line by removing existing 4/0 ACSR conductor and installing replacement conductor along the 48-mile length of Segment 2.
- Install approximately 48 miles of OPGW and/or ADSS fiber optic cable and install system protection and telecommunications-associated equipment at existing substations.
- Install marker balls on overhead wire where determined to be appropriate.

3.5.1.3 Segment 3N

Construction activities for the Full-Rebuild Concept within Segment 3N include:

- Install approximately 291 double-circuit TSPs with a single circuit installed.
- Install, and then remove, approximately 3 temporary LWS poles with a single circuit installed.
- Install, and then remove, approximately 35 temporary multi-pole LWS structures.
- Remove approximately 299 existing subtransmission structures.
- Rebuild the Kramer-Coolwater115 kV Subtransmission Line by removing existing 795 SAC conductor and installing replacement conductor along the 44-mile length of Segment 3N.
- Install approximately 44 miles of OPGW and/or ADSS fiber optic cable and install system protection and telecommunications-associated equipment at existing substations.
- Install marker balls on overhead wire where determined to be appropriate.

3.5.1.4 Segment 3S

Construction activities for the Full-Rebuild Concept within Segment 3S include:

- Install approximately 33 single-circuit TSPs.
- Install 3 multi-pole TSP structures.
- Install approximately 276 single-circuit LWS poles.
- Install approximately 5 LWS H-frames.
- Remove approximately 317 existing subtransmission structures.
- Rebuild the Kramer-Tortilla 115 kV Subtransmission Line and the Coolwater-Tortilla segment of the Coolwater-SEGS2-Tortilla 115 kV Subtransmission Line by removing existing 795 SAC conductor and installing replacement conductor along the 44-mile length of Segment 3S.
- Install approximately 44 miles of OPGW and/or ADSS fiber optic cable and install system protection and telecommunications-associated equipment at existing substations.
- Install marker balls on overhead wire where determined to be appropriate.

3.5.1.5 Segment 4

Construction activities for the Full-Rebuild Concept within Segment 4 include:

- Install approximately 69 single-circuit TSPs.
- Install approximately 2 double-circuit TSPs.
- Install 9 multi-pole TSP structures.
- Install approximately 15 single-circuit LWS H-frames.
- Install approximately 590 single-circuit LWS poles.
- Remove approximately 687 existing subtransmission structures.
- Rebuild the Ivanpah-Baker-Coolwater-Dunn Siding-Mountain Pass 115 kV Subtransmission Line by removing existing 4/0 ACSR and 336 ACSR conductor and installing replacement conductor along the 96-mile length of Segment 4.
- Install approximately 96 miles of OPGW and/or ADSS fiber optic cable and install system protection and telecommunications-associated equipment at existing substations.
- Install marker balls on overhead wire where determined to be appropriate.

3.5.2 Telecommunications Description

Telecommunications infrastructure would be added to connect the IC Project-associated substations to SCE's telecommunications system. The telecommunications infrastructure would provide Supervisory Control and Data Acquisition (SCADA), protective relaying, data transmission, and telephone services for the Full-Rebuild Concept and associated facilities. Where installed, OPGW also serves as lightning and grounding protection.

New telecommunications cable and appurtenances would be installed along the length of each Segment and at each of the existing substations (see Figure 3.1-1). In addition, an approximately 2.5-mile long fiber optic cable tap would be installed between Segment 1 and an existing third-party telecommunications facility in the community of Independence. The fiber optic cable tap would be installed overhead on approximately 65 new LWS or equivalent poles and underground as it enters the existing facility. Amplification equipment would be installed in the existing facility and connected to the fiber optic cable tap; this equipment is necessary to maintain signal strength in the fiber optic cable line.

The fiber optic cable would be approximately ½-inch in diameter; appurtenances include splice boxes and risers, among other infrastructure. Risers are small-diameter (2-5 inch) plastic or galvanized steel conduit attached with strapping to poles or other structures through which telecommunications cable is placed to transition from an overhead to an underground configuration. Splice boxes are metal or plastic enclosures, frequently of dimensions approximating 36 x 36 x 10-inch, that are attached to attached to subtransmission structures with strapping. The cable would generally be installed overhead at the top of the replacement structures and new poles; in these areas, OPGW would be installed.

Where the IC Project's subtransmission lines are crossed overhead by other transmission lines, ADSS fiber optic cable may be installed below the conductor on the replacement structures instead of OPGW being installed at the top of the replacement structure; this would be necessary to maintain adequate clearances between the Full-Rebuild Concept's infrastructure and the other transmission line's conductor. If adequate clearance between the replacement conductor and the ADSS fiber optic cable cannot be achieved at these locations, ADSS fiber optic cable may be installed on new poles adjacent to the subtransmission line alignment; these new poles would carry only the fiber optic cable. Approximately 32 LWS (or equivalent) poles may be installed to carry ADSS fiber optic cable at line crossings in Segment 1, and approximately 12 may be installed in Segment 2. If neither option is feasible at a given crossing location, ADSS fiber optic cable may be installed in new underground facilities at these crossing locations.

Telecommunications-related modifications at the Independence telecommunications facility and at the existing substations would generally include the installation of equipment on existing rack structures; the installation of cable in new or existing underground cable raceways and/or ducts; and the installation of new, or replacement of, existing telecommunications infrastructure within existing buildings or in existing or new telecommunications cabinets. At some substations, ADSS fiber optic cable would be installed underground where the cable route enters and exits the substation.

3.5.3 Distribution Description

Distribution circuits are installed on a few existing structures; no new distribution circuits would be installed as part of the Full-Rebuild Concept. The existing distribution circuits and appurtenances would be removed and new distribution conductor and appurtenances would be installed on replacement structures.

3.5.4 Poles/Towers

3.5.4.1 Transmission Poles/Towers

No transmission poles or towers (i.e., poles or towers designed to support circuits operated at 200 kV or greater) would be removed, modified, or installed as part of the Full-Rebuild Concept.

3.5.4.2 115 kV Subtransmission Poles/Towers

The rebuilt 115 kV subtransmission lines included in the Full-Rebuild Concept would utilize single TSPs, multi-pole TSP and LWS pole structures, LWS H-frames, and LWS poles. Replacement structures in Segments 1, 2, and 3N would be located in a new alignment adjacent to the existing alignment. The installation of replacement structures in new alignments in these Segments is necessary due to system outage constraints, which require the existing circuits to remain energized while replacement structures are installed; therefore, to maximize worker safety, the replacement structures would be installed in new alignments. Replacement structures in Segments 3S and 4 would generally be installed proximate to existing structures. The approximate dimensions of the proposed structure types are shown in Figureset 3.5-1, Typical Structure Design, and summarized in Table 3.5-1: Typical Subtransmission Structure Dimensions.

Subtransmission facilities would be designed consistent with the Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006 (Avian Power Line Interaction Committee 2006) where feasible. Subtransmission facilities would also be evaluated for potential collision reduction devices in accordance with Reducing Avian Collisions with Power Lines: The State of Art in 2012 (Avian Power Line Interaction Committee 2012).

Approximately 1,257 permanent LWS poles would be installed under the Full-Rebuild Concept. LWS poles would be direct-buried and extend approximately 56 to 124 feet above ground.[9] The diameter of LWS poles would typically be 1 to 4 feet at ground level and tapers to the top of the pole. Depending upon field conditions at the time of construction, a hybrid LWS pole may be installed at some locations. Hybrid LWS poles have a concrete base (either poured in-place or pre-cast) with the steel portion of the pole installed on the concrete base. The LWS poles would be galvanized steel structures with a dulled finish. At 6 locations in Segment 1, multi-pole LWS pole structures would be installed. Approximately 111 temporary LWS poles would be installed and then removed under the Full-Rebuild Concept; at 37 locations, temporary multi-pole LWS pole structures would be installed and then removed.

9 See Section 3.7.2.2.3.5, LWS Pole/LWS H-Frame Installation, for a description of direct-burial of TSPs and LWS poles.

Table 3.5-1: Typical Subtransmission Structure Dimensions

Pole Type	Number of Structures, Full-Rebuild Concept	Approximate Height Above Ground (Feet)	Approximate Pole Diameter (Feet)	Approximate Auger Hole Depth (Feet)	Approximate Auger Diameter (Feet)	Number of Existing Structures	Approximate Height Above Ground, Existing Structures (Feet)
Segment 1							
TSP, Single	383	75-140	2-6	10-40	4-8	—	—
TSP, Multi-pole	125	65-140	2-6	10-30	4-8	—	—
LWS, Multi-pole	6	88-106	1-4	11-13	2-5	—	—
LWS Pole	391	75-124	1-4	9-15	2-5	—	—
LST/TSP	—	—	—	—	—	969	65-81
Pole (LWS or Wood)	—	—	—	—	—	192	42-94
Segment 2							
TSP, Single	342	72-137	2-6	10-40	4-8	—	—
LWS Pole, Temporary	108	52-84	1-4	7-11	2-5	—	—
LWS, Multi-pole, Temporary	2	38-43	1-4	6-7	2-5	—	—
LST/TSP	—	—	—	—	—	385	66-132
H-Frame (LWS or Wood)	—	—	—	—	—	5	58-69
Segment 3N							
TSP, Single	291	72-132	2-6	10-40	4-8	—	—
LWS Pole, Temporary	3	61-93	1-4	8-11	2-5	—	—
LWS, Multi-Pole, Temporary	35	44-62	1-4	6-8	2-5	—	—
LST	—	—	—	—	—	8	79-106
H-Frame	—	—	—	—	—	287	51-89
Pole	—	—	—	—	—	4	71-82
Segment 3S							
TSP, Single	33	62-106	2-6	10-40	4-8	—	—
TSP, Multi-pole	3	52-67	2-6	10-30	4-8	—	—
LWS H-Frame	5	56-66	1-4	7-9	2-5	—	—
LWS Pole	276	56-106	1-4	7-13	2-5	—	—

Table 3.5-1: Typical Subtransmission Structure Dimensions

Pole Type	Number of Structures, Full-Rebuild Concept	Approximate Height Above Ground (Feet)	Approximate Pole Diameter (Feet)	Approximate Auger Hole Depth (Feet)	Approximate Auger Diameter (Feet)	Number of Existing Structures	Approximate Height Above Ground, Existing Structures (Feet)
LST	—	—	—	—	—	1	54
H-Frame	—	—	—	—	—	304	55-85
Pole	—	—	—	—	—	12	61-103
Segment 4							
TSP, Single	71	62-106	2-6	10-40	4-8	—	—
TSP, Multi-pole	9	52-67	2-6	10-30	4-8	—	—
LWS H-Frame	15	51-70	1-4	7-9	2-5	—	—
LWS Pole	590	56-88	1-4	7-11	2-5	—	—
LST	—	—	—	—	—	37	54-106
H-Frame, Lattice	—	—	—	—	—	635	49-69
H-Frame	—	—	—	—	—	7	50-71
Pole	—	—	—	—	—	8	54-72

Approximately 20 LWS H-frames would be used for the Full-Rebuild Concept. Each of the vertical LWS poles would extend approximately 51 to 70 feet above the ground. The diameter of the vertical LWS poles would be approximately 1 to 4 feet at ground level and would taper to the top of the pole. The horizontal member of the H-frame would be approximately 7 inches square. Hybrid LWS pole H-frames may be installed at some locations depending upon field conditions at the time of construction. The LWS poles would be galvanized steel structures with a dulled finish.

Guys are typically used when LWS poles or LWS H-frames are located on angles or corners to provide support to the poles. Guys may also be used on tangent/suspension poles as field conditions dictate. Guying consists of a guy wire (down guy) that is fastened to a pole and attached to a buried anchor, or when there is not adequate space for the required down guy, a shorter guy pole (stub pole) is typically placed with a down guy and buried anchor in a location that has sufficient room for these facilities. The need for and location of guy wires and anchors for LWS poles would be determined during final engineering and construction on a case-by-case basis. Guying across a roadway would be avoided where feasible.

Approximately 1,120 TSPs, or equivalent structures, would be used for the Full-Rebuild Concept. The TSPs would be approximately 2 to 6 feet in diameter at the base and extend approximately 62 to 140 feet above ground. TSPs, or equivalent structures, would be either direct-buried, attached to a concrete foundation, or installed on an engineered micro-pile foundation. TSP concrete pile foundations would be approximately 4 to 8 feet in diameter and would extend underground approximately 10 to 40 feet with approximately 1 to 3 feet of concrete visible above ground. Each TSP would use approximately 5 to 75 cubic yards of concrete. The TSPs would be galvanized steel structures with a dulled finish.

Approximately 137 multi-pole TSP structures would be used for the Full-Rebuild Concept. The TSPs would be approximately 2 to 6 feet in diameter at the base and extend approximately 52 to 140 feet above ground. TSPs, or equivalent structures, would be either direct-buried, attached to a concrete foundation, or installed on an engineered micro-pile foundation. TSP concrete pile foundations would be approximately 4 to 8 feet in diameter and would extend underground approximately 10 to 30 feet with approximately 1 to 3 feet of concrete visible above ground. Each TSP would use approximately 5 to 56 cubic yards of concrete. The TSPs would be galvanized steel structures with a dulled finish.

SCE would file Federal Aviation Administration (FAA) notifications for structures installed under the IC Project, as required. With respect to structures, the FAA would conduct its own analysis and may recommend no changes to the design of the proposed structures; or may request redesigning any proposed structures near an airport to reduce the height of such structures; or marking the structures, including the addition of aviation lighting; or placement of marker balls on wire spans.

SCE would evaluate the FAA recommendations for reasonableness and feasibility, and in accordance with Title 14, Part 77 of the Code of Federal Regulations (CFR), SCE may petition the FAA for a discretionary review of its determination to address any issues with the FAA determination. FAA agency determinations for permanent structures typically are valid for 18 months, and, therefore, such notifications would be filed upon completion of final engineering and before construction commences. The entirety of the Full-Rebuild Concept would be built within a combination of existing SCE fee-owned property, SCE ROWs, and/or properties to be acquired and all construction activities would be performed at a distance from airport activity sufficient to minimize safety concerns to construction personnel.

Subtransmission poles/towers at heights of 200 feet are anticipated to require FAA notifications, as are subtransmission structures located in the vicinity of airports. SCE would consult with the FAA and consider recommendations, to the extent feasible. Typical recommendations include, but are not limited to, the following: installation of marker balls on spans (on OPGW) between structures, and/or installation of lighting on structures. Generally, marking or lighting is recommended by the FAA for those spans or structures that exceed 200 feet in height above ground level (AGL); however, marking or lighting may be recommended for spans and structures that are less than 200 feet AGL, but located within close proximity to an airport or other high-density aviation environment. FAA recommendations of guidelines and standards for marking and lighting are included in Advisory Circular AC 70/7460-1L.

3.5.4.3 Telecommunications Poles/Towers

In Segment 1, approximately 65 new LWS poles (or equivalents) would be installed along Mazourka Canyon Road between the IC Project Alignment and the community of Independence. The poles would be direct-buried and extend approximately 25-40 feet above ground. The diameter of the poles would typically be 1-2 feet at ground level and tapering to the top of the pole. Figure 3.5-2, Independence Telecom Tap illustrates this telecommunications route.

Where the IC Project Alignment is crossed overhead by other transmission and subtransmission lines, it may be necessary to install ADSS fiber optic cable on new poles that carry only the ADSS fiber optic cable (Figure 3.5-3). If this is necessary, approximately 44 LWS poles (or equivalents) would be installed at crossing locations in Segments 1 and 2. The poles would be direct-buried and extend approximately 25-40 feet above ground. The diameter of the poles would typically be 1-2 feet at ground level and tapering to the top of the pole.

3.5.4.4 Distribution Poles

No distribution poles are included in the Full-Rebuild Concept.

3.5.5 Conductor/Cable

3.5.5.1 Above-Ground Installation

3.5.5.1.1 Transmission

No transmission conductor would be installed or removed as part of the Full-Rebuild Concept.

3.5.5.1.2 Subtransmission

The approximate distance from the ground to the lowest conductor would comply with CPUC GO 95 requirements. The distance between the ground and the lowest conductor would exceed applicable minimum height requirements where the conductor spans roadways and water conveyance structures. Fiber optic cable would be installed on all replaced or reused structures. The typical configuration of conductor and fiber optic cable on replacement structures is shown in Figureset 3.5-1, Typical Structure Design.

Conductor span lengths would vary depending upon topography, engineering, and site considerations. Spans would range from approximately 50 feet to 2,000 feet. In all Segments, short sections of OHGW may be installed between the substation racks and getaway or other replacement structures.

3.5.5.1.2.1 Segment 1

Existing subtransmission structures in Segment 1 are generally double-circuited, with single-circuit structures dispersed along the alignment. Replacement TSPs and LWS poles would generally be double-circuited with ACCC ‘Dove’ conductor; the conductor would be non-specular and would have a diameter of approximately 0.93 inches. At some locations, including where other transmission lines cross over the IC Project subtransmission lines, single-circuited replacement multi-pole TSP or LWS pole structures may be installed to maintain adequate clearances between lines. OHGW would be installed on some structures for system protection.

3.5.5.1.2.2 Segment 2

Existing subtransmission structures in Segment 2 are generally double-circuited, with single-circuit structures dispersed along the alignment. In Segment 2, replacement TSPs would be designed as double-circuit structures, but only a single circuit with ACCC ‘Dove’ conductor would be installed; depending on location along the alignment, the circuit would be installed on the west or east side of the replacement structures as part of the Full-Rebuild Concept. The conductor would be non-specular and would have a diameter of approximately 0.93 inches. At some locations, including where other transmission lines cross over the IC Project subtransmission line, single-circuited replacement TSPs, LWS H-frames, or LWS poles may be installed to maintain adequate clearances between lines. OHGW may be installed on some temporary structures during construction for system protection.

3.5.5.1.2.3 Segment 3N

In Segment 3N, replacement TSPs would be designed as double-circuit structures, but only a single circuit with ACCC ‘Dove’ conductor would be installed as part of the Full-Rebuild Concept. The conductor would be non-specular and would have a diameter of approximately 0.93 inches.

3.5.5.1.2.4 Segments 3S and 4

In Segments 3S and 4, replacement TSPs, multi-pole TSP structures, LWS H-frames, and LWS poles would be designed as single-circuit structures and would be single-circuited with ACCC ‘Dove’ conductor. The conductor would be non-specular and would have a diameter of approximately 0.93 inches. OHGW would be installed on some structures for system protection.

3.5.5.1.3 Telecommunications

New telecommunications cable and appurtenances would be installed along the length of each Segment, at each of the existing substations, and to the Independence amplifier site. New fiber optic cable would be approximately ½-inch in diameter and non-specular; appurtenances would include splice boxes and risers, among other infrastructure.

The OPGW would generally be installed at the top of the replacement structures as shown in Figureset 3.5-1, Typical Structure Design. There are several locations along the IC Project Alignment where other transmission lines cross over the IC Project subtransmission lines. At these locations, ADSS fiber optic cable may be installed below the conductor on the replacement structures or ADSS fiber optic cable may be installed on new poles adjacent to the subtransmission alignment. If these options are not feasible, the ADSS fiber optic cable may also be installed underground in new facilities in these locations. At some substations and at the Independence amplifier site, ADSS fiber optic cable would be installed underground where the cable route enters and exits the substation.

The telecommunications route would originate at Control Substation (Figure 3.1-1, Project Segments). The fiber optic cable would be routed underground from the mechanical electrical equipment room (MEER) to the first replacement structure outside the fence line (referred to as the getaway structure), and then transition to overhead where it would continue on replacement structures to a point on the alignment where it crosses Mazourka Canyon road east of the community of Independence.

At a replacement structure adjacent to Mazourka Canyon Road, the fiber optic cable would transition to an overhead configuration on new poles to the Independence amplifier site. At the amplifier site, it would transition to an underground configuration to enter an existing third-party telecommunications facility. From the Mazourka Canyon Road replacement structure, the fiber optic cable would continue overhead on replacement structures to Haiwee Substation.

At Haiwee Substation, the telecommunications route would be routed overhead from the IC Project Alignment to the substation on H-frame structures owned by Los Angeles Department of Water and Power (LADWP). The route would transition from overhead to underground via two existing LADWP H-frame structures. A new telecommunications cabinet would be constructed at the substation. From Haiwee Substation, the route would proceed overhead on replacement subtransmission structures to Coso Substation.

At Coso Substation, the telecommunications route would transition from overhead to underground via a replacement TSP located proximate to the substation. From this TSP, fiber optic cable would be placed underground, terminating within the existing MEER building at Coso Substation. The fiber optic circuit would loop through Coso Substation, transitioning back to an overhead configuration. From Coso Substation, the telecommunications route would continue overhead to Inyokern Substation, where just outside the substation it would transition underground via a replacement structure and would terminate at an existing telecommunication building at Inyokern Substation.

In Segment 2, the telecommunications route would originate at the MEER building at Inyokern Substation. The fiber optic cable would be routed underground from the MEER building, beneath SR-178, to a getaway TSP, where it would transition to an overhead configuration and continue to Randsburg Substation. At Randsburg Substation, the fiber optic circuit would transition to underground conduit via a riser on a getaway structure and be routed to an existing telecommunications cabinet inside the substation. The fiber optic circuit would leave Randsburg Substation underground, transitioning to an overhead configuration via a riser on a replacement getaway structure. The fiber optic circuit would then travel overhead to Kramer Substation, where it would again transition to an underground configuration and terminate at an existing telecommunications room.

In Segment 3N, the fiber optic circuit would be routed underground in new and existing conduit from the existing telecommunications room at Kramer Substation to a replacement getaway structure inside the substation, where it would transition to an overhead configuration. The route would then travel overhead to Coolwater Substation, where the route would transition from overhead to underground, with fiber optic cable installed in new and existing conduit from a replacement getaway pole to the existing telecommunications room at Coolwater Substation.

In Segment 3S, fiber optic cable would be routed underground in new and existing conduit from the existing MEER at Kramer Substation to a replacement getaway structure, located inside the substation, where it would transition to an overhead configuration. The fiber optic circuit would then travel overhead to Tortilla Substation, where it would transition underground at a replacement getaway pole and run underground in new conduit to the existing MEER. The fiber optic circuit would loop through Tortilla Substation, returning to an overhead configuration. From Tortilla Substation the route would then travel overhead to Coolwater Substation, where the route would transition from overhead to underground, with fiber optic cable installed in new and existing conduit from a replacement getaway pole to the existing MEER at Coolwater Substation.

In Segment 4, the route would start at the existing MEER at Coolwater Substation. It would start underground in new and existing conduit, and transition from underground to overhead via a riser on a replacement getaway pole. At Dunn Siding Substation, the fiber optic cable would enter and exit the substation underground and be routed through new conduit to the existing communications cabinet. At Baker Substation, the fiber optic cable would transition from overhead to underground at getaway structures on the west and east of the substation, and then would be installed in new conduit to a new communications cabinet. At Mountain Pass Substation, the fiber optic cable would enter and exit the substation underground and be routed through new conduit to the existing communications cabinet. At

Ivanpah Substation, the OPGW would transition underground via a riser on an existing structure and be installed in new and existing conduit to the control building at Ivanpah Substation.

3.5.5.1.4 Distribution

Distribution circuits are installed on a few existing structures; no new distribution circuits would be installed as part of the Full-Rebuild Concept. The existing distribution circuits and appurtenances would be removed and new distribution conductor and appurtenances would be installed on replacement structures. New distribution conductor would be covered as appropriate.

3.5.5.2 Below-Ground Installation

3.5.5.2.1 Transmission

No below-ground installation of transmission conductor is included in the Full-Rebuild Concept.

3.5.5.2.2 Subtransmission

No below-ground installation of subtransmission conductor is included in the Full-Rebuild Concept.

3.5.5.2.3 Telecommunications

The Full-Rebuild Concept would require the below-ground installation of ADSS fiber optic cable near some substations and at the Independence amplifier site. Below-ground installation would occur both within the fence line of the existing substations and amplifier site, and outside the fence line, as described in Section 3.5.1.2, Telecommunications Description. In addition, ADSS fiber optic cable may be installed underground at locations where the IC Project Alignment is crossed overhead by other transmission or subtransmission lines.

3.5.6 Substations

3.5.6.1 New Substations

No new substations are included in the Full-Rebuild Concept.

3.5.6.2 Modification to Existing Substations

No subtransmission-related expansion or major modification of existing substations is included in the Full-Rebuild Concept.

Subtransmission-related work within the existing substations would include disconnecting existing conductor from existing substation equipment and connecting new conductor to existing substation equipment. Minor modifications to the existing racks at each of the substations may be required so that overhead groundwire (OHGW) can be installed between the racks and the getaway structures. These minor modifications could include installation of new fittings to which the OHGW would be attached, or structural reinforcement of the existing racks. New and upgraded protection and control equipment would be installed within the control buildings at each of the twelve substations.

Existing control cables between existing breakers and the existing MEER/communication room/telecommunications relay protection and control racks would be removed and new bundled multi-conductor would be installed where necessary. The new control cable would be installed into existing cable trench and conduit systems within the substation. If a conduit cannot be re-used, then a new conduit shall be installed between the equipment and cable trench or MEER building. New relay and protection racks would be installed into existing MEER/communication room/telecommunications buildings as required per the final engineering design.

Telecommunications-related work within the existing substations would include the installation of new terminal equipment, channel multiplexer equipment, equipment cabling, and other telecommunication equipment devices; these would be installed within the existing MEERs and/or communication rooms, or in existing or new communications cabinets, at the substations. This work would provide the required telecommunication circuit connection to subtransmission line protection relay equipment within the substations. Other telecommunications-related work that would occur within substations is described above in Section 3.5.1.2, Telecommunications Description.

3.6 Right-of-way Requirements

Upon final engineering and receipt of project approvals, SCE would confirm the necessary land rights and acquire the same for the IC Project. A summary of land rights to be acquired is as follows:

- Segment 1. Replacement structures in Segment 1 would be installed outside the existing corridor on which SCE has rights. New rights required for entire 126-mile length; replacement infrastructure would be installed outside of the corridor on which SCE has rights. Rights to be obtained from BLM, BIA, DoD, California State Lands Commission, LADWP, and private landowners.
- Segment 2. Replacement structures in Segment 2 would be installed within the existing corridor on which SCE has rights, with the following exceptions: Existing rights on BLM-managed lands have expired and would be renegotiated; new rights to be obtained from Caltrans and counties for road crossings; new rights to be obtained from private landowners and others; and upgraded rights to be obtained from private landowners.
- Segment 3N. Replacement structures in Segment 3N would be installed within the existing corridor on which SCE has rights, with the following exceptions: Existing rights on BLM- and DoD-managed lands have expired and would be renegotiated; new rights to be obtained from Caltrans and county for road crossings; new rights to be obtained from Union Pacific Railroad for crossing, new rights to be obtained from private landowners; and upgraded rights to be obtained from private landowners.
- Segment 3S. Replacement structures in Segment 3S would be installed within the existing corridor on which SCE has rights, with the following exceptions: Existing rights on BLM- and DoD-managed lands have expired and would be renegotiated; new rights to be obtained from Caltrans and county for road crossings; new rights to be obtained from private landowners.
- Segment 4. Replacement structures in Segment 4 would be installed within the existing corridor on which SCE has rights, with the following exceptions: Existing rights on BLM-managed lands have expired and would be renegotiated; new rights to be obtained from Caltrans and county for road crossings; upgraded rights to be obtained from California State Lands Commission; new rights to be obtained from Union Pacific Railroad for crossing; new rights to be obtained from private landowners; and upgraded rights to be obtained from private landowners.

The IC Project would be built within existing or new ROWs, including easements, public ROWs, and on existing SCE fee-owned property. The width of these ROWs varies over the length of the IC Project Alignment. Existing access roads and spur roads are primarily located within existing ROWs or covered under easements, are public roads, or are open roads on lands administered by the BLM.

New authorizations from the BLM and other federal and state landowners, and new or modified easements from private landowners, would be obtained to accommodate the reconstructed subtransmission lines as necessary. In addition, appropriate permits, licenses, and/or property rights would be obtained for flood control, railroad, and highway crossings. Temporary land rights (e.g., easements, permits, and license) may be required for access roads, construction work areas, conductor stringing sites, helicopter landing zones, staging yards and other construction-support areas during construction. This is subject to change based on final engineering and construction requirements.

Easement widths are based on facility types, final design and type of right to be acquired. Upgrading easements may include adding land rights, adding width to existing easements, improving or clarifying access or maintenance rights, etc.

3.7 Construction

The following subsections describe the construction activities associated with the Full-Rebuild Concept.

3.7.1 For All Projects

3.7.1.1 Staging Yards

Construction of the Full-Rebuild Concept 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 yard may also have construction trailers for supervisory and clerical personnel. Staging yards may be lit for staging and security. Normal maintenance and refueling of construction equipment would also be conducted at these yards. All refueling—which may include helicopters—and storage of fuels would be in accordance with the site-specific Storm Water Pollution Prevention Plan (SWPPP).

SCE anticipates using one or more of the possible locations listed in Table 3.7-1: Potential Staging Yard Locations, and shown in Figureset 3.7-1, Staging Yards as the staging yard(s) for the Full-Rebuild Concept. Typically, each yard would be approximately 1 to 5 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 and/or minor grading may be required to provide a plane and dense surface for the application of gravel or crushed rock. Any land that may be disturbed at the staging yard would be returned to preconstruction conditions or left in its modified condition, if requested by the landowner following the completion of construction for the Full-Rebuild Concept.

Table 3.7-1: Potential Staging Yard Locations

Yard Name	Location	Condition	Approx. Area (Acres)	Project Component
1-1	US 395/Sunland Reservation Rd., Bishop	Disturbed	5.04	Segment 1
1-2	Sunland Ln., Bishop	Disturbed	3.8	Segment 1
1-3	US 395/Collins Rd.	Undisturbed	4.94	Segment 1
1-4	Big Pine Dump Rd./Gregg Rd., Big Pine	Undisturbed	5.06	Segment 1
1-5	Fish Springs Rd., Fish Springs	Undisturbed	4.94	Segment 1
1-6	US 395/East Elna	Undisturbed	4.94	Segment 1
1-7	US 395/Aberdeen Station Rd.	Undisturbed	4.93	Segment 1
1-8	US 395/North Coloseum Rd.	Undisturbed	4.92	Segment 1
1-9	Mazourka Canyon Rd.	Undisturbed	4.73	Segment 1
1-10	Manzanar Reward Rd.	Disturbed/ Asphalted	4.6	Segment 1
1-11	Substation Rd., Lone Pine	Disturbed	4.87	Segment 1
1-12	1800 Block S. Main St., Lone Pine	Disturbed	2.87	Segment 1
1-13	US 395/South of Diaz Lake	Disturbed	5.08	Segment 1
1-14	US 395	Disturbed	4.96	Segment 1
1-15	US 395, Cartago	Disturbed	4.95	Segment 1
1-16	SR-190, Olancha	Disturbed	5.06	Segment 1
1-17	East of Enchanted Lake Rd.	Undisturbed	5.02	Segment 1
1-18	Haiwee Substation	Disturbed	4.95	Segment 1
1-19	Gill Station Coso Rd.	Undisturbed	4.88	Segment 1
1-20	South of Little Lake	Undisturbed	4.94	Segment 1

Table 3.7-1: Potential Staging Yard Locations

Yard Name	Location	Condition	Approx. Area (Acres)	Project Component
1-21	US 395/Brown Rd.	Undisturbed	5.01	Segment 1
1-22	East of Inyokern Substation	Disturbed	1.64	Segment 1
2-1A	SR-178 A	Undisturbed	4.73	Segment 2
2-1B	SR-178 B	Undisturbed	4.11	Segment 2
2-2	North Downs St	Asphalted/ Paved	5.15	Segment 2
2-3	East Upjohn Ave	Disturbed	4.6	Segment 2
2-4A	South Brown Road A	Disturbed	4.86	Segment 2
2-4B	South Brown Road B	Disturbed	4.93	Segment 2
2-5	Garlock Rd	Disturbed	4.93	Segment 2
2-6	Garlock Rd	Disturbed	5.01	Segment 2
2-7A	Goler Rd B	Disturbed	4.85	Segment 2
2-7B	Goler Rd A	Disturbed	4.36	Segment 2
2-8	Red Mountain Rd	Disturbed	5.01	Segment 2
2-9	Hoffman Rd	Disturbed	3.77	Segment 2
2-10A	US 395 A	Undisturbed	4.95	Segment 2
2-10B	US 395 B	Undisturbed	4.33	Segment 2
2-11A	AT&SF RR A	Disturbed	1.63	Segment 2
2-11B	AT&SF RR B	Undisturbed	4.72	Segment 2
2-12A	US 395 A	Disturbed	4.07	Segment 2
2-12B	US 395 B	Disturbed	4.67	Segment 2
3S-13A	US 395 A	Undisturbed	3.39	Segment 3S
3S-13B	US 395 B	Undisturbed	4.38	Segment 3S
3N-14A	Harper Lake Rd A	Undisturbed	4.52	Segment 3N
3N-14B	Harper Lake Rd B	Undisturbed	4.5	Segment 3N
3N-15A	Harper Lake Rd	Undisturbed	4.51	Segment 3N
3N-16A	Rainbow Ranch Rd A	Undisturbed	4.78	Segment 3N
3N-16B	Rainbow Ranch Rd B	Disturbed	4.76	Segment 3N
3N-17	Irwin Road	Disturbed	4.76	Segment 3N
3N-18	North Frontage Rd	Disturbed	5.22	Segment 3N
3N-19	County Rd	Undisturbed	5.12	Segment 3N
3N-20	Harper Lake Rd	Undisturbed	5.01	Segment 3N
3S-21	Hinkley Rd	Undisturbed	5.05	Segment 3S
3S-22	Agate Rd	Undisturbed	5.16	Segment 3S
3S-23	Tortilla Substation	Undisturbed	5.22	Segment 3S
3S-24	Ord Mountain Rd	Undisturbed	4.95	Segment 3S
3S-25	Santa Fe St	Disturbed	5.49	Segment 3S
3S-26	Coolwater (Ongen) Substation	Disturbed	4.87	Segment 3S
4-27	Minneola Rd	Undisturbed	4.86	Segment 4
4-28	Harvard Rd	Undisturbed	4.74	Segment 4
4-29	I-15	Undisturbed	4.59	Segment 4
4-30	Afton Canyon Rd	Disturbed	4.49	Segment 4
4-31	Arrowhead Trail	Undisturbed	4.38	Segment 4
4-32	Rasor Rd	Disturbed	2.31	Segment 4
4-33	I-15	Undisturbed	4.92	Segment 4
4-34	Baker Blvd	Disturbed	5.09	Segment 4
4-35	Baker Airport	Disturbed	5.12	Segment 4
4-36	Halloran Springs Rd	Disturbed	0.85	Segment 4
4-37	Halloran Springs Rd	Disturbed	3.8	Segment 4
4-39	Halloran Summit Rd	Disturbed	0.63	Segment 4
4-40	Halloran Summit Rd	Disturbed	5.03	Segment 4

Table 3.7-1: Potential Staging Yard Locations

Yard Name	Location	Condition	Approx. Area (Acres)	Project Component
4-41	Kingston Rd	Undisturbed	5.08	Segment 4
4-42	Mountain Pass Rare Earth Mine	Disturbed	5.01	Segment 4
4-43	Ivanpah Substation	Disturbed	4.83	Segment 4
4-44	Ivanpah Substation	Disturbed	5.05	Segment 4
4-45	Powerline Rd	Disturbed	4.89	Segment 4

Temporary power would be determined based on the type of equipment/facilities being used at the staging yards. If existing distribution facilities are available, a temporary service and meter may be used for electrical power at one or more of the yards. If it is determined that temporary power is not needed or available at the staging yards full time, a portable generator may be used intermittently for electrical power at one or more of the yards.

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

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 subtransmission construction areas described in Section 3.7.1.2, Work Areas.

3.7.1.2 Work Areas

Subtransmission construction work areas serve as temporary working areas for crews and where project related equipment and/or materials are placed at or near each structure location, within SCE ROW or franchise. Table 3.7-2: Approximate Laydown/Work Area Dimensions, identifies the approximate land disturbance for these construction areas dimensions for the Full-Rebuild Concept.

The new structure pad locations and laydown/work areas (Table 3.7-2: Approximate Laydown/Work Area Dimensions) would first be graded and/or cleared of vegetation as required to provide a reasonably level and vegetation-free surface for structure installation. Sites would be graded such that water would run toward the direction of the natural drainage and as directed by the SWPPP requirements. In addition, drainage would be designed to prevent ponding and erosive water flows that could cause damage to footings or poles. The graded area would be compacted to at least 90 percent relative density and would be capable of supporting heavy vehicular traffic.

Erection of the structures may also require establishment of a temporary crane pad. The crane pad would typically 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. The pad may be cleared of vegetation and/or graded as necessary to provide a level surface for crane operation. The decision to use a separate crane pad would be determined during final engineering for the Full-Rebuild Concept and the selection of the appropriate construction methods to be used by SCE or its Contractor.

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 may also be used on an as-needed basis in areas to help ensure the safety of personnel during construction activities. SCE does not foresee the need for benching as part of the Full-Rebuild Concept; however, the physical environment in which the Full-Rebuild Concept would be constructed is dynamic, and thus this description of benching is included should the need for benching arise during construction.

Table 3.7-2: Approximate Laydown/Work Area Dimensions

Laydown/Work Area Feature	Number of Features	Preferred Size (L x W) (Feet)	Total Square Footage	Total Acreage
Install TSP	1,120	200 x 150	33,053,328	758.8
Install Multi-Pole TSP Structure	137	200 x 150	4,042,368	92.8
Install LWS pole (permanent)	1,257	200 x 100	32,034,024	735.4
Install LWS H-Frame	20	200 x 125	483,516	11.1
Install Multi-Pole LWS Structure (permanent)	6	200 x 125	178,596	4.1
Install LWS pole (temporary)	111	200 x 100	3,327,984	76.4
Install Multi-Pole LWS Structure (temporary)	37	200 x 150	1,110,780	25.5
Remove TSP or LST	1,399	200 x 150	41,612,868	955.3
Remove H-Frame (steel or wood)	1,238	200 x 125	28,152,828	646.3
Remove wood pole	142	100 x 200	4,016,232	92.2
Conductor Stringing Site	1,006	400 x 150	60,409,008	1,386.8
Conductor Field Snub Areas	79	400 x 100	3,262,644	74.9
Splice Removal Area	883	50 x 75	3,410,748	78.3
Install/Remove Guard Structure	535	75 x 75	3,558,852	81.7
Telecommunications Pull and Tension Site	—	400 x 150	—	—
Staging Yards	75	Varies	1,4819,112	340.2

Notes:
The dimensions listed above are preferred for construction efficiency; actual dimensions may vary depending on project constraints.
For the purposes of this PEA it is assumed that the entirety of the 'Preferred Size' for each laydown/work area feature would be disturbed during construction. It is also assumed that the entirety of the 'Preferred Size' would be used at every TSP installation site, every LWS H-Frame installation site, etc.
Telecommunications pull and tension sites along Segments 1, 2, 3N, 3S and 4 would be located within conductor stringing sites or conductor field snub areas.

3.7.1.3 Access Roads and/or Spur Roads

Subtransmission line roads are classified into two groups; 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 line ROWs. Spur roads are roads that lead from access roads and terminate at one or more structure sites.

As discussed earlier, construction and operation and maintenance crews would employ a network of existing roads. The typical subtransmission access road consists of a network of dirt roads accessed from paved public and private roads.

No new permanent access roads would be developed as part of the Full-Rebuild Concept. In some locations, new permanent spur roads may be constructed from existing access roads to replacement structures. Approximately 426 miles of existing access and spur roads would be employed for construction of the Full-Rebuild Concept. At present, all 426 miles are projected to require minor rehabilitation work, including regrading and repair of the existing roadbed. These roads would be cleared of vegetation; blade-graded to remove potholes, ruts, and other surface irregularities; and re-compacted to provide a smooth and dense riding surface capable of supporting heavy construction equipment. As part of this minor rehabilitation, vegetation within the road prism would be trimmed or removed to the width of the prism.

Prior to the start of construction, some of the existing 426 miles of existing access and spur roads may require additional rehabilitation. The extent and scope of this rehabilitation is unknown at this time, as field conditions along the Full-Rebuild Concept alignment are subject to change. The types of additional rehabilitation that may be required could include:

- Widening of the existing roadbed at curves and other locations.
- Installation of new, or repair of existing, drainage structures such as wet crossings, water bars, overside drains and pipe culverts to allow for construction traffic usage, as well as to prevent road damage due to uncontrolled water flow.
- Repair and stabilization of slides, washouts, and other slope failures by installing retaining walls or other means necessary to prevent future failures. The type of structure to be used would be based on specific site conditions.

If, during the final engineering process, the need for retaining walls is identified, the location, length, height, and type of such walls would be communicated to the CPUC. If the need for extensive rehabilitation is identified, a Minor Project Refinement and associated environmental effects analysis likely would be developed and submitted to the CPUC.

Where existing access or spur roads cross culverted waterways, temporary plating or matting may be laid over the roadway to protect the culverts and to support the movement of heavy construction equipment. In some instances, a temporary bridge may be placed over a culverted or bridged waterway if plating or matting would not adequately protect the culverts or if an existing bridge is not suitable for the movement of heavy construction equipment. Plating or matting may also be placed in other locations depending on surface conditions at the time of construction.

Table 3.7-3: Access and Spur Road Land Disturbance Table

Project Feature	Site Quantity	Disturbance Acreage Calculation (L x W)	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Existing Access and Spur Roads	426 miles	# of miles x 18 feet	933	0	181[1]
New Spur Roads	3.2 miles	#of miles x 18 feet	5	0	5

Notes:

1 The width of existing access and spur roads varies across the IC Project Alignment. SCE's standard design for access and spur roads is that they have a width of 18 feet (a 14-foot drivable surface and 2-foot shoulders on each side of the road). At present, existing access and spur roads account for 752 acres of disturbance. To bring these access and spur roads up to the SCE standard design, an additional 181 acres would be permanently disturbed. No disturbance outside the 18-foot width (including vegetation trimming) is included in these calculations.

3.7.1.4 Helicopter Access

Helicopters would be used to support construction activities. Helicopter use supporting construction may include, but is not limited to, areas where access is limited (e.g., no suitable access road, limited construction area to facilitate on-site structure assembly, and/or there are environmental constraints to accessing the project area with standard construction vehicles and equipment) or where system outage constraints are a factor.

Specifically, SCE currently anticipates helicopters would be utilized in support of the construction of the Full-Rebuild Concept, to include the installation of replacement LWS poles, LWS H-frames, TSPs, and multi-pole LWS pole and TSP structures, and removal of existing structures where overland access is not feasible. The dimensions of the construction work areas required for this work are captured by the dimensions described in Table 3.7-2. Helicopters may be used in other areas to facilitate construction of the Full-Rebuild Concept as the exact method of construction employed and the sequence by which construction tasks occur would be dependent on final engineering, contract award, conditions of permits, and contractor preference.

Project related helicopter activities may include transportation of construction workers, delivery of equipment and materials to structure sites, structure placement, structure removal, hardware installation, marker ball installation (if applicable), and conductor and fiber optic cable stringing operations. SCE would consider IEEE Standards 951-1966, *Guide to the Assembly and Erection of Metal Transmission Structures*, and 524-2003, *Guide to the Installation of Overhead Transmission Line Conductors* in the construction of the Full-Rebuild Concept.

Helicopter operations and support areas typically include helicopter staging and material yards, storage and maintenance sites, and ground locations in close proximity to conductor or OPGW/ADSS pulling, tensioning, and splice sites and/or within 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. 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(s) or airstrips; helicopters may also be refueled at these airports or airstrips.

Helicopter construction activities would typically be based out of a staging yard as described above. Staging yards would be sited based upon a variety of factors, including the optimization of flight time to work locations. Additionally, operation crews, as well as fueling and maintenance trucks, may be based in the staging yards. Staging yards may also be used for material storage and pole assembly activities. Once pole sections are assembled, they would be transported via helicopter or ground-based vehicle to installation sites for final assembly.

SCE anticipates using the possible locations listed in Table 3.7-1: Potential Staging Yard Locations, as the helicopter staging yards for the Full-Rebuild Concept. Preparation of the staging yard would include temporary perimeter fencing and depending on existing ground conditions at the site, grubbing and/or minor grading may be required to provide a plane and dense surface for include the application of gravel or crushed rock. Any land that may be disturbed at the staging yard would be restored to preconstruction conditions or to the landowner's requirements following the completion of construction for the Full-Rebuild Concept.

Flight paths would be determined immediately prior to construction by the helicopter contractor. Flight paths would be filed with the appropriate authorities, where required. As examples, SCE anticipates that medium-duty helicopters would be used for structure removal and installation activities, and light-duty helicopters would be used for conductor, OPGW, and marker ball installation.

3.7.1.5 Vegetation Clearance

Construction of the Full-Rebuild Concept would be performed using public roads, SCE's existing access and spur roads, as well as stringing sites, construction work areas, staging yards, and helicopter landing zones along the alignment.

During road rehabilitation activities, vegetation would be trimmed and/or removed within the 18-foot wide access or spur road prism as necessary. Vegetation would also be trimmed and/or removed as needed at stringing sites, construction work areas, staging yards, and helicopter landing zones. Vegetation removal in some areas would consist of "brushing" (i.e., shrubs and other low-lying vegetation would be trimmed and/or removed within the 18-foot wide access or spur road prism as necessary).

Where overland travel is feasible, vegetation would be trimmed while leaving the root structure intact, or vehicles would drive over the extant vegetation (overland travel). In some locations, temporary matting may be placed on the surface to facilitate access to a work location.

Brushing would generally be accomplished using a mower-type attachment mounted to a tractor; in some instances, areas would be brushed by individuals using heavy-duty “weed whacker” type equipment. Vegetation growing on the road surface would be removed by a motor grader during the blade-grading of roads to remove potholes, ruts, and other surface irregularities.

Trees or portions of trees that encroach upon the 18-foot wide access and spur road prism may be removed to facilitate the safe movement of construction equipment. Similarly, trees or portions of trees within or adjacent to stringing sites, construction laydown areas, construction work areas, staging yards, and helicopter landing zones may be trimmed or removed to permit the safe operation of construction equipment; these areas would be preferentially selected to minimize the trimming or removal of trees.

3.7.1.6 Erosion and Sediment Control and Pollution Prevention during Construction

3.7.1.6.1 Storm Water Pollution Prevention Plan (SWPPP)

Construction of the Full-Rebuild Concept would disturb a surface area greater than one acre. Therefore, SCE would apply for coverage under a 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 (SWRCB). As part of the permitting requirements, SCE or its contractor would prepare a Storm Water Pollution Prevention Plan (SWPPP) that includes project information, design features, monitoring and reporting procedures, and Best Management Practices (BMPs). Commonly used BMPs are storm water runoff quality control measures (e.g., boundary protection, erosion and sediment controls, etc.), good housekeeping, dewatering procedures, and concrete waste management. The SWPPP would be based on final engineering design and would include all project components.

3.7.1.7 Dust Control

During construction, migration of fugitive dust from the construction sites would be limited by control measures set forth by the Eastern Kern Air Pollution Control District, Great Basin Unified Air Pollution Control District, and the Mojave Desert Air Quality Management District. These measures may include the use of water trucks and other dust control measures, including the application of non-toxic soil binders. The sources of water to be used for dust control are discussed in Section 4.19, Utilities and Service Systems.

3.7.1.8 Hazardous Materials

Construction of the Full-Rebuild Concept 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. Safety Data Sheets would be made available at the construction site for all crew workers.

Based on the anticipated volume of hazardous liquid materials, such as fuel, that would be stored and dispensed at staging yards, a Spill Prevention, Control, and Countermeasure (SPCC) Plan could be required (in accordance with 40 C.F.R. Parts 112.1-112.7) depending on contractor requirements.

3.7.1.9 Reusable, Recyclable, and Waste Material Management

Construction of the Full-Rebuild Concept would result in 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 applicable sanitation waste management practices. Material from existing infrastructure that would be removed as part of the Full-Rebuild Concept such as conductor, steel, concrete, and debris, would be temporarily stored in one or more staging yards as the material awaits salvage, recycling, and/or disposal. Approximately 3,045 tons of metal (consisting of steel from existing towers and metals from existing conductor) would be removed as part of the Full-Rebuild Concept, as would approximately 155 tons of concrete from the foundations of existing towers.

The existing wood poles removed for the Full-Rebuild Concept would be returned to a staging yard, and either reused by SCE, returned to the manufacturer, disposed of in a Class I hazardous waste landfill, and/or disposed of in the lined portion of a Regional Water Quality Control Board (RWQCB)-certified landfill. Approximately 1,420 wood poles would be removed and disposed under the Full-Rebuild Concept.

Drilling muds would be disposed of off-site at an appropriately licensed waste facility. Material excavated for the Full-Rebuild Concept would either be used as fill, backfill for replacement TSPs or LWS poles or other excavations, and/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 notify the proper authorities.

3.7.1.10 Geotechnical Studies

Prior to construction, geotechnical investigations would be initiated to compile information required to complete final engineering. The results of these studies would provide an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils, slope stability, and the presence of hazardous materials and common contaminants; the studies may also include recommendations for the final engineering design.

3.7.1.11 Cleanup and Post-Construction Restoration

SCE would clean up all areas that would be temporarily disturbed by construction of the Full-Rebuild Concept (which may include the staging yards, construction work areas, and stringing sites, among others) 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 Full-Rebuild Concept.

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

3.7.2 Subtransmission Line Construction (Above Ground)

The following sections describe the above ground construction activities associated with installing the subtransmission and telecommunications line infrastructure for the Full-Rebuild Concept.

3.7.2.1 Pull and Tension Sites

Conductor stringing sites associated with the Full-Rebuild Concept would be temporary and the land would be restored to its previous condition following completion of pulling and splicing activities. The conductor stringing sites require level areas to allow for safely positioning of the equipment and, when possible, these locations would be located on existing roads and level areas to minimize the need for grading. Approximately 1,006 conductor pulling sites, and 79 conductor splice sites, are currently proposed. The final number and location of these sites would be determined upon final engineering. The approximate area needed for conductor stringing sites associated with wire installation is variable and depends upon terrain. See Table 3.7-2: Approximate Laydown/Work Area Dimensions for approximate size of conductor stringing sites.

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 a variety of factors, including 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 occur approximately every 13,000 feet on flat terrain. When the line route alignment contains multiple deflections or is situated in rugged terrain, the length of the wire pull is typically diminished. Generally, pulling locations and equipment set-ups would be in direct line with the direction of the overhead conductors and established at a distance equal to approximately three times the height of the adjacent structure.

Each stringing operation consists of a puller set-up positioned at one end, and a tensioner set-up with wire reel stand truck positioned at the other end of the wire pull. Pulling and wire tensioning locations may also be utilized for splicing and field snubbing of the conductors. Where the existing conductor is spliced, permanent splices may be removed and temporary splices would be installed; this is necessary prior to conductor removal because permanent splices may not easily 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.

3.7.2.1.1 Telecommunications Pull and Tension Sites

Telecommunications pull and tension sites would generally be co-located within the conductor stringing sites described above. Where telecommunications cable is installed in a new alignment (for instance, the Independence tap line), telecommunications pull and tension sites of approximately 60 feet by 30 feet would be established.

The pull and tension sites require level areas to allow for safely positioning of the equipment. Existing, level areas and existing roads would be used to minimize the need for grading when possible. Equipment used to pull the telecommunication line would be similar to the equipment described previously for the subtransmission lines. Within the approximately 60-foot by 30-foot work area, two splice trucks with pulling equipment would be required to complete the splicing.

3.7.2.2 Pole (Structure) Installation and Removal

Structure installation and structure removal would require the use of a variety of equipment as presented in Table 3.7-8 and Table 3.7-9. Construction vehicles and equipment would be moved to pole installation or removal sites along the existing subtransmission access road network and spur roads, over new spur roads, overland, or flown to the installation or removal sites by helicopter. Section 3.7.5, Construction Workforce and Equipment describes the anticipated equipment and workforce required for the Full-Rebuild Concept. To get to and from the sites, the crews would use one or more of the construction vehicles listed in Table 3.7-8 and Table 3.7-9. The numbers of anticipated trips are discussed in Section 4.17, Transportation and Traffic.

3.7.2.2.1 Construction Sequence

The Full-Rebuild Concept would involve removing structures, conductor, and associated hardware. The discussions below present information regarding how construction work in each of the Segments may be sequenced; the actual sequence of construction would be determined by the construction contractor. The duration of each of these activities, in terms of estimated production per day and overall estimated schedule, are provided in Table 3.8-1, Construction Equipment and Workforce. The potential work sequence for Segment 1, where the existing structures are double-circuited, may be as follows:

1. Road work – Existing access and spur roads would be used to reach structures, but some rehabilitation and grading may be necessary before removal activities would begin to establish construction access. Where existing access roads and/or spur roads are not present, and where the topography and soil conditions are suitable for overland travel, vegetation would be trimmed to define a route between the nearest access and/or spur road and a construction work area to permit the safe transit of construction vehicles. In some locations where surface conditions are not suitable for overland travel (soft soils, wetland areas, etc.), temporary matting may be placed on the surface from an existing access or spur road to the construction work area, and additional matting laid to form a construction work area. In some locations, new permanent spur roads may be constructed if existing spur roads are not present to replacement structure locations.
2. Wire-pulling locations – Wire pulling sites would be located approximately every 13,000 feet along the existing utility corridor and could include locations at dead-end structures and turning points.
3. De-energize circuit – The subtransmission circuit on one side of the existing structures would be deenergized.
4. Conductor removal –Upon placement of the wire pulling equipment, the existing subtransmission conductor on one side of the existing structures would be pulled out with a pulling rope and/or cable attached to the trailing end of the conductor; guard structures or the equivalent might be used during the removal process. The old conductor would be transported to a staging yard where it would be prepared for recycling.
5. Pole/tower installation – Replacement structures would be installed as described in Section 3.7.2.2.3.
6. Conductor installation – Replacement conductor would be installed on one side of the replacement structures as described in Section 3.7.2.3.
7. Fiber optic cable installation – Fiber optic cable would be installed on the replacement structures as described in Section 3.7.2.3.
8. Energize /deenergize circuits – The newly-installed circuit on replacement structures would be energized, and the remaining existing circuit on the existing structures would be deenergized.
9. Conductor removal – The remaining deenergized subtransmission conductors on the existing structures would be removed as described above.
10. Wood pole/wood pole H-frame removal, surface construction – Wood poles and wood pole H-frames would be removed utilizing a line truck or similar equipment with an attached boom. The removal would consist of above and below-ground portions of the pole. A ground crew would hand excavate around the wood pole; a boom would be attached to the pole, and the pole would then be lifted out and placed on the ground or on a trailer. The wood pole would be transported by truck to a staging yard, and then to an SCE facility for reuse or recycling. The holes left from removing the poles would be backfilled and compacted with soils that may be available as a result of the excavation for new poles, with excess soil from the area, or using imported fill as needed.
11. Wood pole/wood pole H-frame removal, helicopter construction – Wood poles and wood pole H-frames would be removed utilizing a helicopter and sling. The removal would consist of the above and below-ground portions of the pole. Ground crew would access the pole location overland by vehicle or would walk to the location. The ground crew would hand excavate around the wood pole; a sling would be attached to the pole, and the pole would then be lifted out by the helicopter and placed on the ground or on a trailer or flown to a helicopter landing zone. The wood pole would then be transported by truck or helicopter to a staging yard, and then to an SCE facility for reuse or

recycling. The holes left from removing the poles would be backfilled and compacted with soils that may be available as a result of the excavation for new poles, with excess soil from the area, or using imported fill as needed.

12. LST removal, surface construction – For each structure to be removed, a work area would be required. Most structure removal activities would use the equipment pad or other previously disturbed areas established for structure installation. If previously disturbed areas adjacent to the structure are not available, an area would be cleared of vegetation and could be graded if the ground is not level. A crane could be positioned up to approximately 60 feet from the tower location to dismantle the tower. Structures would be dismantled down to the footings and the materials would be transported to a staging yard where they would be prepared for recycling.
13. LST removal, helicopter construction – At some locations, existing LSTs may be removed using a helicopter if overland access for equipment is not feasible. Ground crew would unbolt portions of the LST and would attach a sling to the unbolted portion. The portion of the LST would then be lifted out by the helicopter and placed on the ground or on a trailer. The material would be transported to a staging yard where it would be prepared for recycling.
14. LST footing removal – Footings would typically be removed 2-3 feet below grade and the holes would be filled with excess soil from the area and smoothed to match the surrounding grade. Footings may be left in-place in locations where their removal may cause slope or soil instability and thus could contribute to localized erosion. Footings may also be left in place if requested by the landowner. Footings would not be left in-place in locations that could pose a hazard to the public.
15. Conductor installation – Replacement conductors would be installed on the other side of the replacement structures as described in Section 3.7.2.3.
16. Energize circuit – The second replacement circuit would be energized.

The potential work sequence for Segment 2, where the existing double-circuited structures would be replaced with double-circuited structures that would have only a single circuit installed on them may be as follows:

1. Road work – Existing access and spur roads would be used to reach structures, but some rehabilitation and grading may be necessary before removal activities would begin to establish construction access. Where existing access roads and/or spur roads are not present, and where the topography and soil conditions are suitable for overland travel, vegetation would be trimmed to define a route between the nearest access and/or spur road and a construction work area to permit the safe transit of construction vehicles. In some locations where surface conditions are not suitable for overland travel (soft soils, wetland areas, etc.), temporary matting may be placed on the surface from an existing access or spur road to the construction work area, and additional matting laid to form a construction work area. In some locations, new permanent spur roads may be constructed if existing spur roads are not present to replacement structure locations.
2. Temporary pole installation – Install temporary poles to restrict blow-out of existing conductor into to-be-constructed new structures.
3. Wire-pulling locations – Wire pulling sites could be located approximately every 13,000 feet along the existing utility corridor and could include locations at dead-end structures and turning points.
4. Deenergize circuit – The subtransmission circuit on one side of the existing structures would be deenergized.
5. Conductor removal – Upon placement of the wire pulling equipment, the existing subtransmission conductor on one side of the existing structures would be pulled out with a pulling rope and/or cable attached to the trailing end of the conductor; guard structures or the equivalent might be used during the removal process. The arms on that side of the existing structures would be removed as well. The old conductor would be transported to a staging yard where it would be prepared for recycling.

6. Pole/tower installation – Replacement subtransmission structures and temporary structures would be installed as described in Section 3.7.2.2.3.
7. Conductor installation – Replacement conductors would be installed on one side of the replacement structures as described in Section 3.7.2.3.
8. Fiber optic cable installation – Fiber optic cable would be installed on the replacement structures as described in Section 3.7.2.3 below.
9. Energize/deenergize circuits – The newly-installed circuit on replacement structures would be energized and the remaining existing subtransmission circuit would be deenergized.
10. Conductor removal – The remaining deenergized subtransmission conductors on the existing structures would be removed as described above.
11. Existing and temporary structure removal – The existing LSTs and footings, poles, and H-frames, and temporary poles, would be removed through surface construction and helicopter construction as described for Segment 1 above.

The work in Segment 3N, where existing single-circuited structures would be replaced with double-circuited structures that would have only a single circuit installed on them, may be as follows:

1. Road work – Existing access roads would be used to reach structures, but some rehabilitation and grading may be necessary before removal activities would begin to establish construction access. Where existing access roads and/or spur roads are not present, and where the topography and soil conditions are suitable for overland travel, vegetation would be trimmed to define a route between the nearest access and/or spur road and a construction work area to permit the safe transit of construction vehicles. In some locations where surface conditions are not suitable for overland travel (soft soils, wetland areas, etc.), temporary matting may be placed on the surface from an existing access or spur road to the construction work area, and additional matting laid to form a construction work area. In some locations, new permanent spur roads may be constructed if existing spur roads are not present to replacement structure locations.
2. Wire-pulling locations – Wire pulling sites could be located approximately every 13,000 feet along the existing utility corridor and could include locations at dead-end structures and turning points.
3. Pole/tower installation – Replacement subtransmission structures would be installed as described in Section 3.7.2.2.3.
4. Conductor/fiber optic cable installation – Replacement conductor and new fiber optic cable would be installed as described in Section 3.7.2.3.
5. Energize circuit – The newly-installed circuit on replacement structures would be energized.
6. Deenergize existing circuit.
7. Conductor removal – Upon placement of wire pulling equipment, the existing subtransmission conductor would be pulled out with a pulling rope and/or cable attached to the trailing end of the conductor; guard structures or the equivalent might be used during the removal process. The old conductor would be transported to a staging yard where it would be prepared for recycling.
8. Existing structure removal – The existing LSTs and footings, poles, and H-frames would be removed through surface construction and helicopter construction as described for Segment 1 above.

The work in Segments 3S and 4, where existing single-circuited structures would be replaced with single-circuited structures, may be as follows:

1. Road work – Existing access roads would be used to reach structures, but some rehabilitation and grading may be necessary before removal activities would begin to establish construction access. Where existing access roads and/or spur roads are not present, and where the topography and soil conditions are suitable for overland travel, vegetation would be trimmed to define a route between

the nearest access and/or spur road and a construction work area to permit the safe transit of construction vehicles. In some locations where surface conditions are not suitable for overland travel (soft soils, wetland areas, etc.), temporary matting may be placed on the surface from an existing access or spur road to the construction work area, and additional matting laid to form a construction work area. In some locations, new permanent spur roads may be constructed if existing spur roads are not present to replacement structure locations.

2. Wire-pulling locations – Wire pulling sites could be located approximately every 13,000 feet along the existing utility corridor and could include locations at dead-end structures and turning points.
3. Deenergize existing circuit.
4. Conductor removal – Upon placement of the wire pulling equipment, the existing subtransmission conductor would be pulled out with a pulling rope and/or cable attached to the trailing end of the conductor; guard structures or the equivalent might be used during the removal process. The old conductor would be transported to a staging yard where it would be prepared for recycling.
5. Existing structure removal – The existing LSTs and footings, poles, and H-frames would be removed through surface construction and helicopter construction as described for Segment 1 above.
6. Pole/tower installation – Replacement subtransmission structures would be installed as described in Section 3.7.2.2.3.
7. Conductor/fiber optic cable installation – Replacement conductor and new fiber optic cable would be installed as described in Section 3.7.2.3.
8. Energize circuit – The newly-installed circuit on replacement structures would be energized.

Any remaining facilities that are not reused by SCE would be removed and delivered to a facility for disposal as described in Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management.

3.7.2.2.2 Top Removal

A single H-frame structure would be topped as part of the Full-Rebuild Concept to ensure adequate clearances.

3.7.2.2.3 Pole/Tower Installation

3.7.2.2.3.1 Foundation Installation

TSPs would be either installed on a drilled, poured-in-place, concrete footing that would form the structure foundation, installed on drilled micro-piles, or direct-buried. If a single concrete footing is used, the hole would be drilled using truck or track-mounted excavators. Excavated material would be used as described in Section 3.7.1.9, 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. TSP foundations typically require an excavated hole approximately 4 feet to 8 feet in diameter and approximately 10 feet to 40 feet deep. TSPs would require approximately 5 to 75 cubic yards of concrete delivered to each structure location.

Where necessary, foundations may also be installed utilizing micropiles. Installation of micropiles would require the drilling of several smaller diameter holes (approximately 7-10, 8-inch holes) for each footing. The holes would be drilled by a drilling rig or drilling attachment on an excavator or similar equipment.

After drilling all the holes, each hole would be flushed with water or air to remove drill cuttings and loose material. Micropiles would then be installed by placing rebar in each hole with cement grout injected through grout tubes at the lowest point of each micropile, and the hole filled until viscous grout reaches the top of the casing. The micropiles would then be tied together, to act as a single unit foundation, in a reinforced concrete cap. Grout could be brought to each tower site dry and mixed at the site, requiring a reduced amount of concrete required and associated transportation requirements and limitations (delivery within 90 minutes to 2 hours).

In some locations, TSPs may be direct-buried. In these locations, a hole would be excavated using either an auger or excavated with a backhoe. Excavated material would be used as described in Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management.

Conventional construction techniques would generally be used as described above for new foundation installation; no alternative foundation installation methods are anticipated to be used. 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.

During construction, existing concrete supply facilities would be used where feasible. However, due to the remote location of many structure locations, a temporary concrete batch plant could be set up in one or more established staging yards. Equipment would include a central mixer unit (drum type); three silos for injecting concrete additives, fly ash, and cement; a water tank; portable pumps; a pneumatic injector; and a loader for handling concrete additives not in the silos. Dust emissions would be controlled by watering the area and by sealing the silos and transferring the fine particulates pneumatically between the silos and the mixers.

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

Should groundwater be encountered during excavation or drilling for foundations, it would be discharged to the surface or pumped into a tank and disposed of at an off-site disposal facility in accordance with applicable laws.

3.7.2.2.3.2 LST Installation

No lattice steel towers would be installed as part of the Full-Rebuild Concept.

3.7.2.2.3.3 TSP Installation

TSP structures typically consist of multiple sections. The TSP sections would be placed in temporary laydown areas at each pole location. See Table 3.7-2: 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 TSP base section on top of the previously prepared concrete pier or micro-pile foundation. Direct-buried TSPs would be installed similarly to LWS poles as described below. If existing terrain around the TSP location is not suitable to safely support crane activities, a temporary crane pad would be established within the construction work area. Alternately, TSPs may be set by helicopter. When the base section is secured, the subsequent section(s) of the TSP would be slipped together into place onto the base section by crane or helicopter. Hydraulic jacks may be temporarily mounted between pole sections in order to jack the pole sections together. The TSP sections may then 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. Each TSP in a multi-pole TSP structure would be installed as described above.

3.7.2.2.3.4 Wood Pole Installation

Wood poles installed as part of the Full-Rebuild Concept would be installed as described in Section 3.7.2.2.3.5 below.

3.7.2.2.3.5 LWS Pole/LWS H-Frame Installation

Most LWS poles would be installed using a direct-buried approach. Direct-buried LWS poles would require a hole to be excavated using either an auger or excavated with a backhoe. In some locations, corrugated steel or plastic forms may be placed to stabilize the excavation walls prior to installation of the pole. Excavated material would be used as described in Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management. LWS poles consist of separate base and top sections and may be placed in the construction work area at each pole location. Depending on conditions at the time of construction, the top sections may come preconfigured, 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(s) 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. LWS poles may also be installed by helicopter depending upon existing field conditions at the time of construction. The vertical components of LWS H-frames would be installed as described above. Following installation of the vertical components, the horizontal member of the LWS H-frame would be installed on the vertical poles using the same types of equipment utilized for installation of the vertical components.

Where hybrid LWS poles are installed, a concrete base would be constructed prior to the installation of the steel portions of the pole as described above. If a poured in-place base is used, a hole would be excavated using either an auger or a backhoe, and then forms installed and concrete poured to create the base. If a pre-cast base is used, a hole would be excavated, and the pre-cast base placed in the hole and then the interstitial space backfilled with excavated soil. Following construction of the base, the steel portions of the pole would be installed on the concrete base.

3.7.2.2.3.6 Microwave Installation

No microwave equipment would be installed as part of the Full-Rebuild Concept.

3.7.2.2.3.7 LST Installation

No lattice steel towers would be installed as part of the Full-Rebuild Concept.

3.7.2.2.3.8 Subtransmission Land Disturbance Table

The estimated land disturbances associated with subtransmission work are presented in Table 3.7-4.

Table 3.7-4: Subtransmission Land Disturbance Table

Project Feature	Site Quantity	Disturbance Acreage Calculation (L x W, feet)	Acres Disturbed During Construction[1]	Acres to be Restored	Acres Permanently Disturbed[1]
Install TSP	1,120	200 x 150	758.8	0	758.8
Install Multi-Pole TSP Structure	137	200 x 150	92.8	0	92.8
Install LWS pole (permanent)	1,257	200 x 100	735.4	0	735.4
Install LWS H-Frame	20	200 x 125	11.1	0	11.1
Install Multi-Pole LWS Structure (permanent)	6	200 x 125	4.1	0	4.1
Install LWS pole (temporary)	111	200 x 100	76.4	0	76.4

Table 3.7-4: Subtransmission Land Disturbance Table

Project Feature	Site Quantity	Disturbance Acreage Calculation (L x W, feet)	Acres Disturbed During Construction[1]	Acres to be Restored	Acres Permanently Disturbed[1]
Install Multi-Pole LWS Structure (temporary)	37	200 x 150	25.5	0	25.5
Remove TSP or LST	1,399	200 x 150	955.3	0	955.3
Remove H-Frame (steel or wood)	1,238	200 x 125	646.3	0	646.3
Remove wood pole	142	100 x 200	92.2	0	92.2
Conductor Stringing Site	1,006	400 x 150	1,386.8	0	1,386.8
Conductor Field Snub Areas	79	400 x 100	74.9	0	74.9
Splice Removal Area	883	50 x 75	78.3	0	78.3
Install/Remove Guard Structure	535	75 x 75	81.7	0	81.7
Telecommunications Pull and Tension Site[1]	—	400 x 150	—	—	—
Staging Yards[2]	75	Varies	340.2	0	162.3
Existing Access and Spur Roads	426 miles	# of miles x 18 feet	933	0	181
New Spur Roads	3.2 miles	#of miles x 18 feet	5	0	5
TOTAL[3]			**3,330.2**	**0**	**2,400.3**

Notes:
1 Telecommunications pull and tension sites along Segments 1, 2, 3N, 3S and 4 would be located within conductor stringing sites or conductor field snub areas.
2 162 acres of staging yards located on undisturbed areas; remainder of staging yard acreage is previously disturbed.
3 Totals reflect the sum of the disturbance areas with no overlaps between and among construction areas; therefore, columns do not sum.

3.7.2.3 Conductor/Cable Installation

3.7.2.3.1 Above Ground

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 is required to determine circuit outages, pulling times, and safety protocols to ensure 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 and the existing racks at substations. These activities include the installation of conductor, OHGW, OPGW/ADSS fiber optic cable, insulators, stringing sheaves (rollers or travelers), vibration dampeners, weights, suspension and dead-end hardware assemblies for the entire length of the route. The following five steps describe typical wire stringing activities:

- Step 1 – Planning: Develop a wire stringing plan to determine the sequence of wire pulls and the set-up locations for the wire pull/tensioning/splicing equipment.
- Step 2 – Sock Line Threading, Ground Access: 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 – Sock Line Threading, Helicopter Access: 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 roller 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 in a process called clipping-in.

3.7.2.3.2 Below Ground

No electrical conductor would be installed below ground as part of the Full-Rebuild Concept. Installation of fiber optic cable below ground is described in Section 3.7.3.1.4, Fiber Optic Installation.

3.7.2.3.3 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 to stop the movement of a conductor should it momentarily drop below a conventional stringing height. SCE estimates that 550 guard structures may need to be constructed along the proposed route.

Typical guard structures are standard wood poles. Depending on the overall spacing of the conductors being installed, approximately three to five guard poles would be required on either side of a 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. The guard structures would be removed after the conductor is secured into place.

For crossings of railroads and highways, SCE would work closely with the applicable agencies to secure the necessary permits to string conductor over the applicable infrastructure.

3.7.3 Subtransmission Line Construction (Below Ground)

The following sections describe the below ground construction activities associated with installing the ADSS fiber optic line segments for the Full-Rebuild Concept. No electrical conductor would be installed underground as part of the Full-Rebuild Concept.

3.7.3.1 Trenching

The following sections describe the construction activities associated with installing the fiber optic line segments for the Full-Rebuild Concept. Along the Full-Rebuild Concept alignment, overhead fiber optic cable would be installed as described in Section 3.7.2.3, Conductor/Cable Installation.

3.7.3.1.1 Subtransmission Survey

Construction activities would begin with the survey of existing underground utilities along the proposed underground route. 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 ministerial encroachment permits for trenching in public streets, as required.

3.7.3.1.2 Subtransmission Trenching

No electrical conductor would be installed underground as part of the Full-Rebuild Concept.

3.7.3.1.3 Subtransmission Vault Installation

No electrical conductor would be installed underground as part of the Full-Rebuild Concept.

3.7.3.1.4 Fiber Optic Installation

Short sections of fiber optic cable would be installed underground in the vicinity of each substation with the exception of Dunn Siding and Mountain Pass substations (Figureset 3.7-2, Telecommunications Underground Routes). Fiber optic cable would transition from an overhead configuration to an underground configuration through risers installed on TSPs or LWS poles (known as getaway poles). The approximate length of undergrounding at each of the substations is shown in Table 3.7-5: Substation Surface Disturbance. At Dunn Siding and Mountain Pass substations, the fiber optic cable would enter and exit the substation overhead.

Where existing conduit or cable raceways within the substations are available, underground fiber optic cable would be installed in these structures. If existing conduit or raceways are not available within the substation, new conduit would be installed in trenches. New conduit would also be installed in trenches between the getaway pole(s) and the MEERs/telecommunications rooms/telecommunications cabinets within or adjacent to each substation. Conduit trenches would be approximately 12 inches wide and 36 inches deep. New underground conduit and structures would typically be installed with a backhoe. PVC conduit would be placed in the trench and covered with a minimum of approximately 30 inches of concrete slurry, then backfilled and compacted. (Figure 3.7-3, Conduit Install Details) The fiber optic cable would be installed in an innerduct that protects and identifies the cable within the underground conduit and structures. To install the innerduct, it would first be pulled in the conduit using a pull rope and pulling machine or truck-mounted hydraulic capstan. Then the fiber optic cable would be pulled inside the innerduct using the same procedure.

Undergrounding would require excavation for installation of pull boxes at each end of the underground conduit. For each pull box, a hole is excavated approximately 8 feet deep by approximately 6 feet long by approximately 6 feet wide. The pull box would be lowered into place, connected to the conduits, and the hole would be backfilled with concrete slurry. One or more splice boxes would also be required on each getaway pole. SCE would install the fiber optic cable at the pull boxes and splice the cable segments, where it would transition from underground to overhead.

Approximately 60 pull boxes would be installed under the Full-Rebuild Concept at or in the vicinity of the existing substations, resulting in the excavation of approximately 640 cubic yards of material. An additional approximately 810 cubic yards of material may be excavated for installation of underground fiber optic cable at or in the vicinity of the existing substations. Excavated material would be managed as described in Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management.

3.7.3.2 Trenchless Techniques: Microtunnel, Bore, Horizontal Directional Drilling

Unless alternate methods are required, telecommunications duct banks would be installed using open-cut trenching techniques. In the event that trenchless techniques are required, SCE would utilize one of the methods described in the following subsections. It is anticipated that the jack-and-bore construction technique would be used to install fiber optic cable beneath SR-178 south of Inyokern Substation in

Segment 2. Additional locations may be identified during final engineering or construction. Typical stormwater/water quality BMPs would be installed and would be implemented to prevent water quality impacts during the execution of trenchless techniques.

3.7.3.2.1 Jack-and-Bore

SCE may use a horizontal boring (referred to as jack-and-bore) construction technique to install telecommunications conduit at locations along the underground route where open-cut trenching may not be permitted or may not be otherwise feasible or preferred, such as at highway crossings.

Jack-and-bore is an augering operation that simultaneously pushes a casing under an obstacle and removes the spoil inside the casing with a rotating auger. Boring operations would begin with excavating bore pits at the sending and receiving ends of the bore. Boring and receiving pits would typically measure approximately 20 feet by 40 feet. The depth of the proposed bore pits would be between 10 and 20 feet, depending on the facilities that would be crossed. It is anticipated that between 590 and 1,180 cubic yards of material would be excavated to facilitate each jack-and-bore installation required for the Full-Rebuild Concept. Following the duct bank installation, the bore pits would be backfilled using native material, and the duct bank would be covered with at least 36 inches of native fill. Soil not used for backfill would be handled as described in Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management.

After establishing the bore pits, boring equipment would be delivered to the site and then installed into the bore pit at the sending end. Jack-and-bore crossings involve pushing or boring a steel casing through the earth and under the obstacle being crossed. Depending on soil conditions, water is often used to lubricate the auger during the boring process. The casings would typically be installed at least 3 to 4 feet below the obstacle, or as required by the relevant permitting agency. Once the casing is in place, the conduit would be installed within the casing by using spacers to hold them in place, and then the remaining space would be backfilled with a slurry mix. The casings would be left in place to protect the conduit once it has been installed.

3.7.3.2.2 Horizontal Directional Drilling

Horizontal directional drilling (HDD) technology is an underground boring technique that uses hydraulically powered, horizontal drilling equipment. It involves drilling along a vertical arc that passes beneath a surface or shallow-subsurface feature. HDD technology utilizes lubrication containing water and bentonite clay (i.e., drilling mud) to aid the drilling, coat the walls of the bore hole, and maintain the open hole. The HDD technology uses a hydraulically powered horizontal drilling rig supported by a drilling mud tank and a power unit for the hydraulic pumps and mud pumps. A variable-angle drilling unit would initially be adjusted to the proper design angle for the particular drill. A 6- to 8-inch-diameter drill would typically be used.

The first step would be to drill a fluid-filled pilot bore. The first and smallest of the cutting heads would begin the pilot hole at the surveyed entry point. The first section of the drill stem has an articulating joint near the drill-cutting head that the HDD operator can control. Successive drill stem sections would be added as the drill head bores under the crossing. The drill head would then be articulated slightly by the operator to follow a designed path under the crossing and climb upward toward the exit point. Once the pilot hole is completed, a succession of larger cutting heads and reamers would be pulled and pushed through the bore hole until it is the appropriate size for the steel casing. Once the steel casing is in place, ducts would be installed within the steel casing using spacers to maintain the needed separation, and then the remaining space would be backfilled with a slurry mix. The fiber optic cable would then be pulled through the ducts.

Infrequently, the geologic strata above the bore may be weaker than anticipated and/or unconsolidated. As the HDD passes under these locations, the high pressure of the drilling mud may result in a fracture of these strata, allowing drilling mud to rise to the surface. This situation is termed a "frac-out" and is usually resolved by reducing the mud system pressure or increasing the mud viscosity. If a frac-out occurs, the boring operation would be stopped immediately, and a frac-out contingency plan would be implemented to contain and remove the drilling mud. Drilling muds would be handled in accordance with federal and state regulations, and disposed of as described in Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management.

3.7.4 Substation Construction

No new substations would be constructed as part of the Full-Rebuild Concept. This section describes modifications to, and construction within, existing substations.

3.7.4.1 Site Preparation and Grading

No new substations would be constructed as part of the Full-Rebuild Concept, and therefore no substation site preparation or grading is included in the Full-Rebuild Concept.

3.7.4.2 Ground Surface Improvements

No ground surface improvements at the existing substations is included in the Full-Rebuild Concept.

3.7.4.3 Below-Grade Construction

New underground fiber optic cable conduit and structures would be installed at existing substations as described in Section 3.7.3.1.4, Fiber Optic Installation.

3.7.4.4 Above-Grade Construction

Minor modifications to the existing racks at each of the substations may be required so that new OHGW, or replacement OHGW, can be installed between the racks and the getaway structures.

These minor modifications could include installation of new hardware on the existing steel racks to which the OHGW would be attached. Where suitable hardware is currently installed on the racks, structural reinforcement of the racks may be necessary. Any surface disturbance would be within the existing currently-disturbed footprint of the substation.

3.7.4.5 Distribution Getaway Construction

No distribution getaway structures are included in the Full-Rebuild Concept.

3.7.4.6 Telecommunications Equipment Installation

Telecommunications-related modifications at existing substations would generally include the replacement of protection equipment on existing subtransmission rack structures, the installation of ADSS fiber optic cable in new or existing cable raceways or conduit, and the installation of new or replacement of existing telecommunications infrastructure within existing MEERs, telecommunication buildings, telecommunication rooms, control room, or within existing or new telecommunications cabinets.

SCE would install new terminal equipment, channel multiplexer equipment, equipment cabling, and other telecommunication equipment devices within the existing MEERs, telecommunications buildings, telecommunications rooms, or control building, or within existing communications cabinets at ten of the IC Project substations; new communication cabinets would be installed at Baker Substation and at Haiwee Substation. This work would provide the required telecommunication circuit connection for subtransmission line protection relay equipment within the substations. This work would occur generally within the substation fence line on previously-disturbed surfaces; new communication cabinets may be installed outside, but immediately proximate to, the substation fence line. SCE would also install cabling between existing breakers to the existing MEER/communication room/telecommunications cabinet at each of the substations and install new relay and protection racks in those facilities.

3.7.4.7 Landscaping

There is no landscaping included under the Full-Rebuild Concept.

3.7.4.8 Substation Land Disturbance Table

The land disturbance anticipated at each of the substations included in the Full-Rebuild Concept is presented in Table 3.7-5.

Table 3.7-5: Substation Surface Disturbance

	Underground Length (feet)		Number of Pull Boxes		Area Disturbed (acres)	
Substation	**Inside Substation**	**Outside Substation**	**Inside Substation**	**Outside Substation**	**Inside Substation**	**Outside Substation**
Control	200	700	0	3	0.05	0.16
Haiwee	10	210	0	7	0.00	0.05
Coso	100	120	1	2	0.02	0.03
Inyokern (N)	20	500	2	1	0.00	0.11
Inyokern (S)	50	250	0	4	0.01	0.06
Randsburg	10	400	0	9	0.00	0.09
Kramer	1000	10	6	0	0.23	0.00
Tortilla	70	310	1	1	0.02	0.07
Coolwater	130	700	3	3	0.03	0.16
Dunn Siding	600	250	5	0	0.14	0.06
Baker	20	650	4	2	0.00	0.15
Mountain Pass	20	730	4	0	0.00	0.17
Ivanpah	140	90	1	1	0.03	0.02
Substation Total	**2,370**	**4,920**	**27**	**33**	**0.54**	**1.13**

3.7.4.9 Modifications at Other Facilities

3.7.4.9.1 Independence Amplifier Site

Due to the distance between Control Substation and Haiwee Substation, an amplifier would need to be located between these two substations to maintain strength of signal. An existing telecommunications facility in the community of Independence has been identified as a potential location for installation of the amplification equipment (Figure 3.5-2, Independence Telecom Tap).

Where the IC Project Alignment crosses Mazourka Canyon Road in Inyo County, the OPGW would be routed down a TSP structure to a splice box. ADSS fiber optic cable would then run from the splice box overhead on approximately 65 new LWS (or equivalent) poles to be located on the north side of the road. The new LWS (or equivalent) poles would be installed as described in Section 3.7.2.2.3.5, LWS Pole/LWS H-Frame Installation. At the telecommunications facility, fiber optic cable would be routed underground through new conduit to an existing telecommunication building owned by a third party. The underground portion would be installed as described above. The amplification equipment would be installed within the building. The disturbance associated with this work is presented in Table 3.7-6: Other Facility Surface Disturbance.

Approximately three pull boxes would be installed under the Full-Rebuild Concept for the Independence amplifier telecommunication tap, resulting in the excavation of approximately 32 cubic yards of material.

An additional approximately 5 cubic yards of material may be excavated for installation of underground ADSS fiber optic cable for the Independence amplifier telecommunication tap. Excavated material would be managed as described in Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management.

3.7.4.9.2 Transmission Line Crossings

As described in Section 3.5.1.2, the IC Project's subtransmission lines are crossed overhead by other transmission lines (see Figure 3.5-3). ADSS fiber optic cable may be installed on new poles adjacent to the subtransmission line alignment or in new underground facilities at these crossing locations. The disturbance associated with this work is presented in Table 3.7-6: Other Facility Surface Disturbance.

Approximately 12 pull boxes would be installed under the Full-Rebuild Concept at these crossings, resulting in the excavation of approximately 128 cubic yards of material. An additional approximately 320 cubic yards of material may be excavated for installation of underground ADSS fiber optic cable. Excavated material would be managed as described in Section 3.7.1.9, Reusable, Recyclable, and Waste Material Management.

3.7.4.9.3 Haiwee Substation

At Haiwee Substation, the installation of fiber optic cable may require the replacement of approximately four wood poles and three wood pole H-frames on the tap lines that connect the subtransmission lines in Segment 1 to the substation. These poles and H-frames are owned by LADWP. The new poles and H-frames would be installed as described in Section 3.7.2.2.3.5, LWS Pole/LWS H-Frame Installation. The disturbance associated with this work is presented in Table 3.7-6: Other Facilities Surface Disturbance.

Table 3.7-6: Other Facilities Surface Disturbance

Facility	Underground Length (feet)	Number of Pull Boxes	Area Disturbed (acres)	
			Temporary	Permanent
Independence Amplifier Site Trench	40	3	0.02	0.02
Independence Amplifier Line, 66 poles	—	—	30.3	30.3
Independence Amplifier Line, Pull Sites	—	—	0.25	0.25
Line Crossings in Segments 1 and 2, 44 poles[1]	—	—	20.4	20.4
Line Crossings in Segments 1 and 2, undergrounding[1]	2,900	12	0.67	0.67
Haiwee Substation, LADWP pole replacements	—	—	3.56	3.56
Other Facility Total	**2,940**	**15**	**51.6**	**51.6**

Notes:

1 Disturbance areas for line crossing in Segments 1 and 2 are calculated cumulatively here. However, at any given crossing ADSS fiber optic cable may be installed on new poles or underground, but not both.

3.7.4.10 Land Disturbance Summary

Land disturbance would include all areas affected by construction of the Full-Rebuild Concept. It is estimated that the total permanent land disturbance for the Full-Rebuild Concept would be approximately 2,454 acres. It is estimated that the Full-Rebuild Concept would temporarily disturb 3,354 acres. The estimated amount of land disturbance for each project component is summarized in Table 3.7-7: Project Estimated Land Disturbance.

Table 3.7-7: Project Estimated Land Disturbance

Project Feature	Acres Disturbed During Construction	Acres to be Restored	Acres Permanently Disturbed
Subtransmission (From Table 3.7-4)	3,330	0	2,400
Substations (From Table 3.7-5)	2	0	2
Other Facilities (From Table 3.7-6)	52	0	52
TOTAL	**3,354**	**0**	**2,454**

3.7.5 Construction Workforce and Equipment

The estimated elements, materials, and number of personnel and equipment required for construction of the Full-Rebuild Concept are summarized in Table 3.7-8: Construction Equipment and Workforce Estimate.

Construction would be performed by SCE construction crews and/or contractors. If SCE construction crews are used, they typically would be based at SCE's local facilities, (e.g., service centers, substation, transmission ROW, etc.) or temporary staging yards set up for the Full-Rebuild Concept. Contractor construction personnel would be managed by SCE construction management personnel and based out of the contractor's existing yard or temporary staging yards set up for the Full-Rebuild Concept. SCE anticipates a total of approximately 200 construction personnel working on any given day. SCE anticipates that crews would work concurrently whenever possible; however, the estimated deployment and number of crew members would 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.

Construction would generally be performed from 7:00 a.m. and 7:00 p.m., Monday through Saturday; however, at limited times some construction along the Project alignment may be required or finished after these hours, and on Sundays. Some activities may require lighting for safety. Any necessary lighting would be confined to an individual work area and would be temporary in nature. Staging yards may be lit for staging and security; this lighting would be directed internally and on-site.

3.7.5.1 Equipment Description

Table 3.7-9: Construction Equipment Description lists the equipment SCE expects to use during construction and a brief description of the use of that equipment.

Table 3.7-9: Construction Equipment Description

Type of Equipment	Use(s)
1-Ton Truck, 4x4	Transport workers and small tools, towing
3/4-Ton Truck, 4x4	Transport workers and small tools, towing
Auger Truck	Drill holes for LWS poles and TSP foundations
Backhoe/Front Loader	Trenching, moving materials
Boom/Crane Truck	LWS pole installation, wood pole removal, guarding during stringing
Bull Wheel Puller	Conductor stringing
Chipper	Tree removal/trimming
Compressor Trailer	Powering compressed air tools
Concrete Truck	Delivery of concrete
Drum Type Compactor	Compacting soils along access and spur roads, construction work sites, and laydown areas
Dump Truck, 4x4	Hauling excavated soils, broken concrete, removed LST sections, and other materials

Table 3.7-9: Construction Equipment Description

Type of Equipment	Use(s)
Excavator	Excavation
Extendable Flat Bed Pole Truck	Hauling poles
Flat Bed Pole Truck	Hauling poles
Flat Bed Truck/Trailer	Moving construction equipment and materials
Lowboy Truck/Trailer	Moving construction equipment
Manlift/Bucket Truck	Lifting workers
Motor Grader	Grading soils along access and spur roads, construction work sites, and laydown areas
R/T Crane (M)	Structure installation and removal
R/T Forklift	Moving materials
Sock Line Puller	Conductor stringing
Static Truck/ Tensioner	Conductor stringing
Stump Grinder	Tree removal/trimming
Track Type Dozer	Grading/blading soils along access and spur roads, construction work sites, and laydown areas
Truck, Semi-Tractor	Hauling materials
Water Truck	Dust control
Medium-duty Helicopter	Structure installation/removal
Light-duty Helicopter	Conductor installation/removal; marker ball installation
Fuel, Helicopter Support Truck	Helicopter refueling/support

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Survey				**4**	**358**		**358 Miles**
1-Ton Truck, 4x4	300	Diesel	2		358	10	1 Mile
Staging Yards				**5**	**DOP**		
1-Ton Truck, 4x4	300	Diesel	1		Duration of Project	4	
R/T Forklift	350	Diesel	1			5	
Boom/Crane Truck	350	Diesel	1			5	
Water Truck	300	Diesel	2			10	
Jet A Fuel Truck	300	Diesel	1			4	
Truck, Semi-Tractor	500	Diesel	1			6	
Road Work				**6**	**52**		**426 Miles**
1-Ton Truck, 4x4	300	Diesel	2		52	5	
Backhoe/Front Loader	350	Diesel	1		52	7	
Track Type Dozer	350	Diesel	1		52	7	
Motor Grader	350	Diesel	1		52	5	
Water Truck	300	Diesel	2		52	10	
Drum Type Compactor	250	Diesel	1		52	5	
Excavator	300	Diesel	1		31	7	
Lowboy Truck/Trailer	500	Diesel	1		31	4	
Wet Crossing Installation				**6**	**80**		**40 Crossings**
1-Ton Truck, 4x4	300	Diesel	1		80	8	0.5 crossing
Tracked Excavator	250	Diesel	1		80	8	
Rubber Tire Backhoe	125	Diesel	1		80	8	
Wheel Loader	250	Diesel	1		80	8	
Dump Truck	350	Diesel	2		80	8	
Water Truck	300	Diesel	1		80	10	
Concrete Truck	350	Diesel	3		80	4	
Flatbed Trailer	--	Diesel	1		80	8	

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Install TSP Foundations				**5**	**2,240**		**1,120 TSPs**
3/4-Ton Truck, 4x4	275	Gas	2		2,240	5	0.5 TSP
Boom/Crane Truck	350	Diesel	1		2,240	7	
Backhoe/Front Loader	200	Diesel	1		2,240	10	
Auger Truck	500	Diesel	1		1,636	10	
Water Truck	350	Diesel	1		2,240	10	
Dump Truck	350	Diesel	1		2,240	10	
Concrete Mixer Truck	425	Diesel	2		1,636	6	
TSP Haul				**5**	**280**		**1,120 TSPs**
3/4-Ton Truck, 4x4	275	Gas	2		280	8	4 TSPs
Boom/Crane Truck	350	Diesel	1		280	8	
Flat Bed Pole Truck	400	Diesel	2		280	10	
Water Truck	350	Diesel	1		280	10	
TSP Assembly				**5**	**1,120**		**1,120 TSPs**
3/4-Ton Truck, 4x4	275	Gas	2		1,120	6	1 TSP
1-Ton Truck, 4x4	300	Diesel	2		1,120	6	
Water Truck	350	Diesel	1		1,120	10	
Compressor Trailer	60	Diesel	1		1,120	6	
Boom/Crane Truck	350	Diesel	1		1,120	7	
TSP Erection				**5**	**1,120**		**1,120 TSPs**
3/4-Ton Truck, 4x4	275	Gas	1		1,120	6	1 TSP
1-Ton Truck, 4x4	300	Diesel	1		1,120	6	
Water Truck	350	Diesel	1		1,120	10	
Compressor Trailer	60	Diesel	1		1,120	6	
R/T Crane	350	Diesel	1		1,120	7	
Medium-duty Helicopter		Jet A	1		112	6	

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Install TSP Multi-Pole Foundations				**5**	**822**		**137 Multi-Pole Structures**
3/4-Ton Truck, 4x4	275	Gas	2		822	5	0.5 TSP
Boom/Crane Truck	350	Diesel	1		822	7	
Backhoe/Front Loader	200	Diesel	1		822	10	
Auger Truck	500	Diesel	1		411	10	
Water Truck	350	Diesel	1		822	10	
Dump Truck	350	Diesel	1		822	10	
Concrete Mixer Truck	425	Diesel	2		411	6	
TSP Multi-Pole Haul				**5**	**137**		**137 Multi-Pole Structures**
3/4-Ton Truck, 4x4	275	Gas	2		137	8	1 Multi-Pole Structure
Boom/Crane Truck	350	Diesel	1		137	8	
Flat Bed Pole Truck	400	Diesel	2		137	10	
Water Truck	350	Diesel	1		137	10	
TSP Multi-Pole Assembly				**5**	**453**		**137 Multi-Pole Structures**
3/4-Ton Truck, 4x4	275	Gas	2		453	6	0.3 Multi-Pole Structure
1-Ton Truck, 4x4	300	Diesel	2		453	6	
Water Truck	350	Diesel	1		453	10	
Compressor Trailer	60	Diesel	1		453	6	
Boom/Crane Truck	350	Diesel	1		45	7	
TSP Multi-Pole Erection				**5**	**453**		**137 Multi-Pole Structures**
3/4-Ton Truck, 4x4	275	Gas	1		453	6	0.3 Multi-Pole Structure
1-Ton Truck, 4x4	300	Diesel	1		453	6	
Water Truck	350	Diesel	1		453	10	
Compressor Trailer	60	Diesel	1		453	6	
R/T Crane	350	Diesel	1		453	7	

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Medium-duty Helicopter		Jet A	1		45	6	
Existing Pole Removal[1]				**5**	**36**		**142 Poles**
1-Ton Truck, 4x4	300	Diesel	2		36	10	4 Poles
Compressor Trailer	60	Diesel	1		36	5	
Manlift/Bucket Truck	250	Diesel	1		36	8	
Boom/Crane Truck	350	Diesel	1		36	8	
Flat Bed Pole Truck	400	Diesel	1		36	10	
Water Truck	300	Diesel	1		36	10	
Existing H-Frame Removal[2]				**5**	**619**		**1,238 H-Frames**
1-Ton Truck, 4x4	300	Diesel	2		619	10	2 H-Frames
Compressor Trailer	60	Diesel	1		619	5	
Manlift/Bucket Truck	250	Diesel	1		619	8	
Boom/Crane Truck	350	Diesel	1		619	8	
Flat Bed Pole Truck	400	Diesel	1		619	10	
Water Truck	300	Diesel	1		619	10	
Existing Lattice Structure/TSP Removal				**5**	**2,798**		**1,399 TSPs/ Lattice Structures**
1-Ton Truck, 4x4	300	Diesel	2		2,798	10	0.5 TSPs or Lattice Steel Structures
Compressor Trailer	60	Diesel	1		2,798	5	
Manlift/Bucket Truck	250	Diesel	1		2,798	8	
Backhoe/Front Loader	125	Diesel	2		2,798	10	
Boom/Crane Truck	350	Diesel	1		2,519	8	
Flat Bed Pole Truck	400	Diesel	1		2,798	10	
Water Truck	300	Diesel	1		2,798	10	

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Medium-duty Helicopter		Jet A	1		279	6	
Dump Truck	350	Diesel	1		2,798	10	
Excavator	250	Diesel	1		2,798	10	
R/T Crane (M)	215	Diesel	1		2,519	5	
R/T Crane (L)	300	Diesel	1		2,519	7	
LWS Pole Haul[3]				**5**	**315**		**1,257 LWS Poles**
3/4-Ton Truck, 4x4	275	Gas	1		315	10	4 Poles
Water Truck	300	Diesel	1		315	10	
Boom/Crane Truck	350	Diesel	1		315	8	
Flat Bed Pole Truck	400	Diesel	1		315	10	
LWS Pole Assembly[3]				**5**	**315**		**1,257 LWS Poles**
3/4-Ton Truck, 4x4	275	Gas	2		315	6	4 Poles
Compressor Trailer	60	Diesel	1		315	6	
1-Ton Truck, 4x4	300	Diesel	2		315	10	
Water Truck	350	Diesel	1		315	10	
Boom/Crane Truck	350	Diesel	1		315	8	
Install LWS Pole[3]				**5**	**315**		**1,257 Poles**
1-Ton Truck, 4x4	300	Diesel	1		315	6	4 Poles
Manlift/Bucket Truck	350	Diesel	1		315	10	
Boom/Crane Truck	350	Diesel	1		315	7	
Auger Truck	210	Diesel	1		315	8	
Water Truck	300	Diesel	1		315	10	
Backhoe/Frontloader	125	Diesel	1		315	10	
Extendable Flat Bed Pole Truck	400	Diesel	1		315	6	
Medium-duty Helicopter		Jet A	1		32	6	
LWS H-Frame/Multi-Pole Structure Haul[4]				**5**	**10**		**20 H-Frames**
3/4-Ton Truck, 4x4	275	Gas	1		10	10	2 H-Frames

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Water Truck	300	Diesel	0.5		10	10	
Boom/Crane Truck	350	Diesel	1		10	8	
Flat Bed Pole Truck	400	Diesel	1		10	10	
LWS H-Frame/Multi-Pole Structure Assembly				**5**	**10**		**20 H-Frames**
3/4-Ton Truck, 4x4	275	Gas	2		10	6	2 H-Frames
Compressor Trailer	60	Diesel	1		10	6	
1-Ton Truck, 4x4	300	Diesel	2		10	10	
Water Truck	350	Diesel	1		10	10	
Boom/Crane Truck	350	Diesel	1		10	8	
Install LWS H-Frame/Multi-Pole Structure				**5**	**10**		**20 H-Frames**
1-Ton Truck, 4x4	300	Diesel	1		10	6	2 H-Frames
Manlift/Bucket Truck	350	Diesel	1		10	10	
Boom/Crane Truck	350	Diesel	1		10	7	
Auger Truck	210	Diesel	1		7	8	
Water Truck	300	Diesel	1		10	10	
Backhoe/Frontloader	125	Diesel	1		10	10	
Extendable Flat Bed Pole Truck	400	Diesel	1		10	6	
Install/Remove Conductor and Install OPGW				**20**	**1,089**		**358 Linear Miles**
¾-Ton Truck, 4x4	275	Gas	1		1,089	10	0.3 Miles/day
1-Ton Truck, 4x4	300	Diesel	2		1,089	10	
Manlift/Bucket Truck	250	Diesel	1		1,089	10	
Boom/Crane Truck	350	Diesel	1		1,089	10	
Dump Truck	350	Diesel	1		1,089	10	
Wire Truck/Trailer	350	Diesel	2		752	10	
Sock Line Puller	300	Diesel	1		294	10	
Bull Wheel Puller	350	Diesel	1		578	10	
Hydraulic Rewind Puller	350	Diesel	1		1,089	10	

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Static Truck/ Tensioner	350	Diesel	1		1,089	10	
Backhoe/Front Loader	125	Diesel	1		218	8	
Truck, Semi-Tractor	400	Diesel	2		1,089	10	
Lowboy Truck/Trailer	450	Diesel	2		1,089	10	
Water Truck	300	Diesel	1		1,089	10	
Light Helicopter		Jet A	1		871	7	
Conductor Splicing Rig	350	Diesel	1		294	10	
Fiber Splicing Lab	300	Diesel	1		363	10	
Install/Remove Guard Structures				**5**	**107**		**535 Structures**
3/4-Ton Truck, 4x4	275	Gas	2		107	8	5 Structures
1-Ton Truck, 4x4	300	Diesel	2		107	8	
Compressor Trailer	60	Diesel	2		107	7	
Backhoe/Front Loader	125	Diesel	1		107	10	
Water Truck	300	Diesel	1		107	5	
Manlift/Bucket Truck	250	Diesel	1		107	8	
Boom/Crane Truck	350	Diesel	1		107	10	
Auger Truck	500	Diesel	1		107	8	
Extendable Flat Bed Pole Truck	400	Diesel	1		107	8	
Telecommunications Underground Infrastructure Installation				**6**	**82**		**~10,230 Feet**
1-Ton Truck, 4x4	300	Diesel	2		82	4	125 Feet/Day
Backhoe/Front Loader	125	Diesel	1		82	6	
Dump Truck	350	Diesel	2		82	6	
Pipe Truck/Trailer	275	Diesel	1		82	8	
Concrete Mixer Truck	350	Diesel	3		82	2	

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Water Truck	300	Diesel	1		82	6	
Compressor Trailer	60	Diesel	1		82	4	
Lowboy Truck/Trailer	450	Diesel	1		82	4	
Telecommunications Pole Haul Independence Tap and Crossings				**5**	**28**		**110 LWS Poles**
3/4-Ton Truck, 4x4	275	Gas	1		28	10	4 Poles
Water Truck	300	Diesel	0.5		28	10	
Boom/Crane Truck	350	Diesel	1		28	8	
Flat Bed Pole Truck	400	Diesel	1		28	10	
Telecommunications Pole Assembly Independence Tap and Crossings				**5**	**28**		**110 LWS Poles**
3/4-Ton Truck, 4x4	275	Gas	2		28	6	4 Poles
Compressor Trailer	60	Diesel	1		28	6	
1-Ton Truck, 4x4	300	Diesel	2		28	10	
Water Truck	350	Diesel	1		28	10	
Boom/Crane Truck	350	Diesel	1		28	8	
Telecommunications Pole Installation Independence Tap and Crossings				**5**	**28**		**110 LWS Poles**
1-Ton Truck, 4x4	300	Diesel	1		28	6	4 Poles
Manlift/Bucket Truck	350	Diesel	1		28	10	
Boom/Crane Truck	350	Diesel	1		28	7	
Auger Truck	210	Diesel	1		28	8	
Water Truck	300	Diesel	1		28	10	
Backhoe/Frontloader	125	Diesel	1		28	10	
Extendable Flat Bed Pole Truck	400	Diesel	1		28	6	
Restoration				**7**	**358**		**358 Miles**
1-Ton Truck, 4x4	300	Diesel	2		358	4	1 Mile
Backhoe/Front Loader	125	Diesel	1		358	4	
Motor Grader	250	Diesel	1		358	6	
Water Truck	300	Diesel	1		358	8	

Table 3.7-8: Construction Equipment and Workforce

Work Activity				Activity Production			
Primary Equipment Description	**Estimated Horse-Power**	**Probable Fuel Type**	**Primary Equipment Quantity**	**Estimated Workforce**	**Estimated Schedule (Days)**	**Duration of Use (Hrs./Day)**	**Estimated Production Per Day**
Drum Type Compactor	100	Diesel	1		358	4	
Lowboy Truck/Trailer	450	Diesel	1		358	4	

Notes:
1 Includes removal of existing poles and temporary poles.
2 Includes removal of existing H-frames and temporary multi-pole LWS structures.
3 Includes permanent and temporarily-installed LWS poles.
4 Includes permanent and temporarily-installed LWS H-frames and permanent and temporarily-installed multi-pole LWS structures.

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3.7.6 Construction Schedule

SCE anticipates that construction of the Full-Rebuild Concept would take approximately 36 months.[10] Construction would commence following CPUC approval, final engineering, procurement activities, land rights acquisition, and receipt of all applicable permits.

Table 3.7-10: Proposed Construction Schedule

Project Activity	Approximate Duration (Months)	Approximate Start Date
PTC	22	July 2019
Final Engineering	8	December 2021
Right-of-Way/ Property Acquisition	18	July 2020
Acquisition of Required Permits	15	July 2020
Subtransmission Line Construction	39	April 2022
Cleanup	8	October 2024
Project Operational	N/A	June 2025

3.7.7 Energizing Subtransmission Lines

Energizing the rebuilt lines is the final step in completing the subtransmission construction. Portions of the existing lines would be de-energized during the construction period in order to connect the new conductor in that portion to the existing system. 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.

3.8 Operation and Maintenance

SCE is currently performing operation and maintenance (O&M) activities as described below along the subtransmission lines that would be rebuilt under the Full-Rebuild Concept. No material changes in the O&M activities described below, or the locations of these activities, are anticipated with implementation of the Full-Rebuild Concept.

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

The subtransmission lines would be maintained in a manner consistent with CPUC GO 95 and GO 128 as applicable, and the National Electrical Safety Code (NESC) for those circuits that are located outside of California. Normal operation of the lines would be controlled remotely through SCE control systems, and manually in the field as required. SCE inspects the subtransmission overhead facilities in a manner consistent with CPUC GO 165 a minimum of once per year via ground and/or aerial observation, but usually occurs more frequently based on system reliability. 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 Operations and Maintenance (O&M) activities of overhead facilities are performed from existing access roads with no surface disturbance. Repairs done to existing

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[10] As displayed in Table 3.7-10, the Project Operational date of June 2025 exceeds the date by which SCE agreed to remediate discrepancies along the IC Project subtransmission lines. SCE will seek means to reduce the permitting/licensing and construction schedules to meet the timeline reflected in Table 3.7-10. The proposed construction schedule may exceed the planned duration due to delays including but not limited to those associated with inclement weather and stoppages necessary to protect biological resources (e.g., nesting birds).

facilities, such as repairing or replacing existing poles and towers, 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 corridor (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 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 pole.

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 (G. O. 95, Rule 35), California 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 structures, and as may be required by applicable regulations 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 25-50-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, structures 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 and OHGW/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 structures, or lines or re-stringing conductors. Emergency repairs could be needed at any time.

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 described 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.

3.9 Applicant Proposed Measures

As part of the Full-Rebuild Concept, SCE has identified APMs that it proposes to implement during construction to reduce or avoid impacts. SCE would conduct the design and construction in accordance with its APMs. The proposed APMs are listed in Table 5.1-1: Applicant Proposed Measures, in Chapter 5 of this PEA document.

3.10 Generator Interconnection Facilities Description

No interconnection facilities are included in the Full-Rebuild Concept.

3.11 Generator Interconnection Facilities Construction

No interconnection facilities are included in the Full-Rebuild Concept.

3.12 Other Major Components Description

No other major components are included in the Full-Rebuild Concept.

3.13 Other Major Components Construction

No other major components are included in the Full-Rebuild Concept.

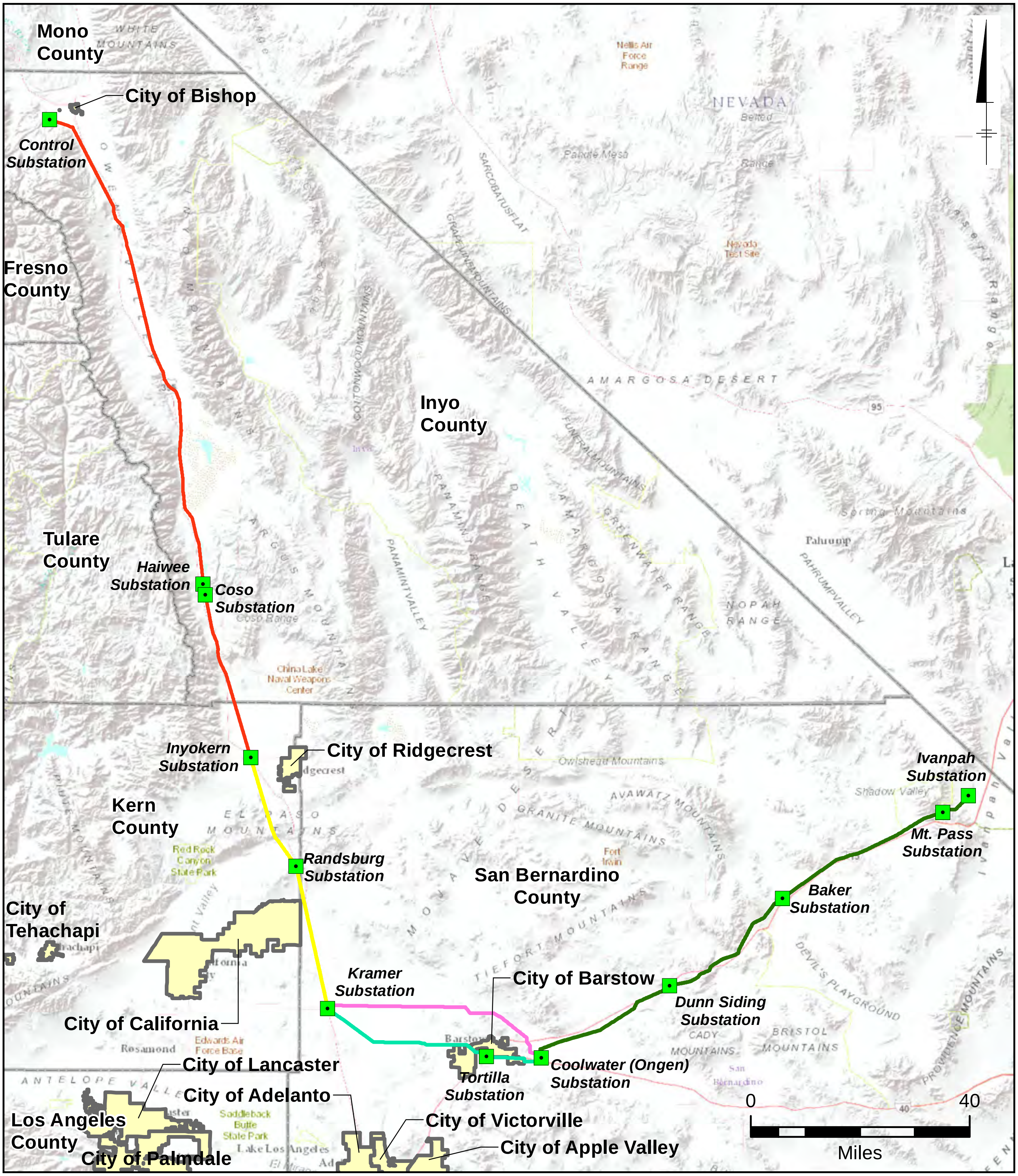
3.14 Decommissioning

Prior to removal or abandonment of the facilities that would be permitted to be constructed on or over BLM, BIA, the DoD, other government lands, and private lands or within a reasonable time following termination of these governmental entities, SCE would prepare a removal and restoration plan. The removal and restoration plan would address removal of SCE's facilities from the permitted area, and any requirements for habitat restoration and revegetation (refer to Biological Resources Section 4.4 of this

PEA). The removal and restoration plan would then be approved by the permitting agency before implementation.

3.15 Project Alternatives Components Description

Whereas the components of the Full-Rebuild Concept are contained in this Chapter 3, the components of the Alternatives to the Full-Rebuild Concept are addressed in detail in Chapter 5.



Legend

- Substation
- County
- City Boundary
- Segment 1
- Segment 2
- Segment 3N
- Segment 3S
- Segment 4

IVANPAH-CONTROL PROJECT

PROJECT SEGMENTS

ARCADIS

FIGURE 3.1-1

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Project (Project #)
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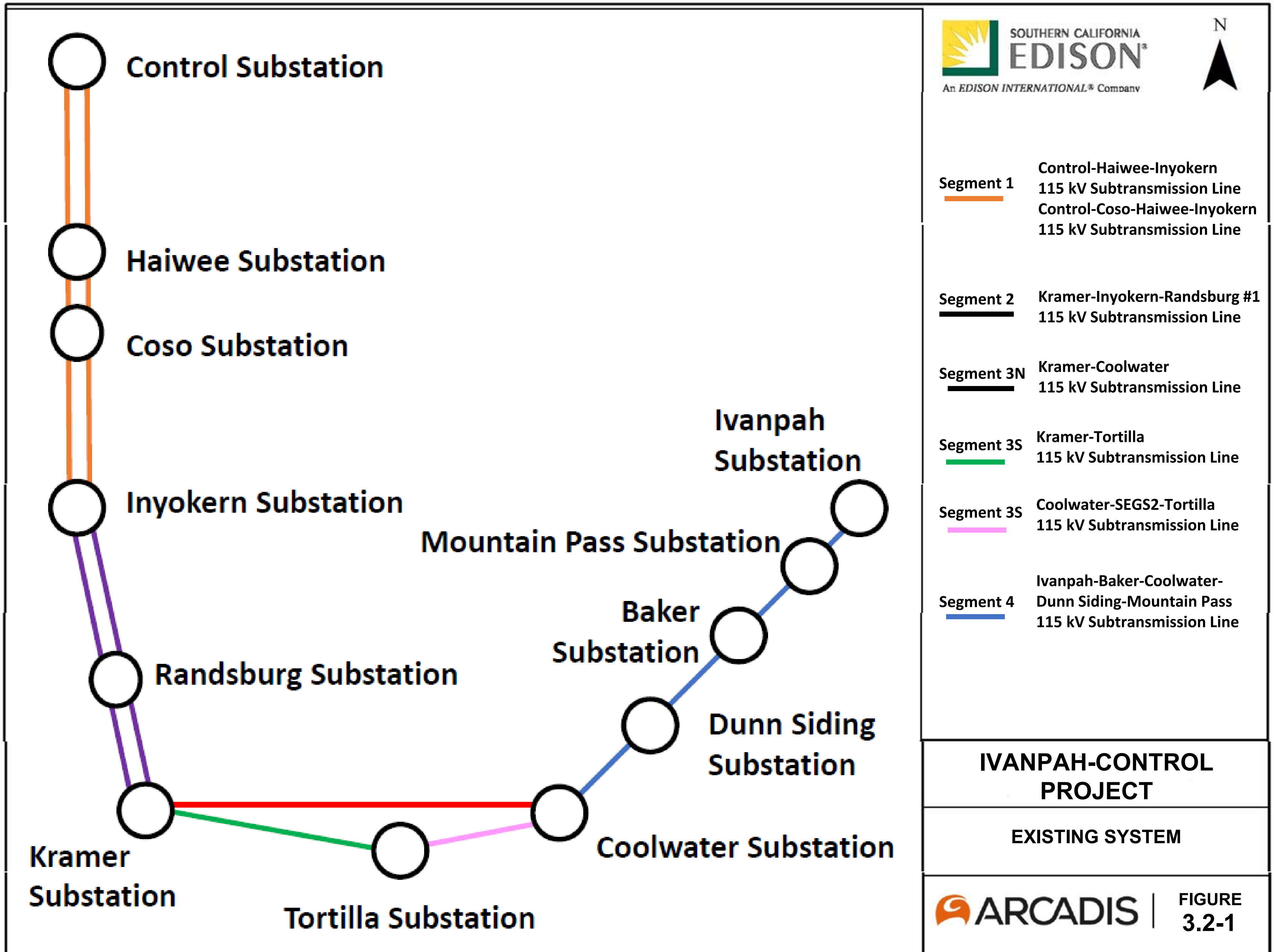
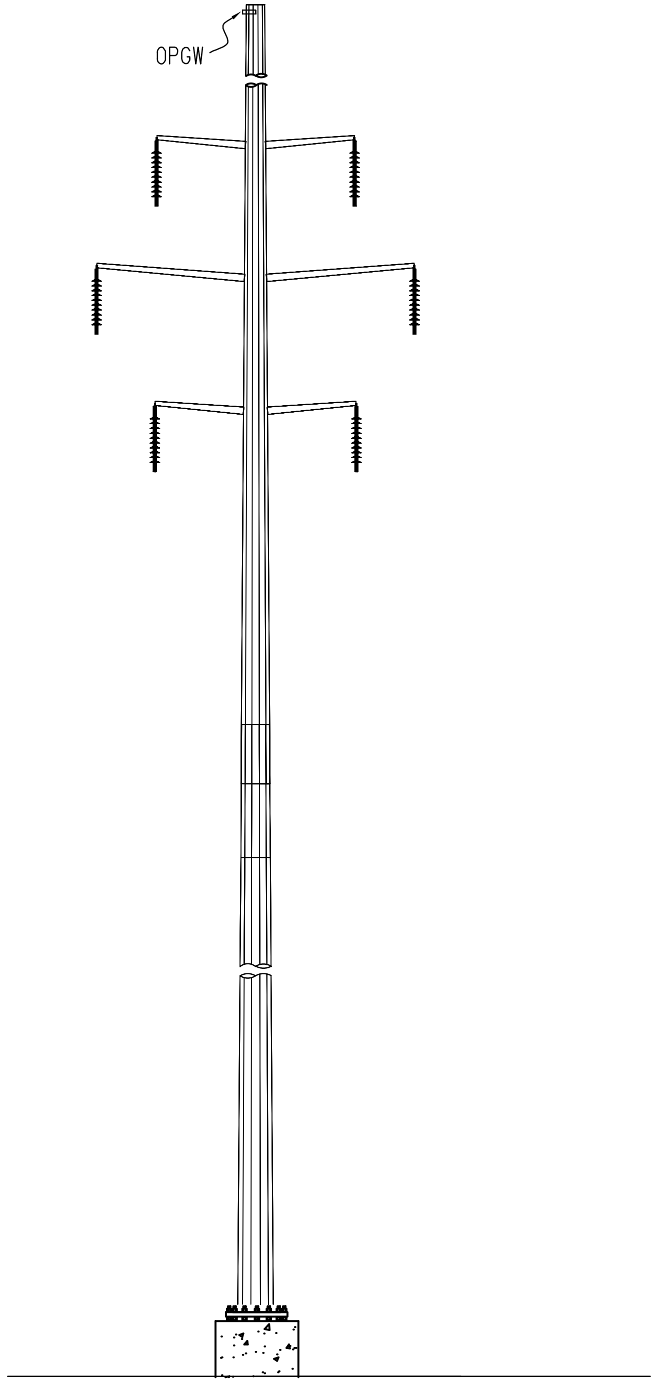


IVANPAH-CONTROL PROJECT

EXISTING SYSTEM

ARCADIS

FIGURE 3.2-1



SOUTHERN CALIFORNIA EDISON

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TSP, TANGENT STRUCTURE, DOUBLE CIRCUIT, SEGMENT 1

NOT TO SCALE

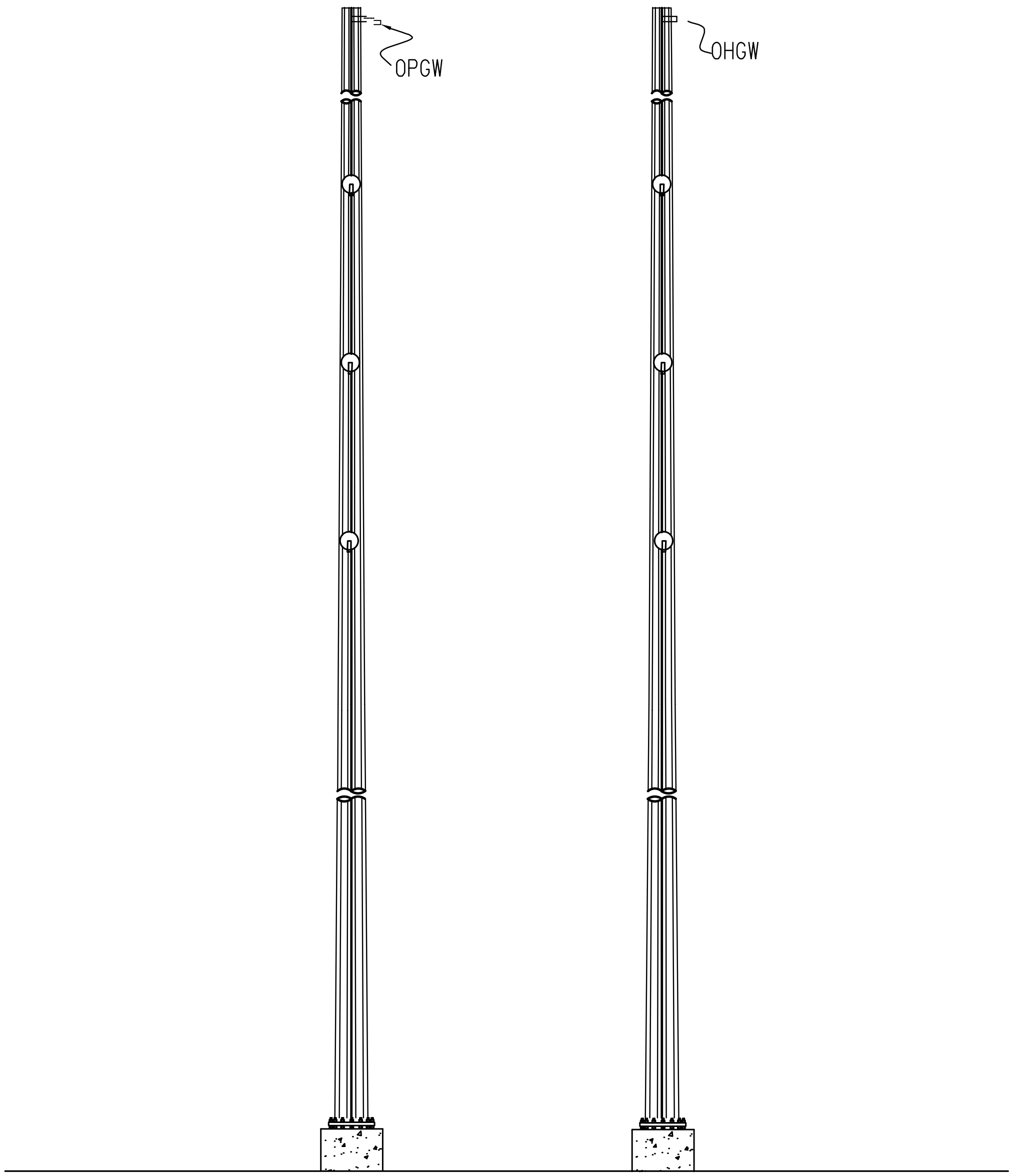
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



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TSP, 2-POLE DEAD-END STRUCTURE, SEGMENT 1

NOT TO SCALE

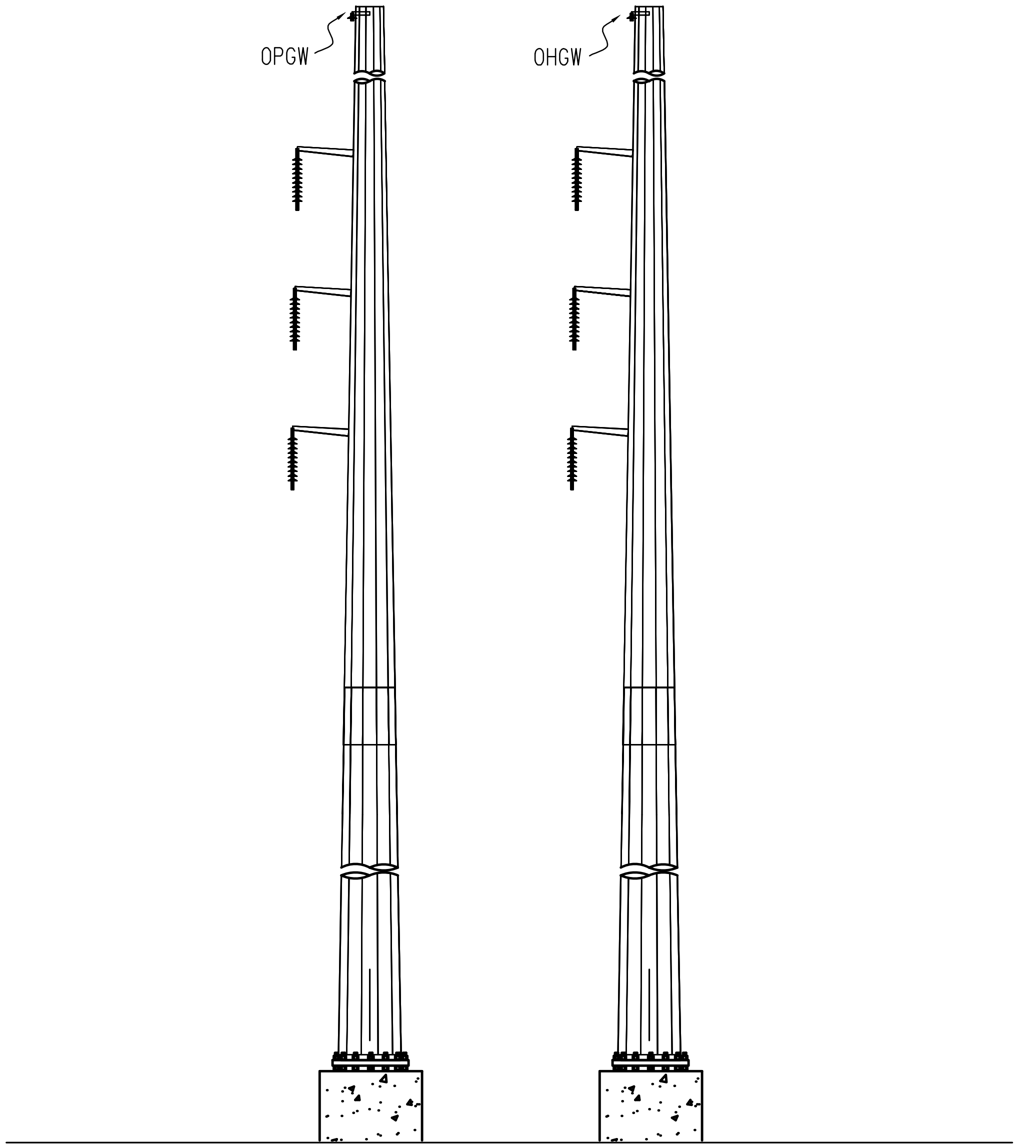
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



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TSP, 2-POLE RUNNING ANGLE STRUCTURE, SEGMENT 1

NOT TO SCALE

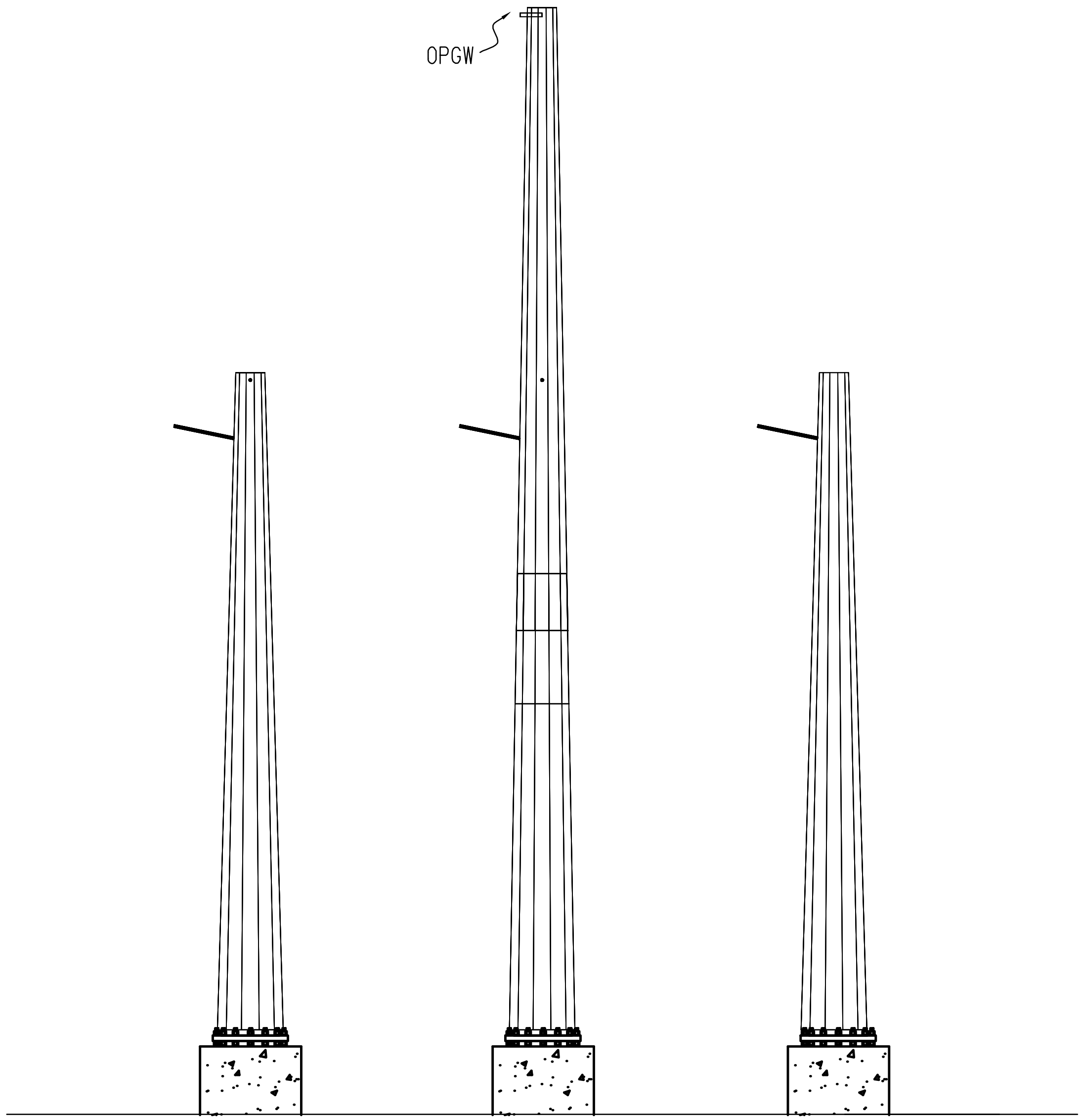
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



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TSP, 3-POLE DEAD END STRUCTURE, SEGMENT 1

NOT TO SCALE

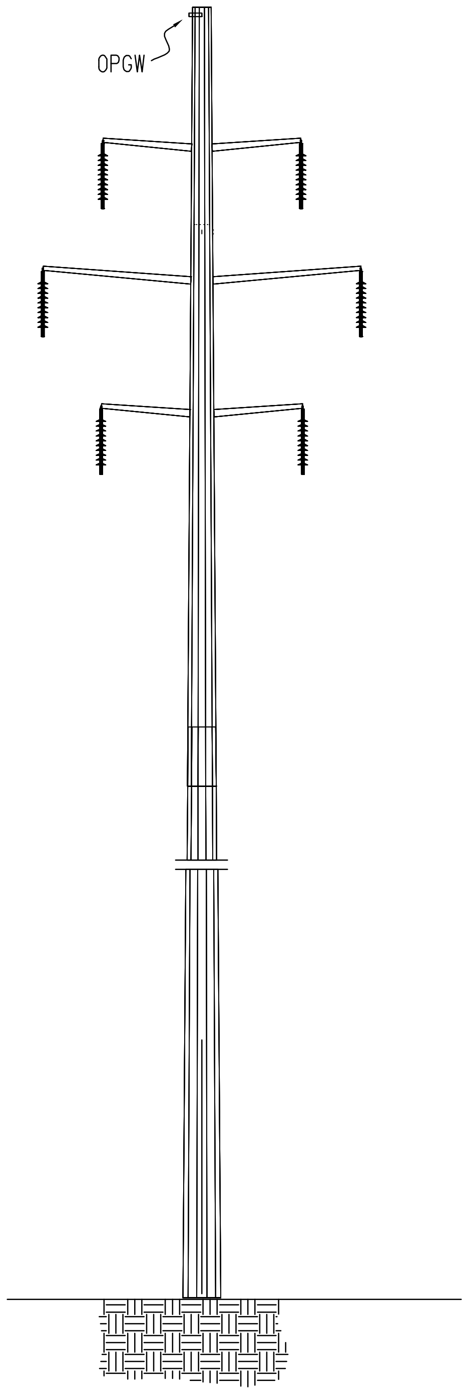
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



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LWS POLE,
TANGENT
STRUCTURE,
SEGMENT 1

NOT TO SCALE

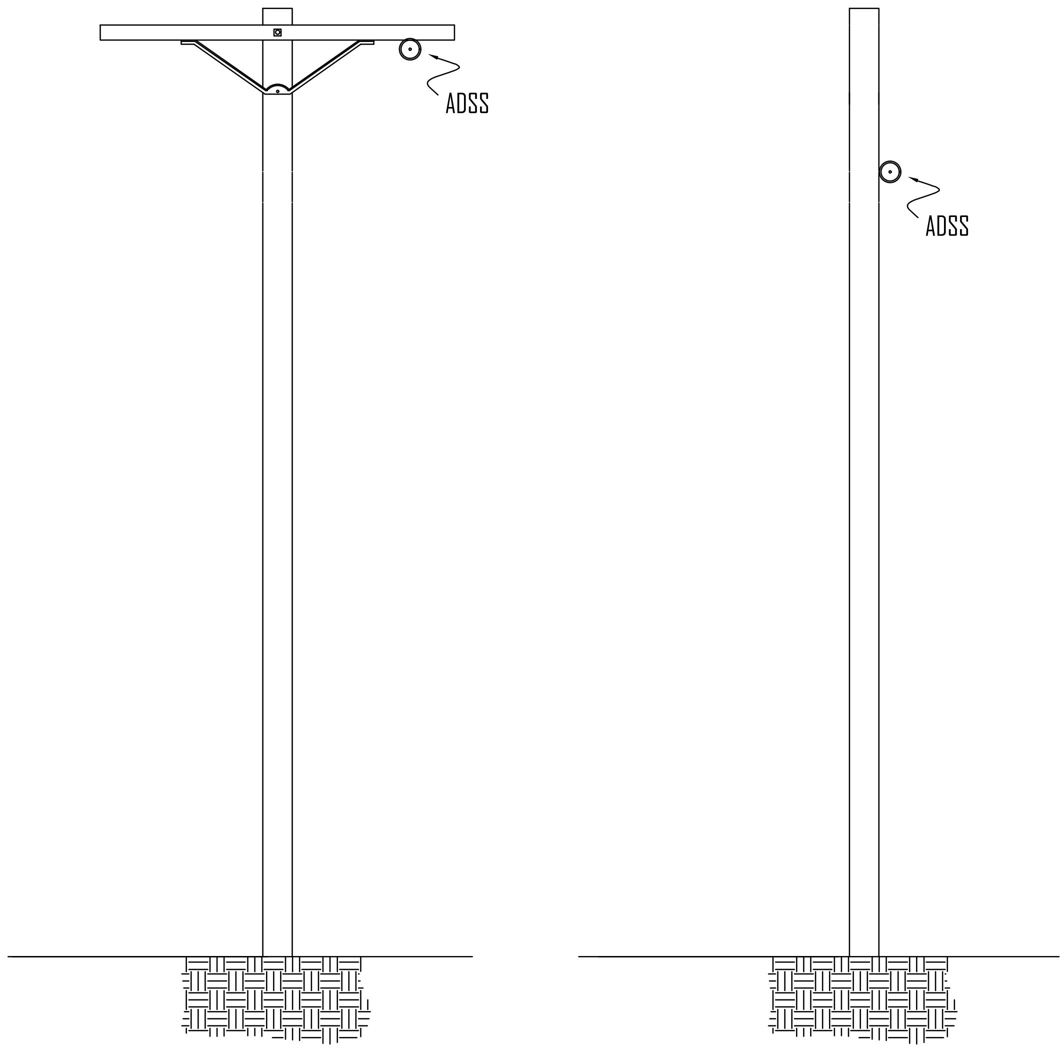
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



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EDISON
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LWS POLE,
INDEPENDENCE
FIBER OPTIC TAP

NOT TO SCALE

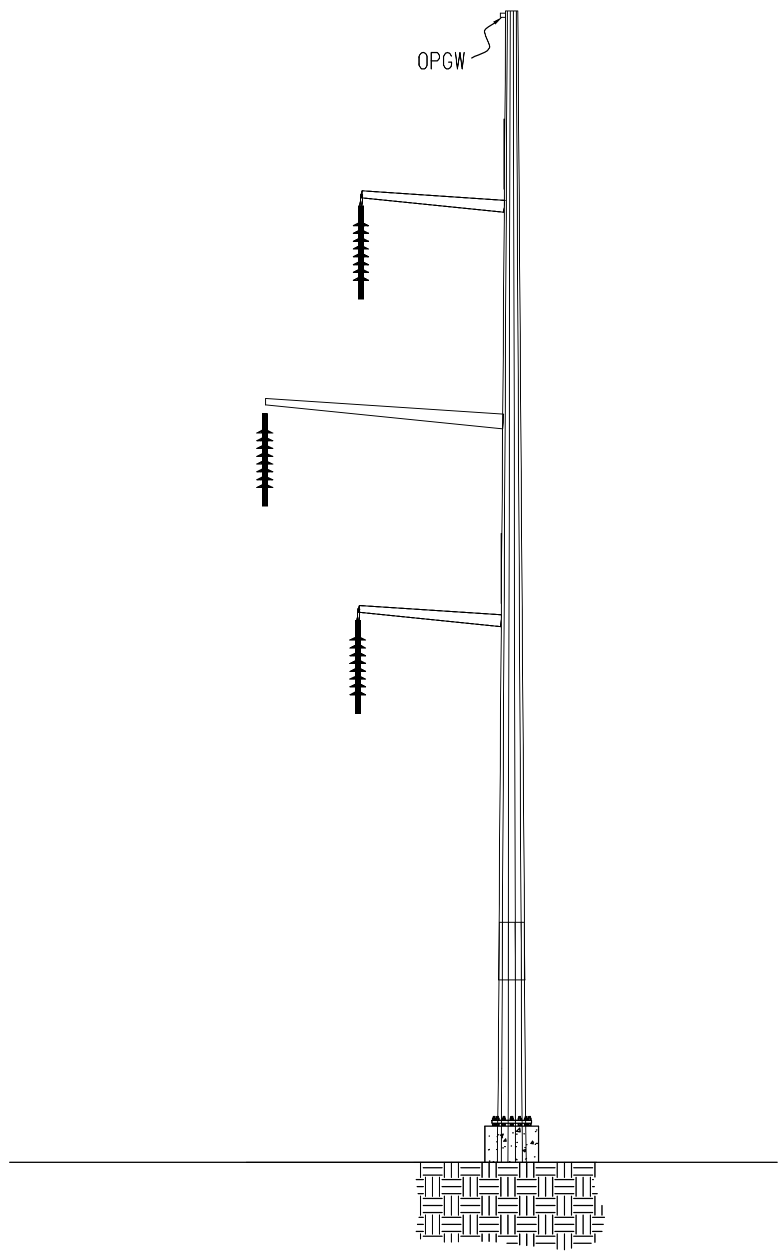
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



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TSP, SUSPENSION STRUCTURE, SEGMENTS 2 AND 3N

NOT TO SCALE

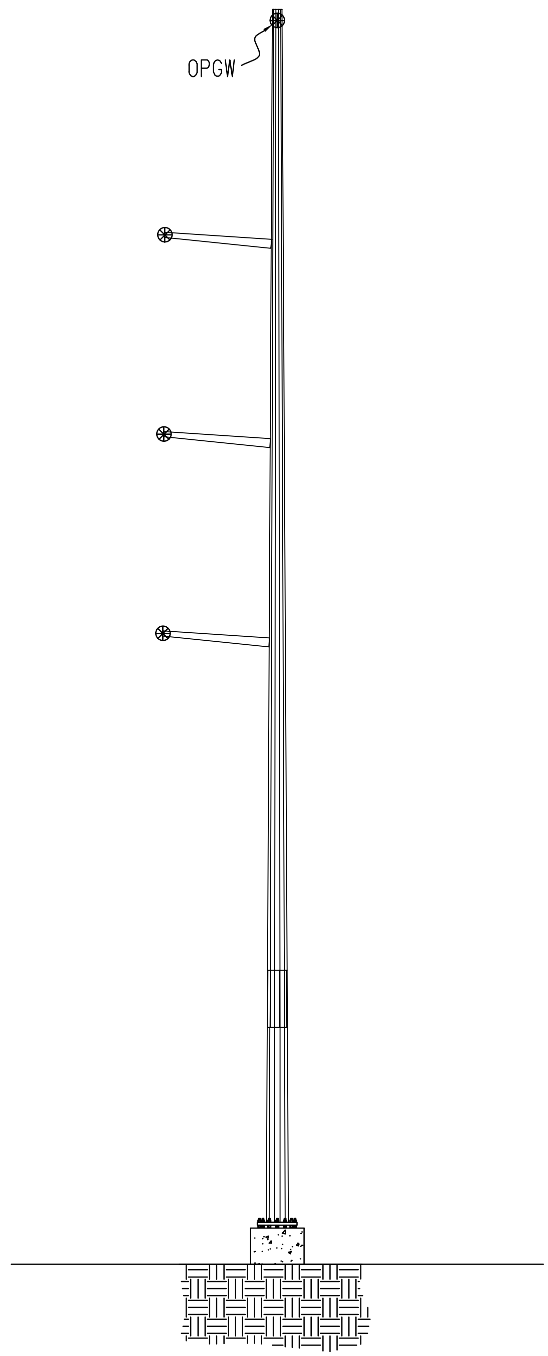
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



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An EDISON INTERNATIONAL® Company

TSP, DEAD-END STRUCTURE, VERTICAL CONFIGURATION, SEGMENTS 2 AND 3N

NOT TO SCALE

IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

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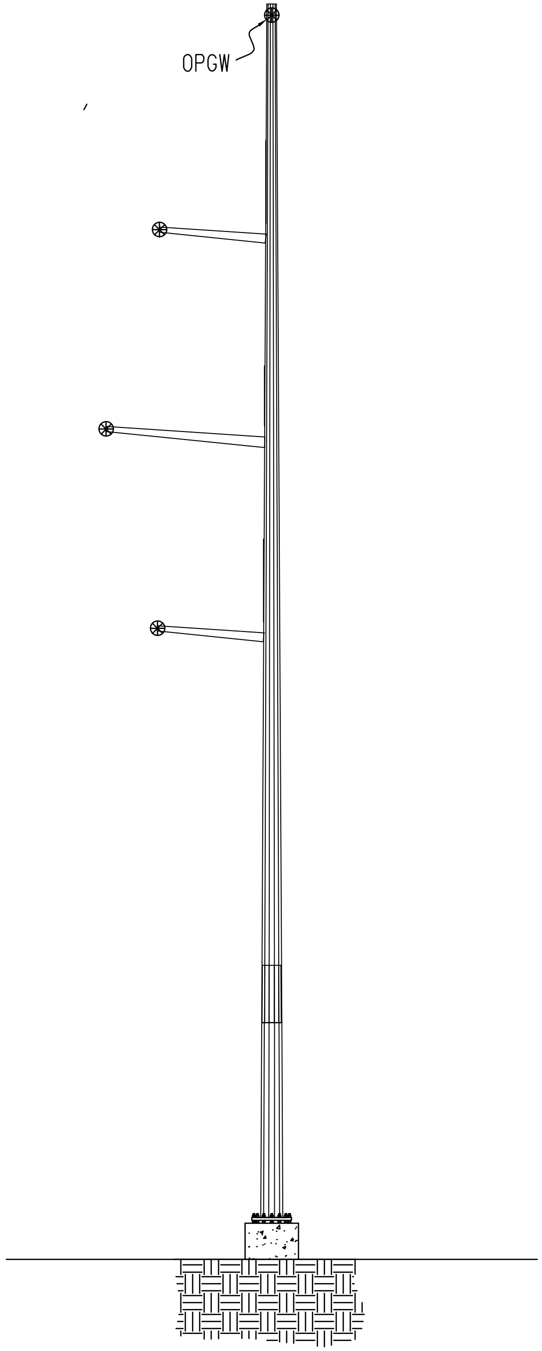


SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL® Company

TSP DEAD-END STRUCTURE, VERTICAL CONFIGURATION, SEGMENTS 2 AND 3N

NOT TO SCALE

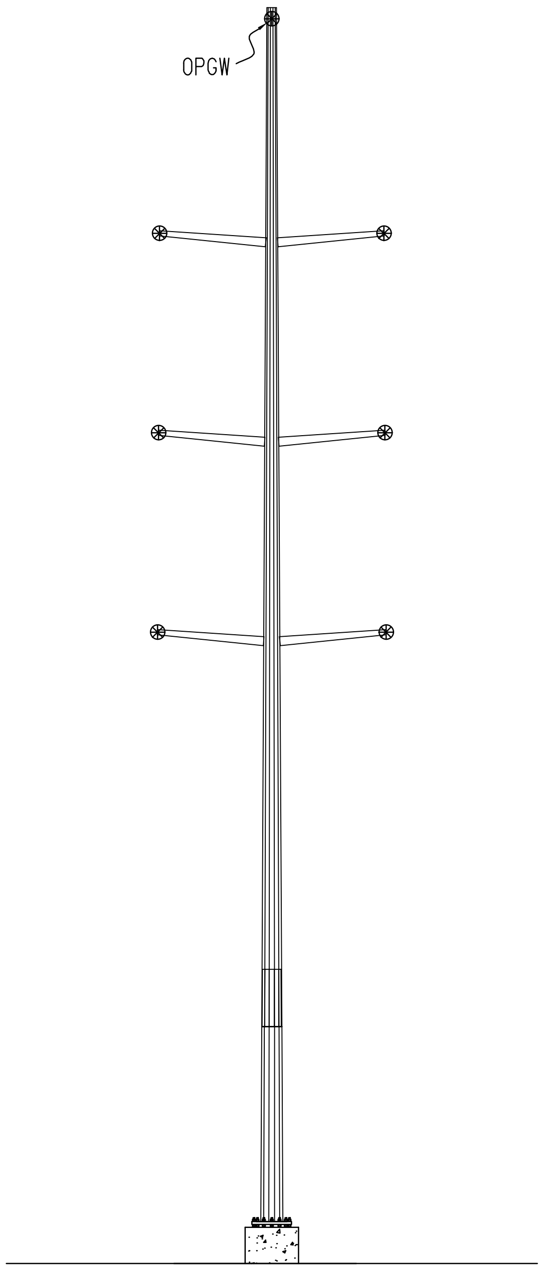
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON
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TSP, DEAD-END STRUCTURE, DOUBLE CIRCUIT VERTICAL CONFIGURATION, SEGMENTS 2, 3N, 3S, AND 4

NOT TO SCALE

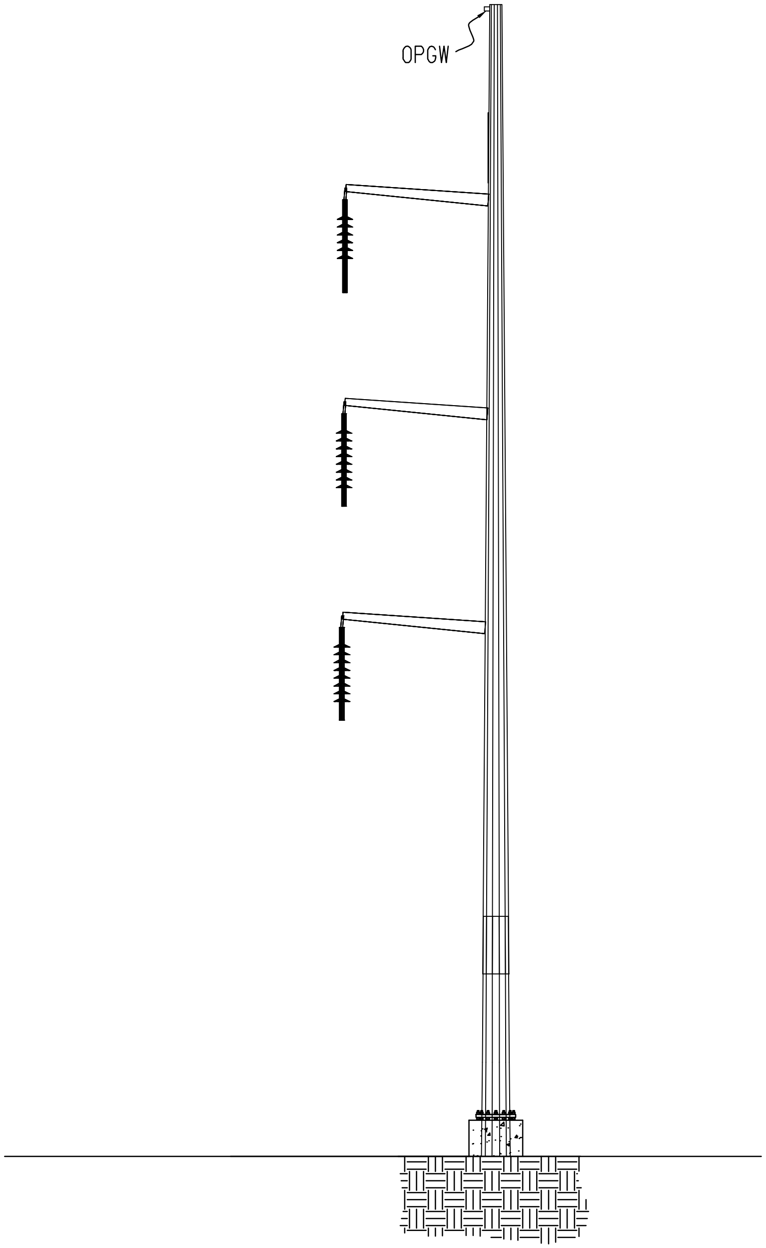
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON
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TSP, SUSPENSION STRUCTURE, SEGMENTS 2, 3N, 3S, AND 4

NOT TO SCALE

IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1

SOUTHERN CALIFORNIA EDISON
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TSP, DEAD-END STRUCTURE, VERTICAL CONFIGURATION, SEGMENTS 3S AND 4

NOT TO SCALE

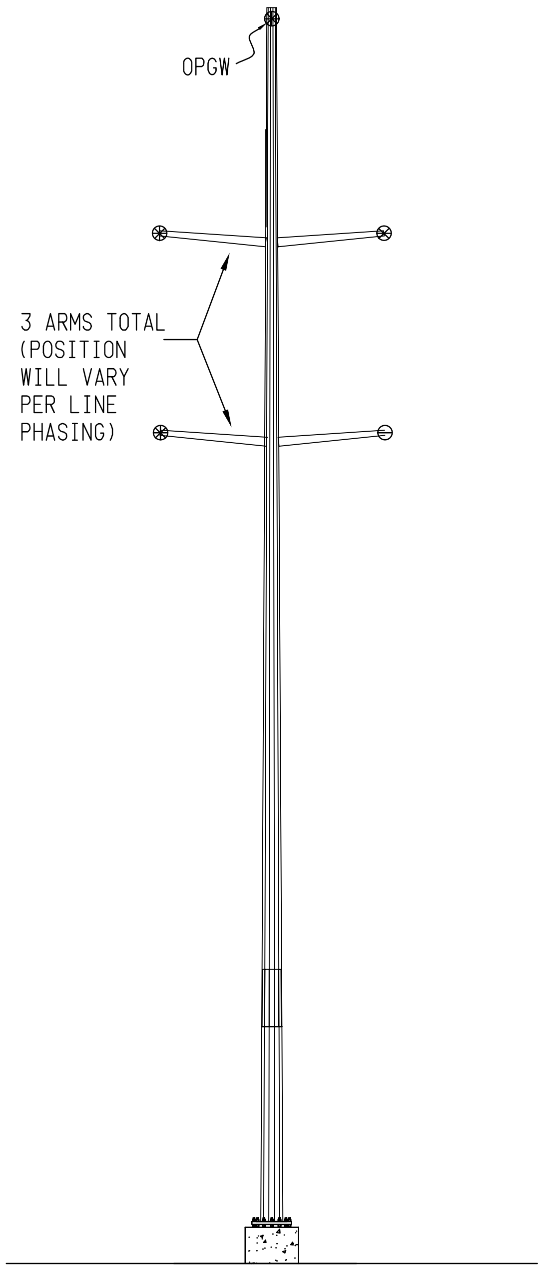
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA
EDISON
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TSP, DEAD-END
STRUCTURE,
TRIANGLE
CONFIGURATION,
SEGMENTS
3S AND 4

NOT TO SCALE

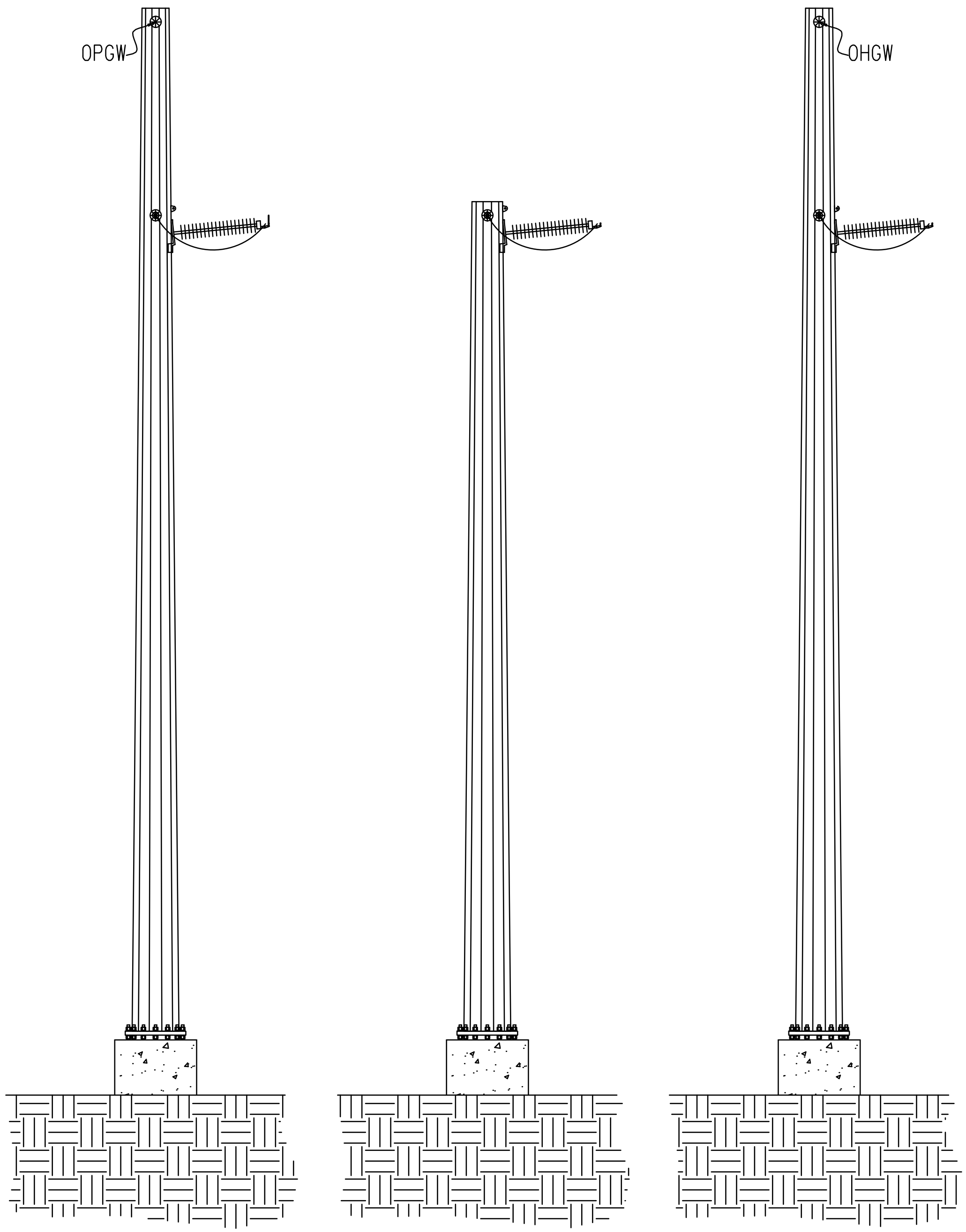
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



TSP, 3-POLE DEAD END STRUCTURE, SEGMENTS 3S AND 4

NOT TO SCALE

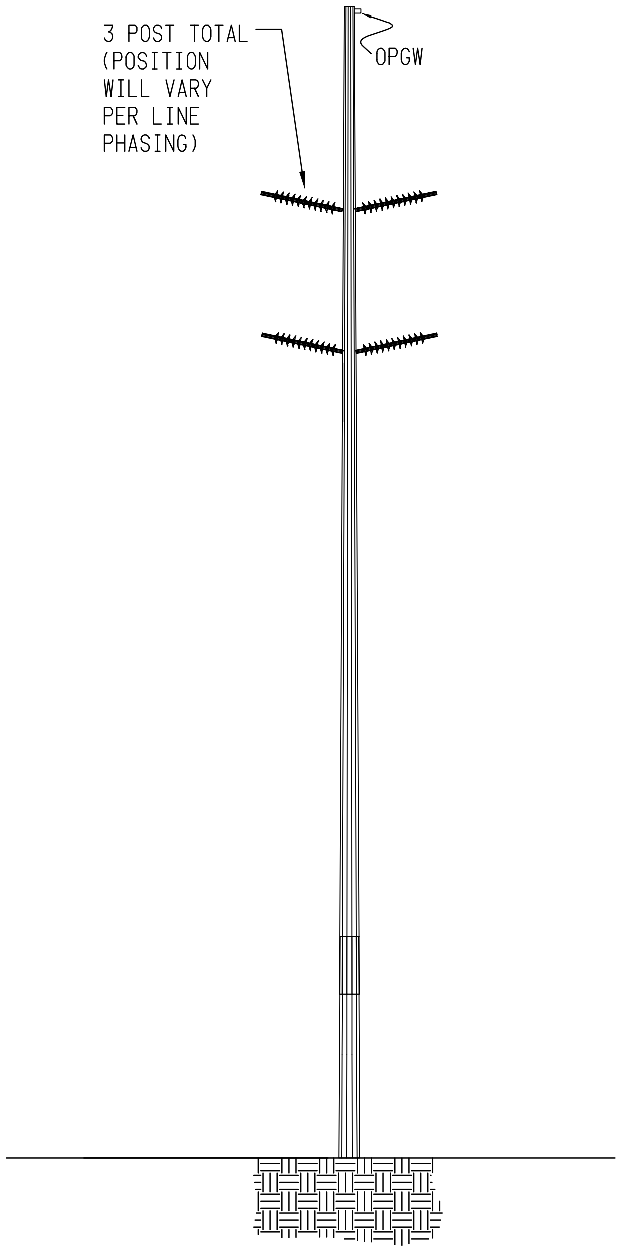
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON

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LWS POLE, TANGENT STRUCTURE, SEGMENTS 3S AND 4

NOT TO SCALE

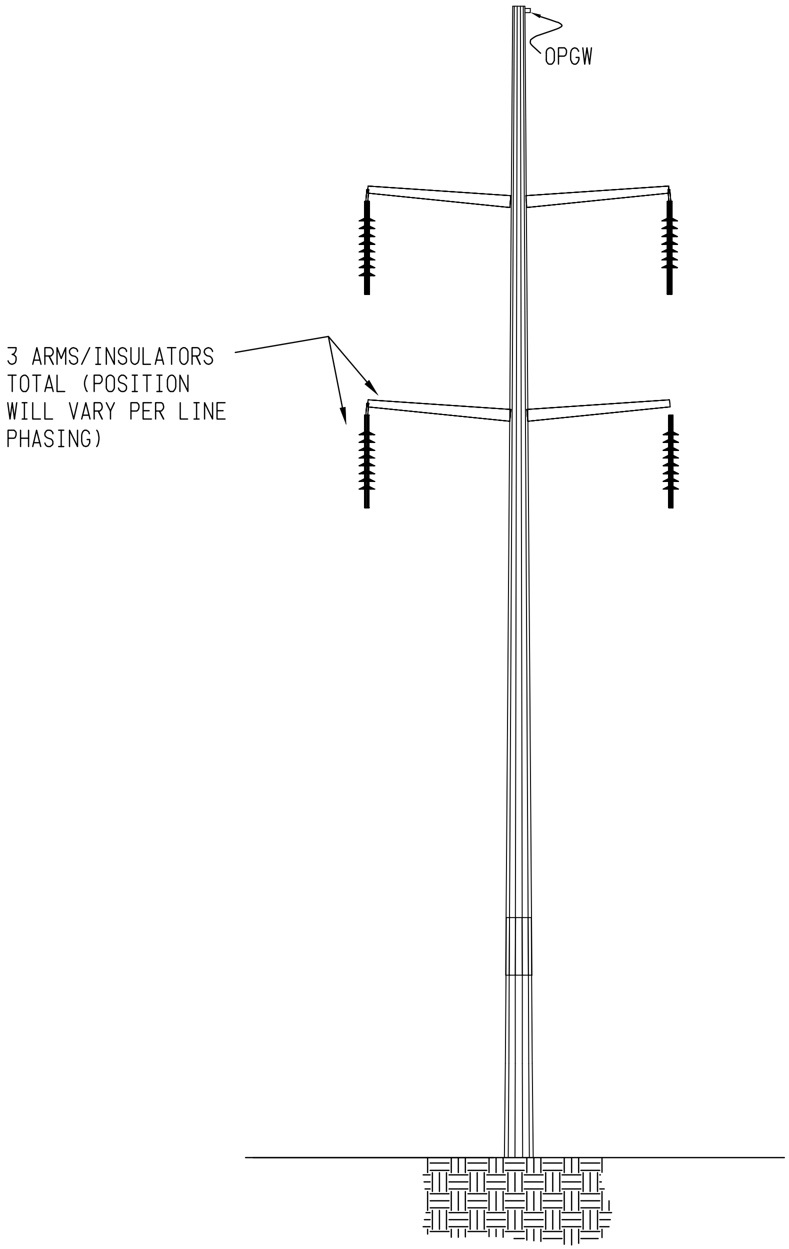
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON
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LWS POLE, TANGENT STRUCTURE, SEGMENTS 3S AND 4

NOT TO SCALE

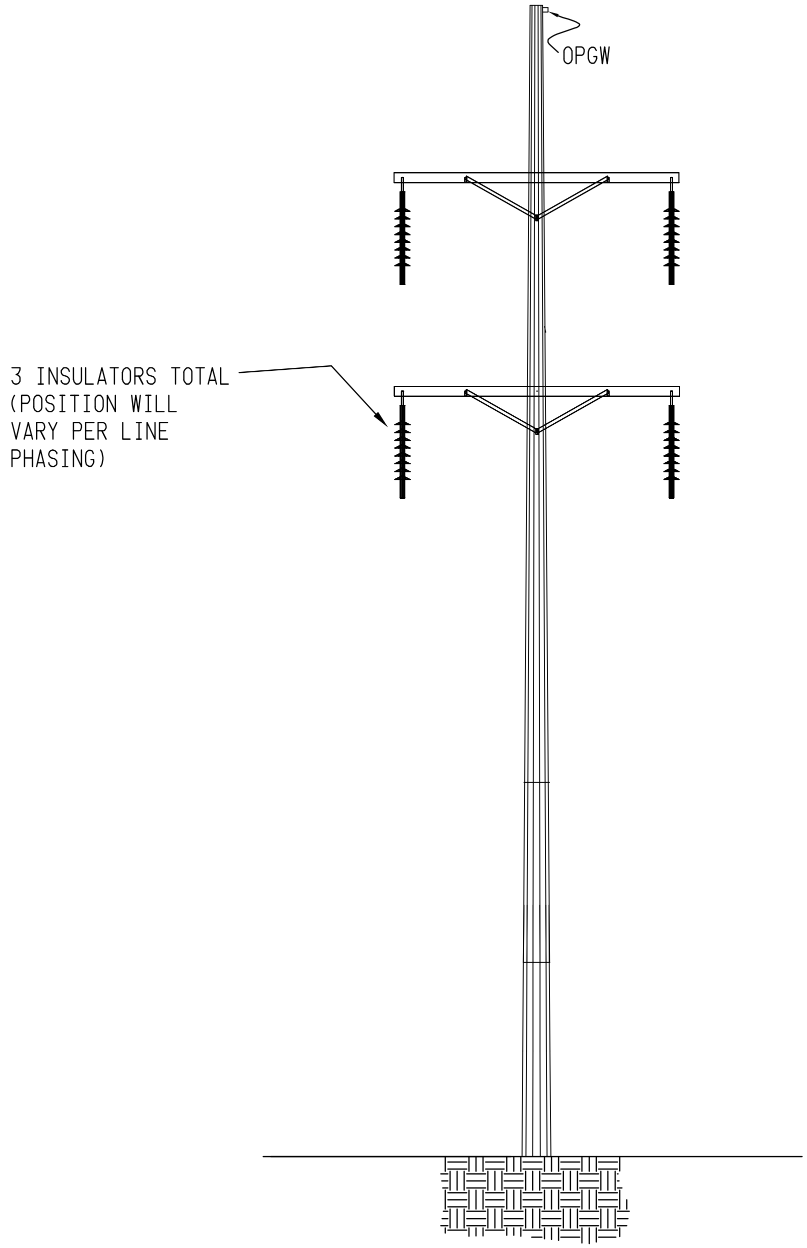
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON

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LWS POLE, SUSPENSION STRUCTURE, SEGMENTS 3S AND 4

NOT TO SCALE

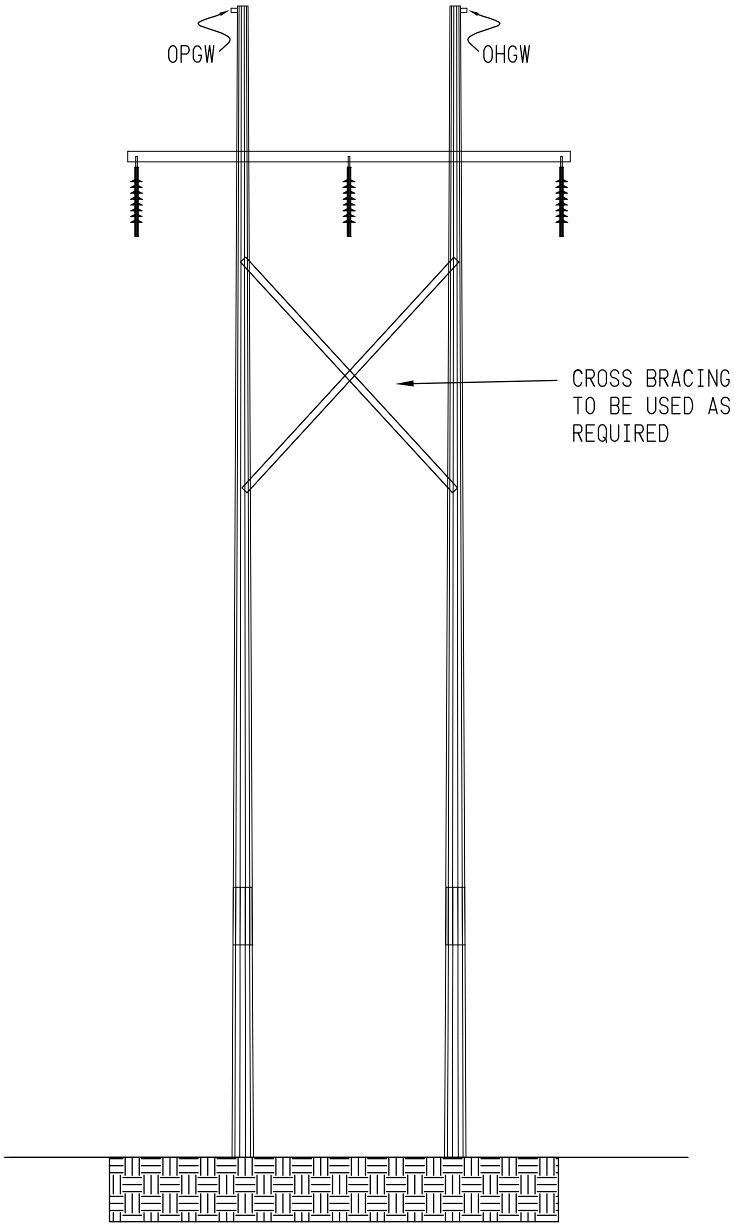
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON

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LWS POLE H-FRAME,
TANGENT
STRUCTURE,
SEGMENTS 3S AND 4

NOT TO SCALE

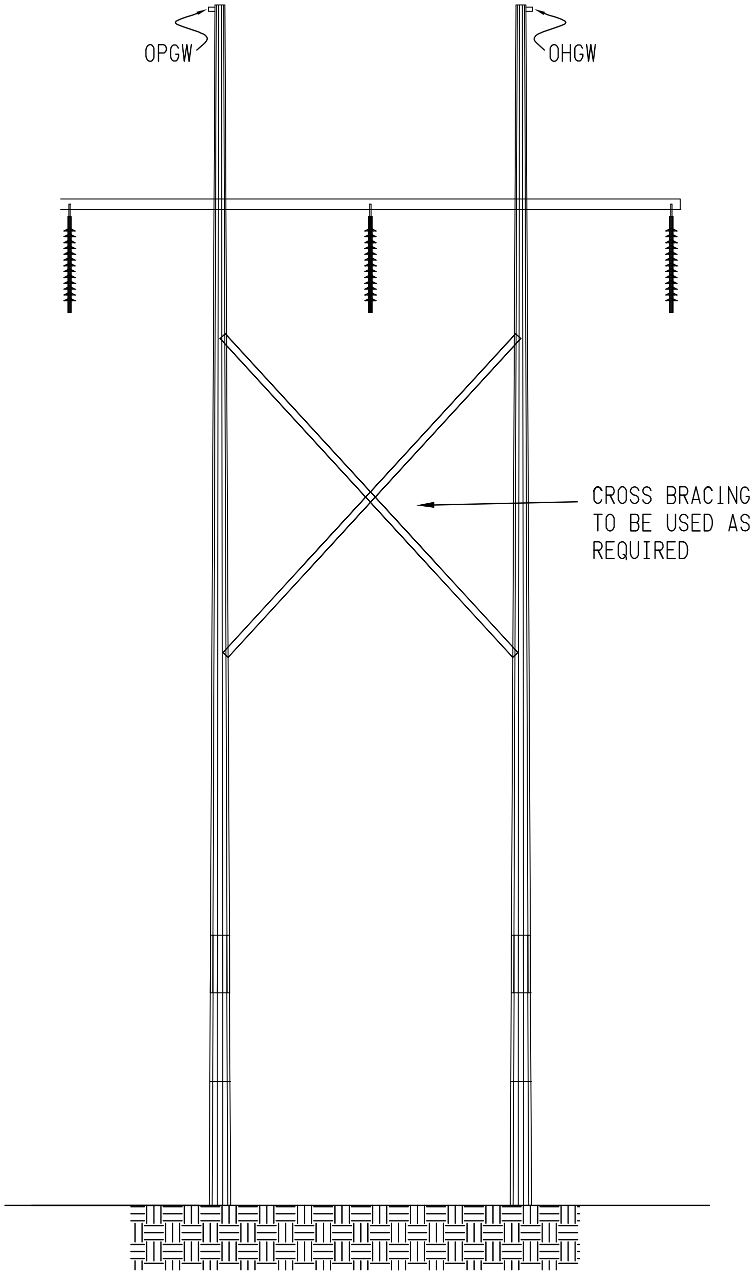
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

LWS POLE EXTRA WIDE H-FRAME, TANGENT STRUCTURE, SEGMENTS 3S AND 4

NOT TO SCALE

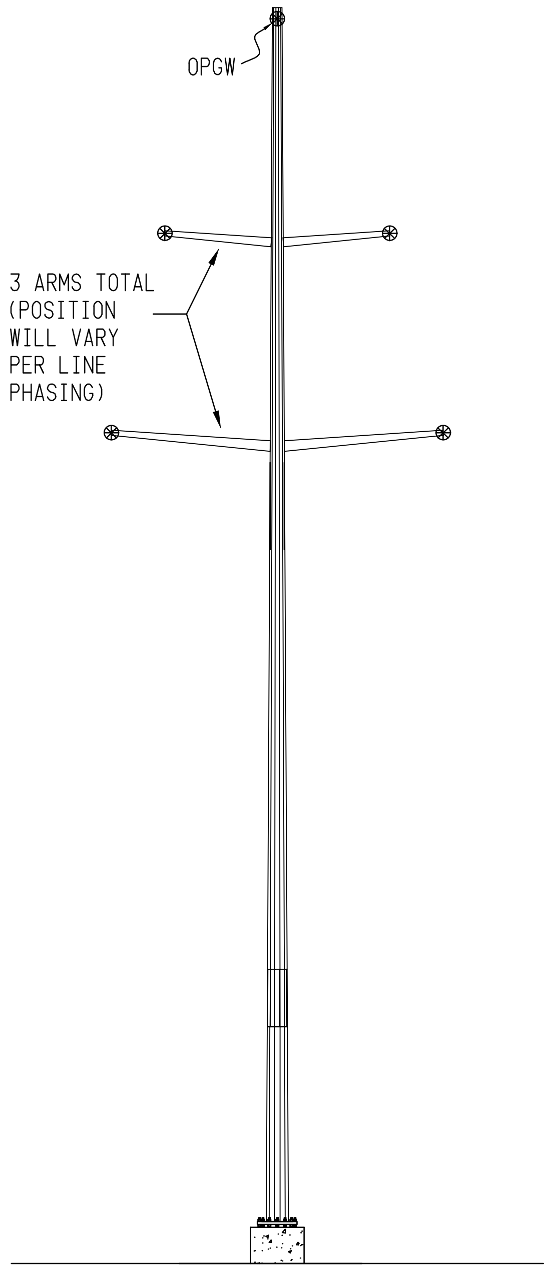
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON

An EDISON INTERNATIONAL® Company

TSP, DEAD-END STRUCTURE, TRIANGLE CONFIGURATION, SEGMENT 4

NOT TO SCALE

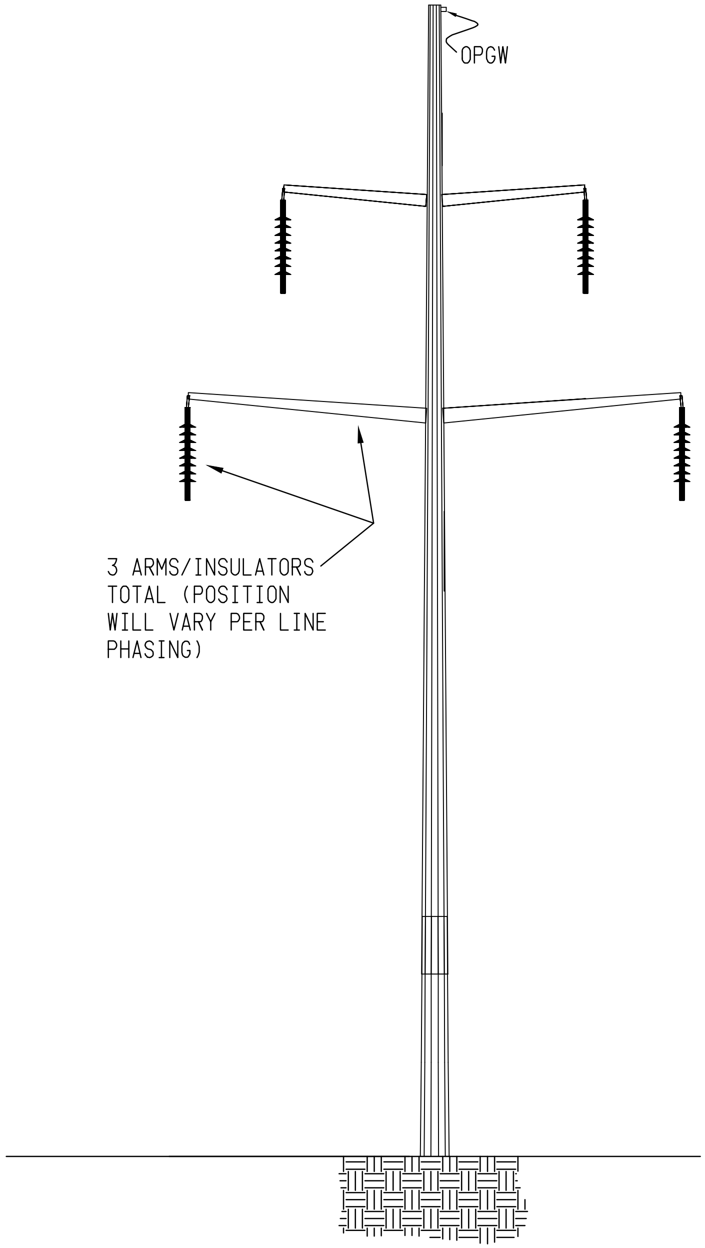
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

LWS POLE, SUSPENSION STRUCTURE, SEGMENT 4

NOT TO SCALE

IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL® Company

TEMPORARY DEADEND LWS POLE THREE POLE STRUCTURE, SEGMENT 2

NOT TO SCALE

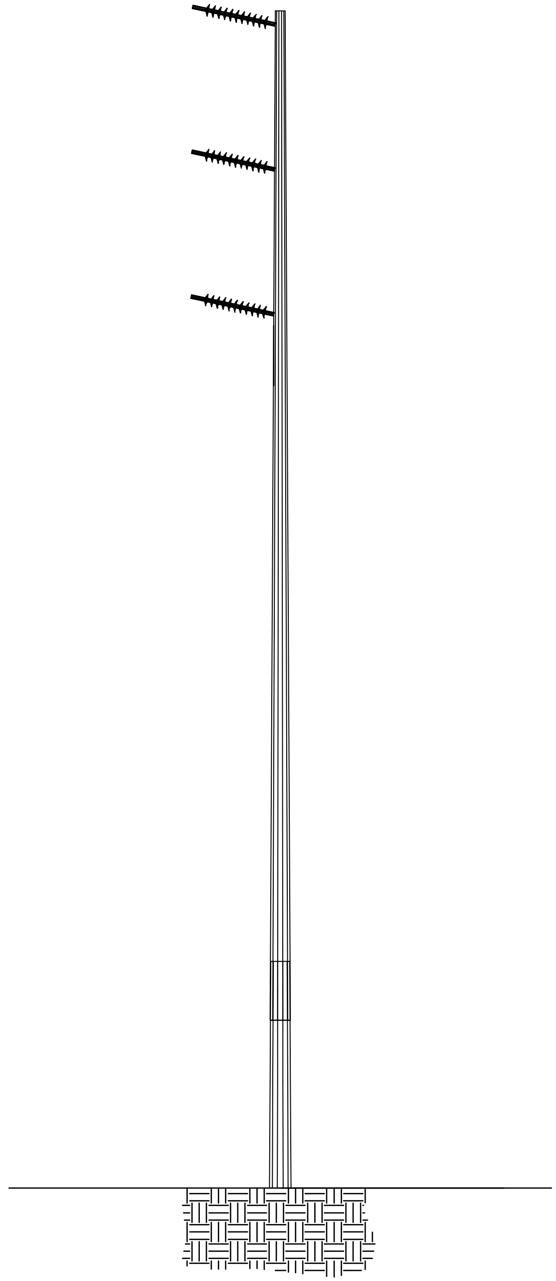
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL® Company

TEMPORARY LWS POLE, TANGENT, SEGMENTS 2 AND 3N

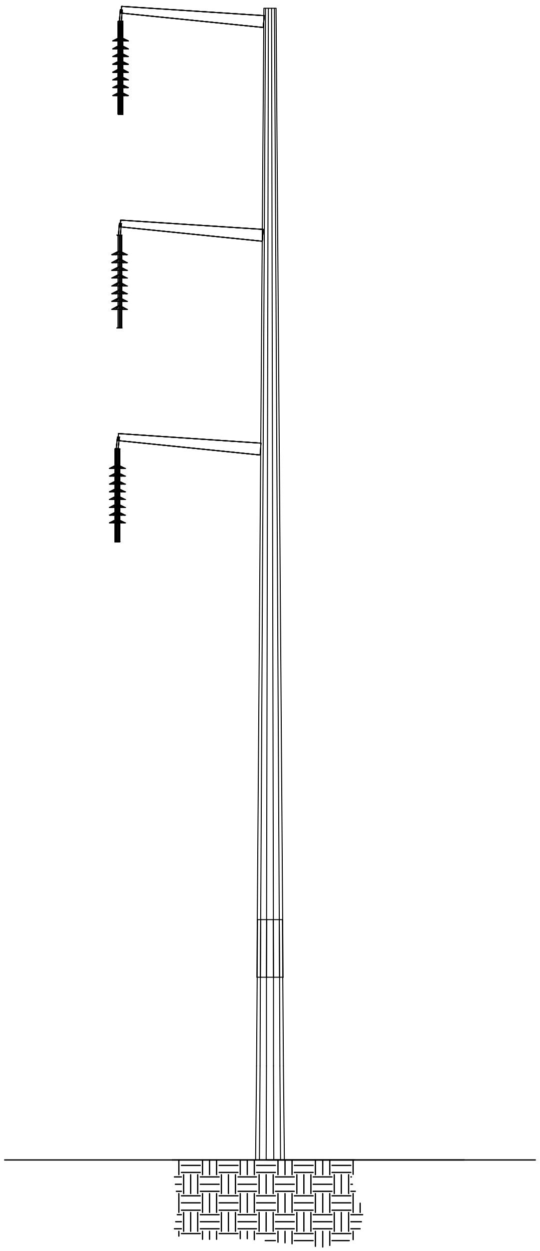
NOT TO SCALE

IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:
3.5-1



SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL® Company

TEMPORARY LWS
POLE, SUSPENSION,
SEGMENTS 2 AND 3N

NOT TO SCALE

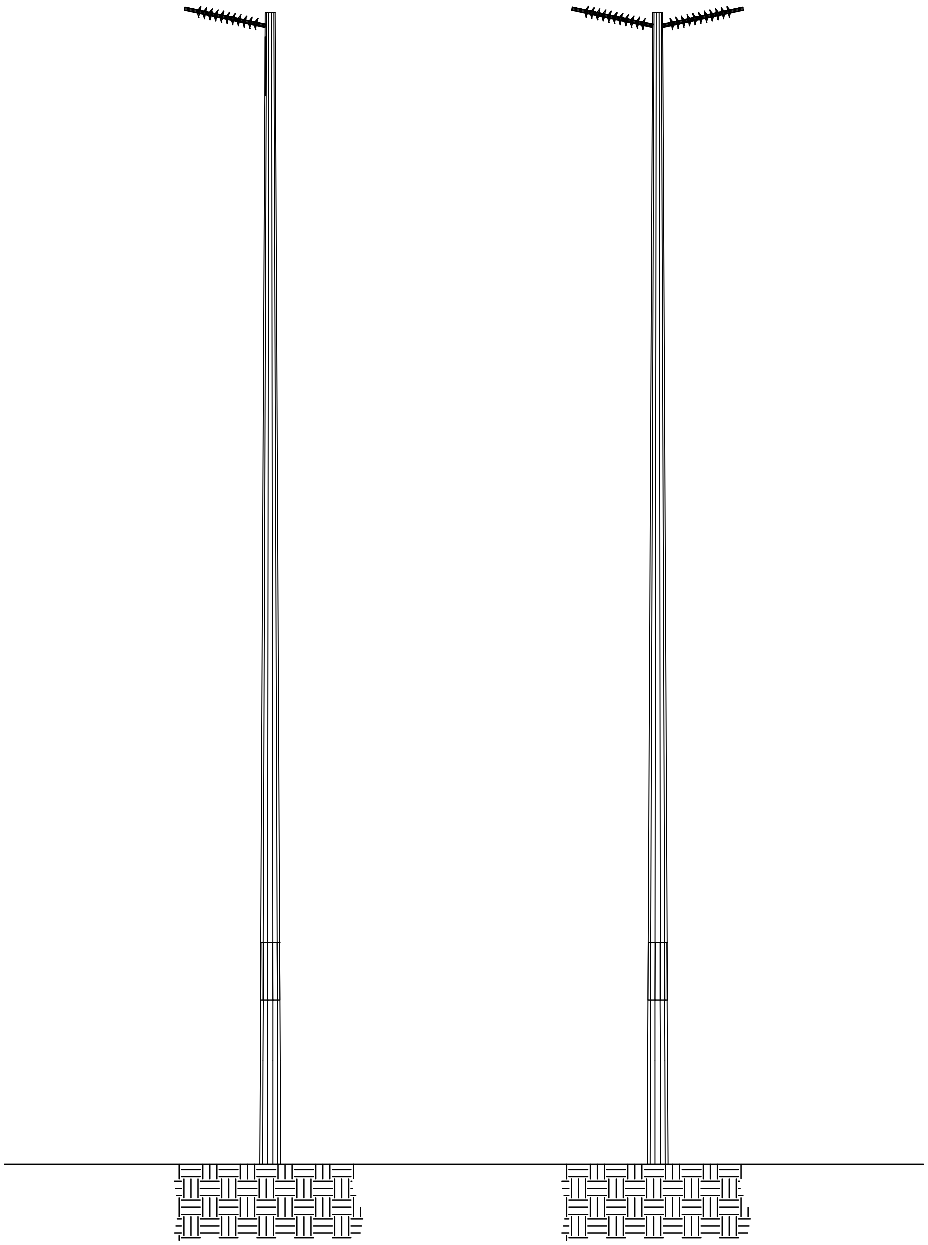
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL® Company

TEMPORARY 2-POLE
LWS TANGENT
STRUCTURE,
SEGMENT 3N

NOT TO SCALE

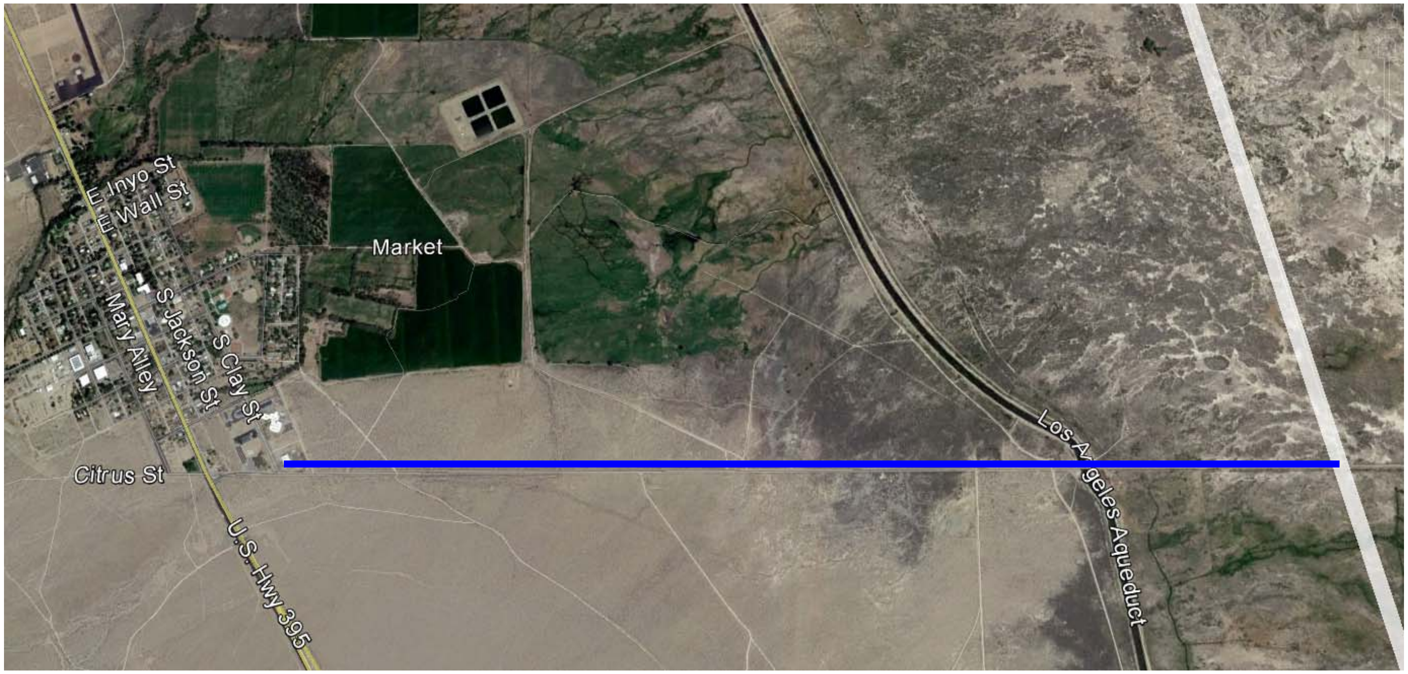
IVANPAH-CONTROL PROJECT

TYPICAL STRUCTURE DESIGN

ARCADIS

FIGURESET:

3.5-1



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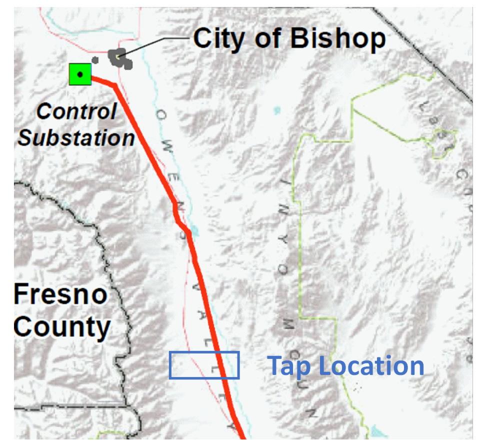
N

IC Project, Segment 1 Alignment

New Independence Telecommunication Tap Line, Overhead

New Independence Telecommunication Tap Line, Underground



IVANPAH-CONTROL PROJECT

INDEPENDENCE TELECOM TAP

ARCADIS

FIGURE 3.5-2

Legend

Transmission Line Crossings	230-287 kV
Substation	33-66 kV
IC Project Alignment	115 kV
/500 kV DC	220 kV
	County

Source: California Energy Commission Critical Infrastructure GIS Data: Transmisssion Line

IVANPAH-CONTROL PROJECT

TRANSMISSION LINE CROSSINGS

ARCADIS

SOUTHERN CALIFORNIA EDISON

An EDISON INTERNATIONAL® Company

FIGURE

3.5-3

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
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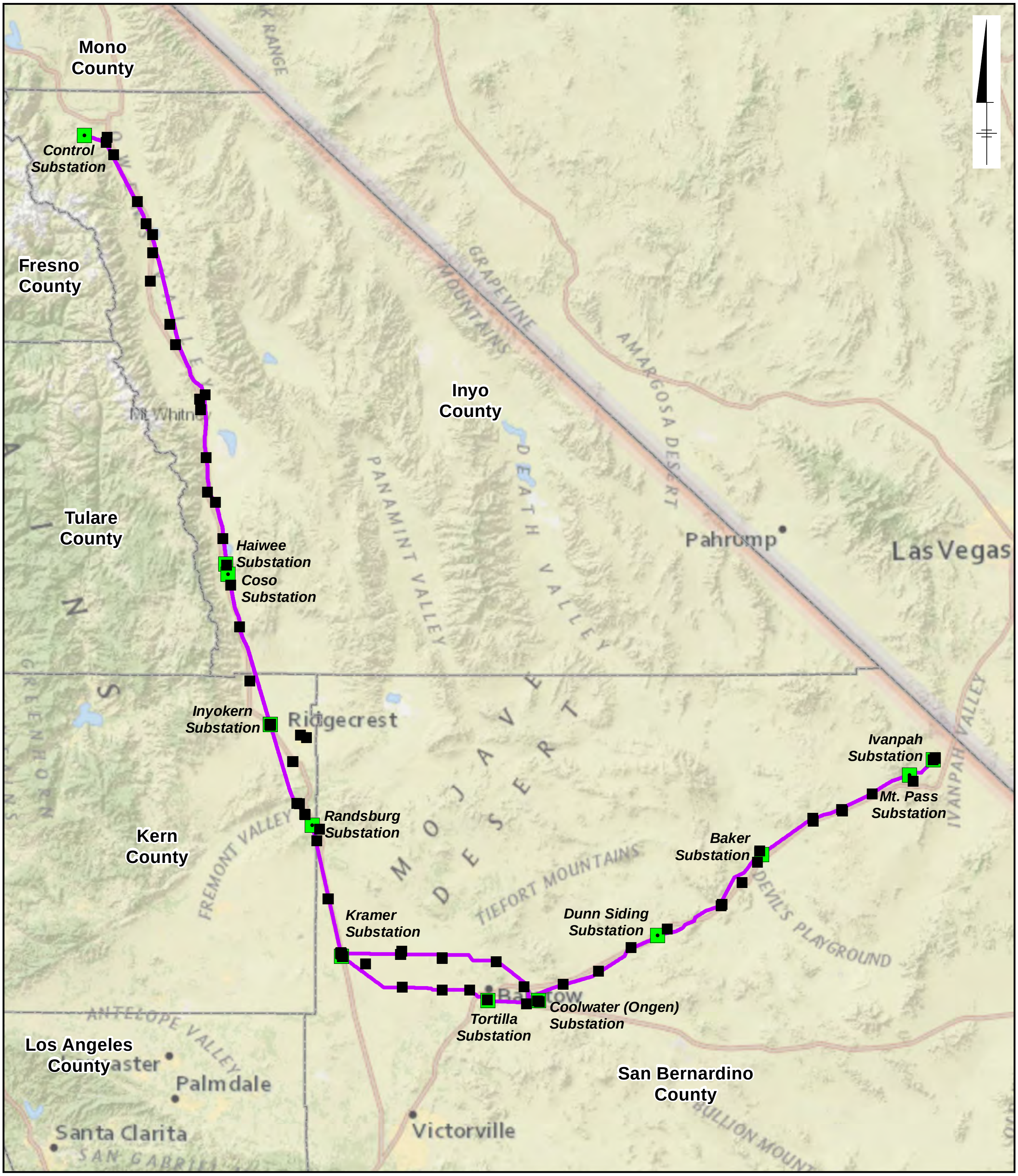

Legend

- ■ Staging Yards
- Substation
- IC Project Alignment
- County

0 40
Miles

IVANPAH-CONTROL PROJECT

STAGING YARDS

ARCADIS | SOUTHERN CALIFORNIA EDISON

FIGURESET **3.7-1**

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
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Legend

- Staging Yards
- Substation
- IC Project Alignment
- County

0 8
Miles

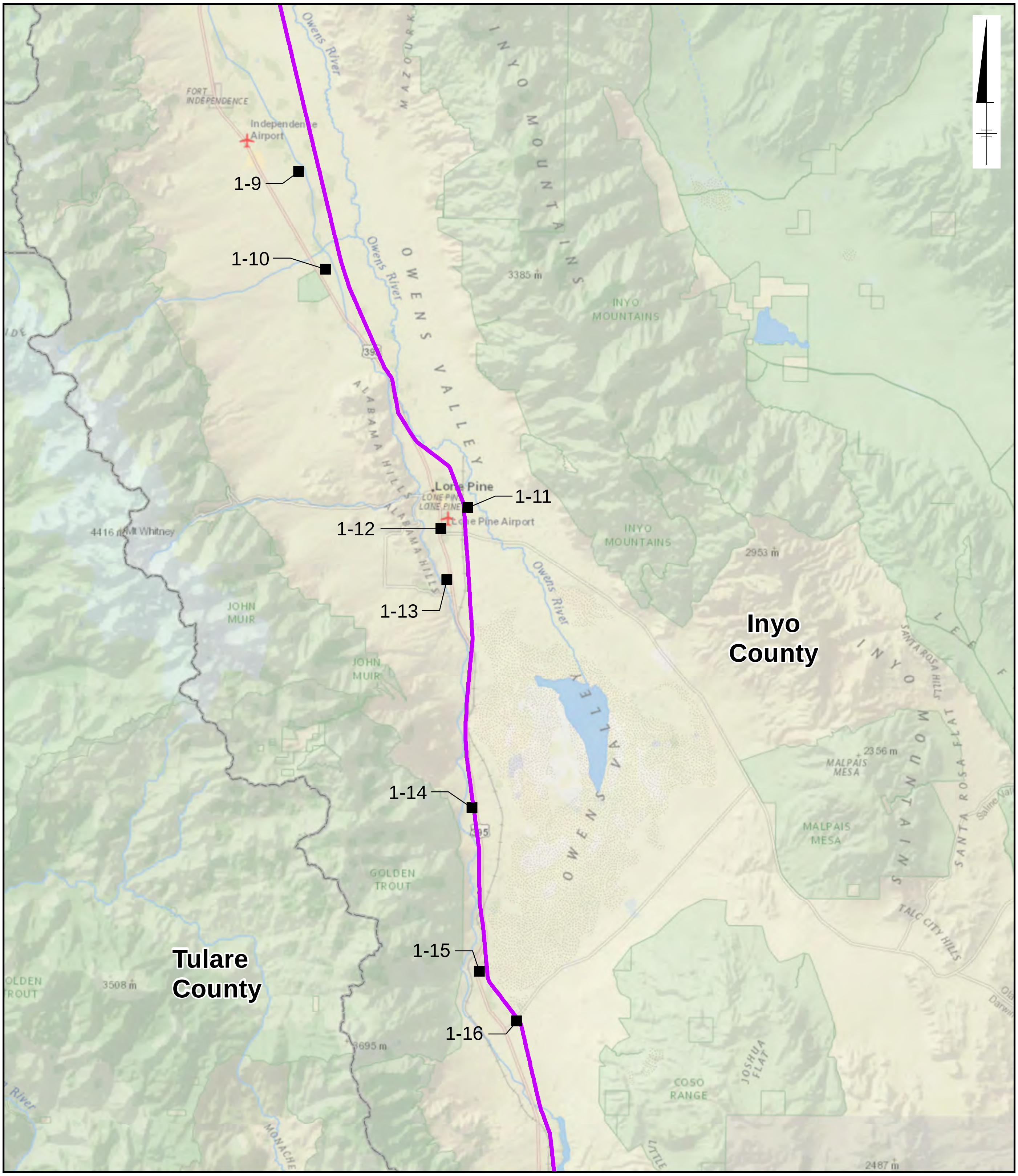
IVANPAH-CONTROL PROJECT

STAGING YARDS

ARCADIS SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL® Company

FIGURESET 3.7-1

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
Z:\GISProjects_ENV_ALPHA_ENV_Q-S\SCE\SCE_TLLR\ArcGIS_Desktop\PEA_Figures\IC\Figure3-7-1_StagingYards_IC.mxd 7/9/2018 10:28:25 AM



Page 3 of 8

Legend

- Staging Yards
- Substation
- IC Project Alignment
- County

0 8
Miles

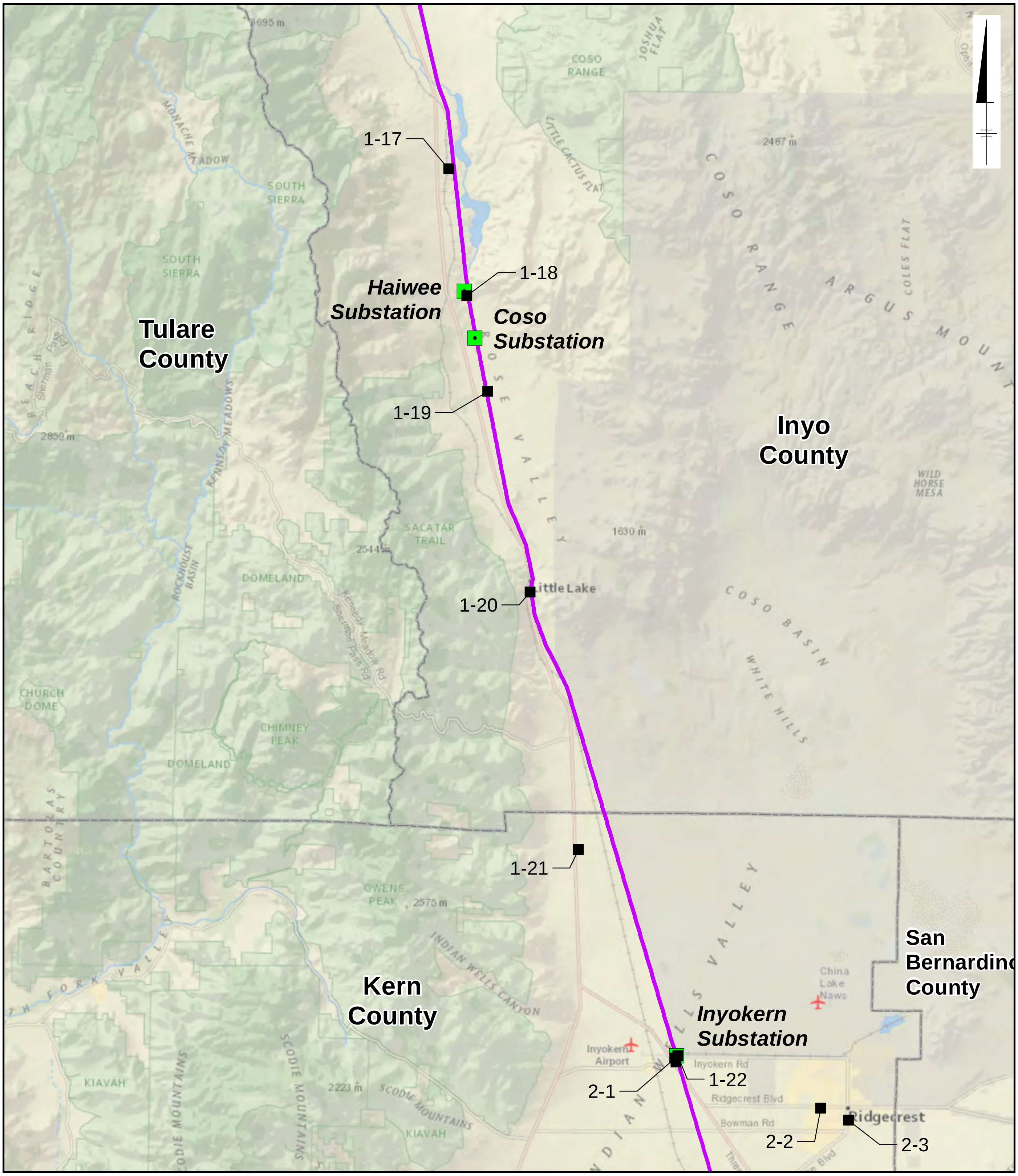
IVANPAH-CONTROL PROJECT

STAGING YARDS

ARCADIS | SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET **3.7-1**

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
Z:\GISProjects_ENV_ALPHA_ENV_Q-S\SCE\SCE_TLLR\ArcGIS_Desktop\PEA_Figures\IC\Figure3-7-1_StagingYards_IC.mxd 7/9/2018 10:28:25 AM



Page 4 of 8

Legend

- Staging Yards
- Substation
- IC Project Alignment
- County

0 8
Miles

IVANPAH-CONTROL PROJECT

STAGING YARDS

ARCADIS
SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

FIGURESET
3.7-1

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
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Page 5 of 8

Legend

- Staging Yards
- Substation
- IC Project Alignment
- County

0 10

Miles

IVANPAH-CONTROL PROJECT

STAGING YARDS

ARCADIS SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET **3.7-1**

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
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Page 6 of 8

Legend

- Staging Yards
- Substation
- IC Project Alignment
- County

0 10
Miles

IVANPAH-CONTROL PROJECT

STAGING YARDS

ARCADIS SOUTHERN CALIFORNIA EDISON

FIGURESET 3.7-1

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
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Page 7 of 8

Legend

- Staging Yards
- Substation
- IC Project Alignment
- County

0 8
Miles

IVANPAH-CONTROL PROJECT

STAGING YARDS

ARCADIS SOUTHERN CALIFORNIA EDISON

FIGURESET **3.7-1**

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
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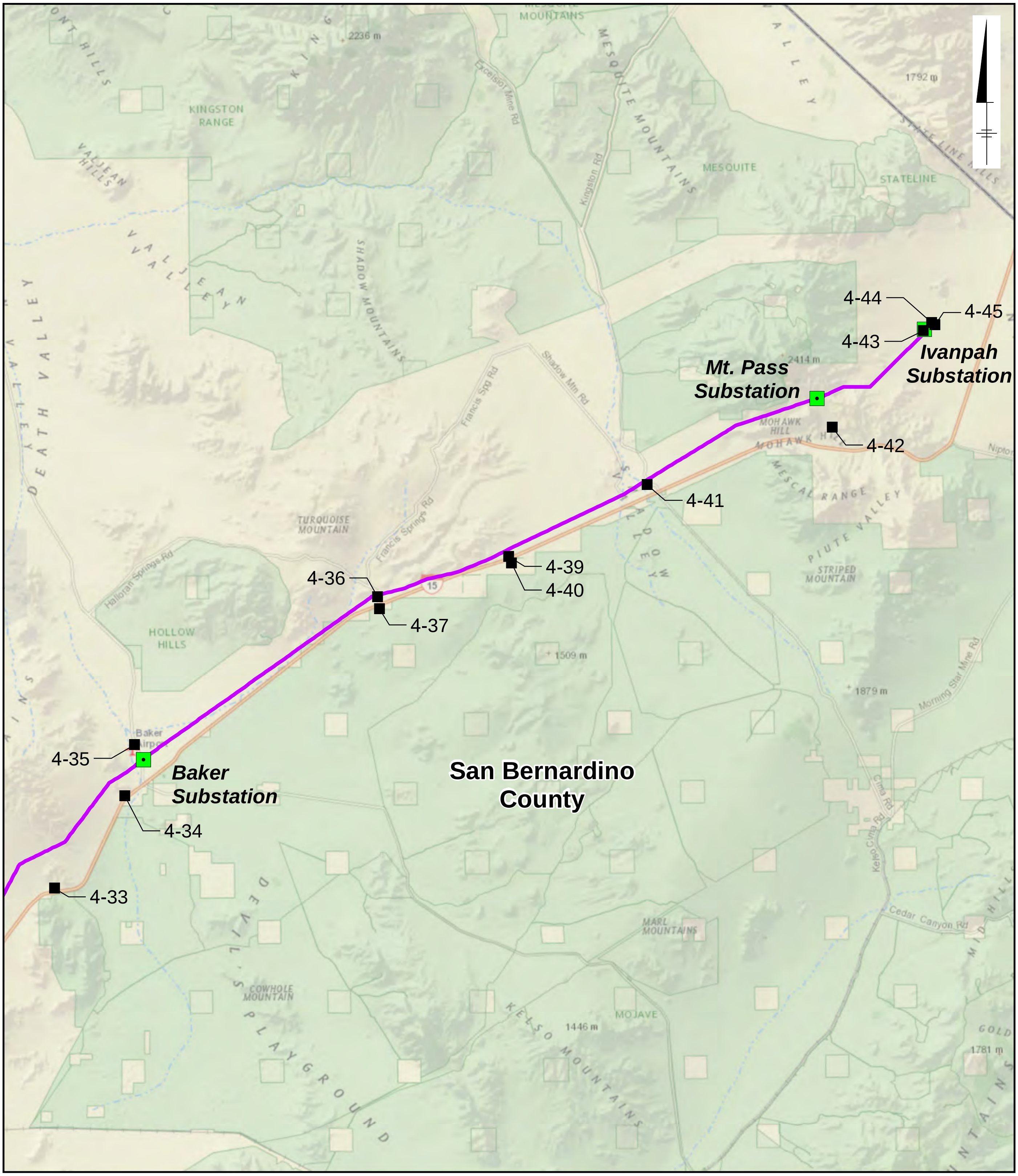

Page 8 of 8

Legend

- Staging Yards
- Substation
- IC Project Alignment
- County

0 10

Miles

IVANPAH-CONTROL PROJECT

STAGING YARDS

ARCADIS SOUTHERN CALIFORNIA EDISON

FIGURESET 3.7-1

City: Div/Group: Created By: Last Saved By: adavis
Project (Project #)
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Control Substation
Page 1 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS
SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

FIGURESET:
3.7-2

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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Haiwee Substation
Page 2 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS | SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET: **3.7-2**

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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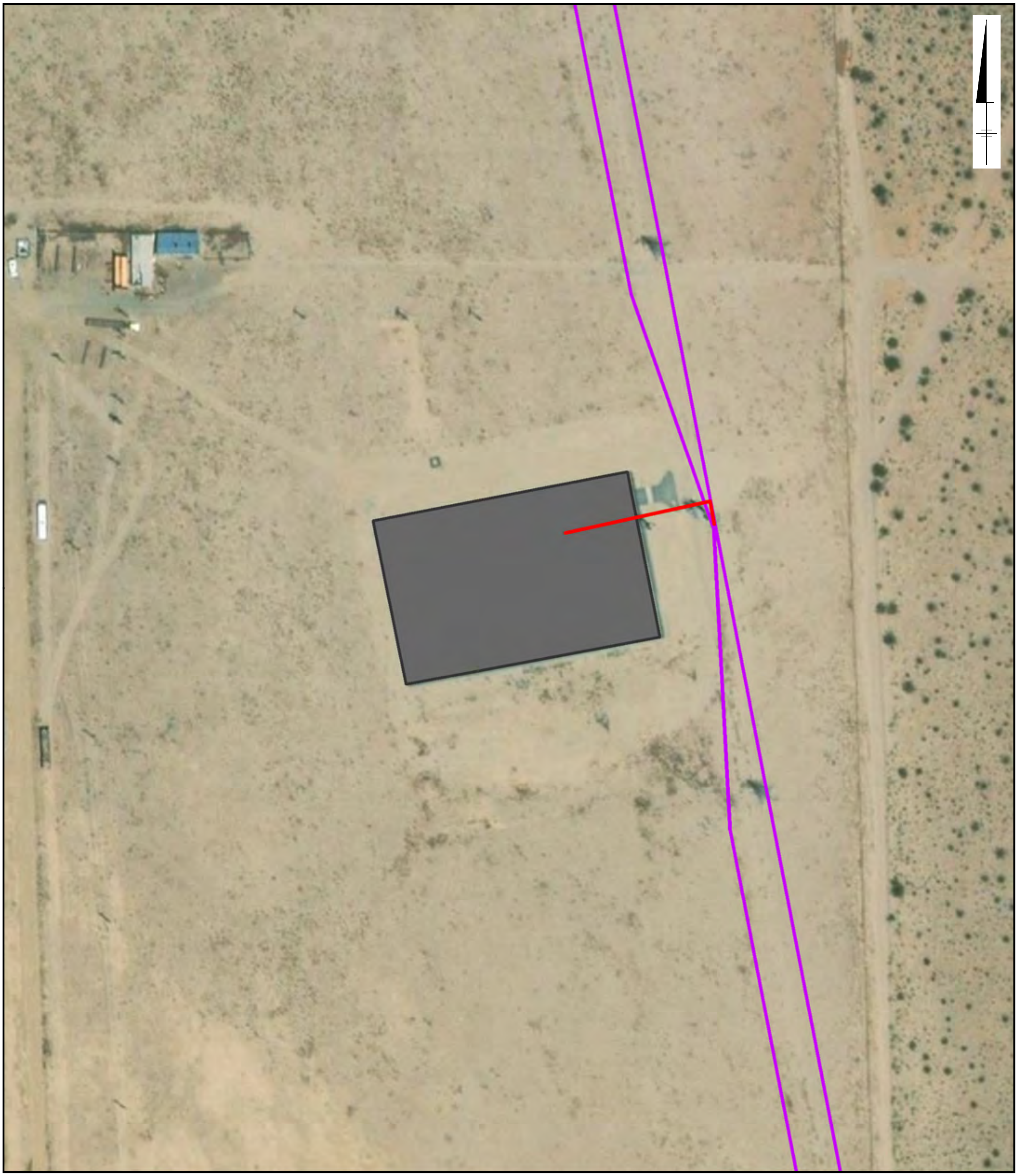

Coso Substation
Page 3 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS

SOUTHERN CALIFORNIA EDISON
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FIGURESET:
3.7-2

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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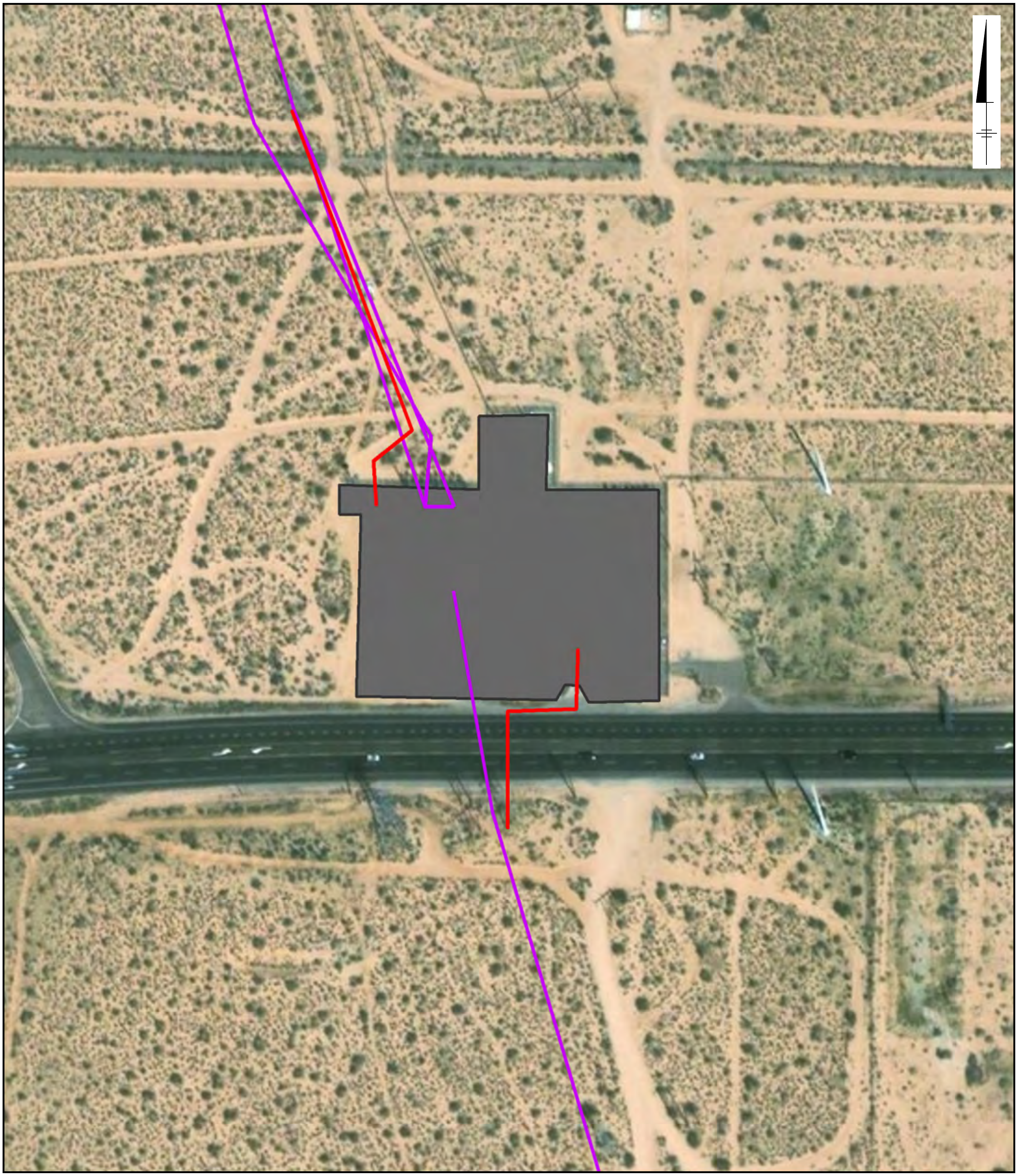


Inyokern Substation
Page 4 of 12

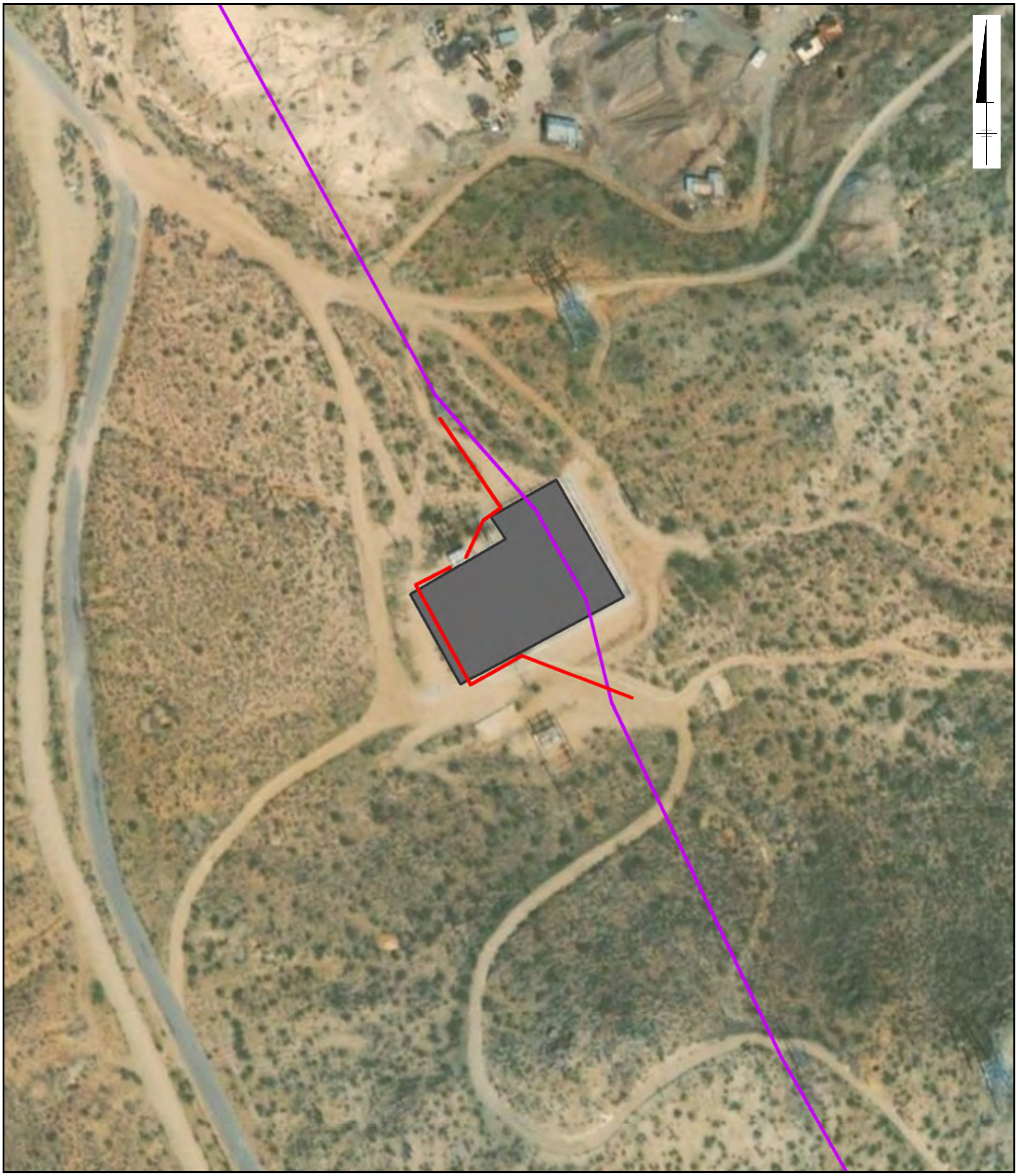
Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

FIGURESET:
3.7-2



Randsburg Substation
Page 5 of 12

Legend

Telecom Underground Segments

IC Project Alignment

Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET: 3.7-2

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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Kramer Substation
Page 6 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS | SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET: **3.7-2**

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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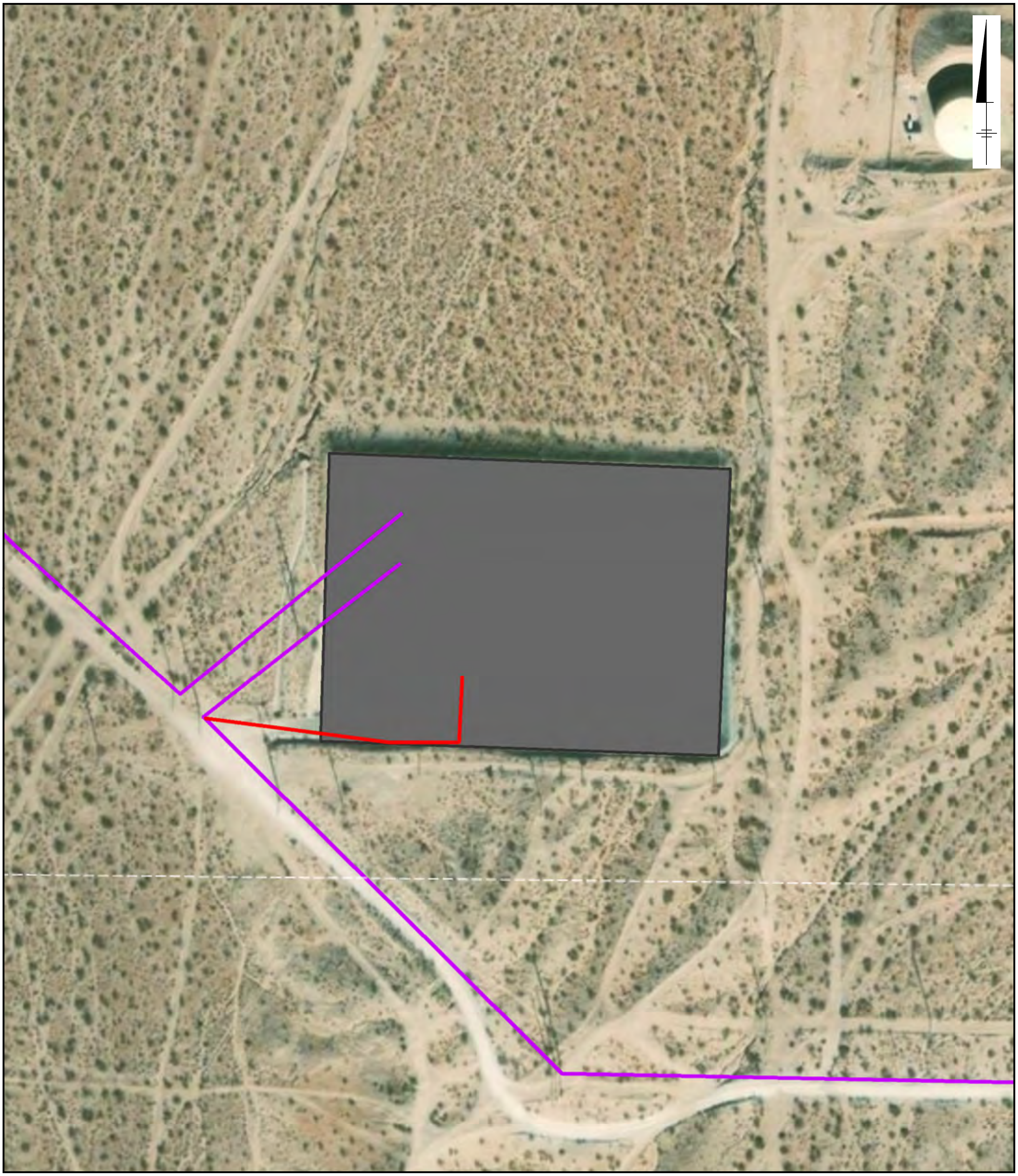

Tortilla Substation
Page 7 of 12

Legend

Telecom Underground Segments

IC Project Alignment

Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

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FIGURESET:
3.7-2

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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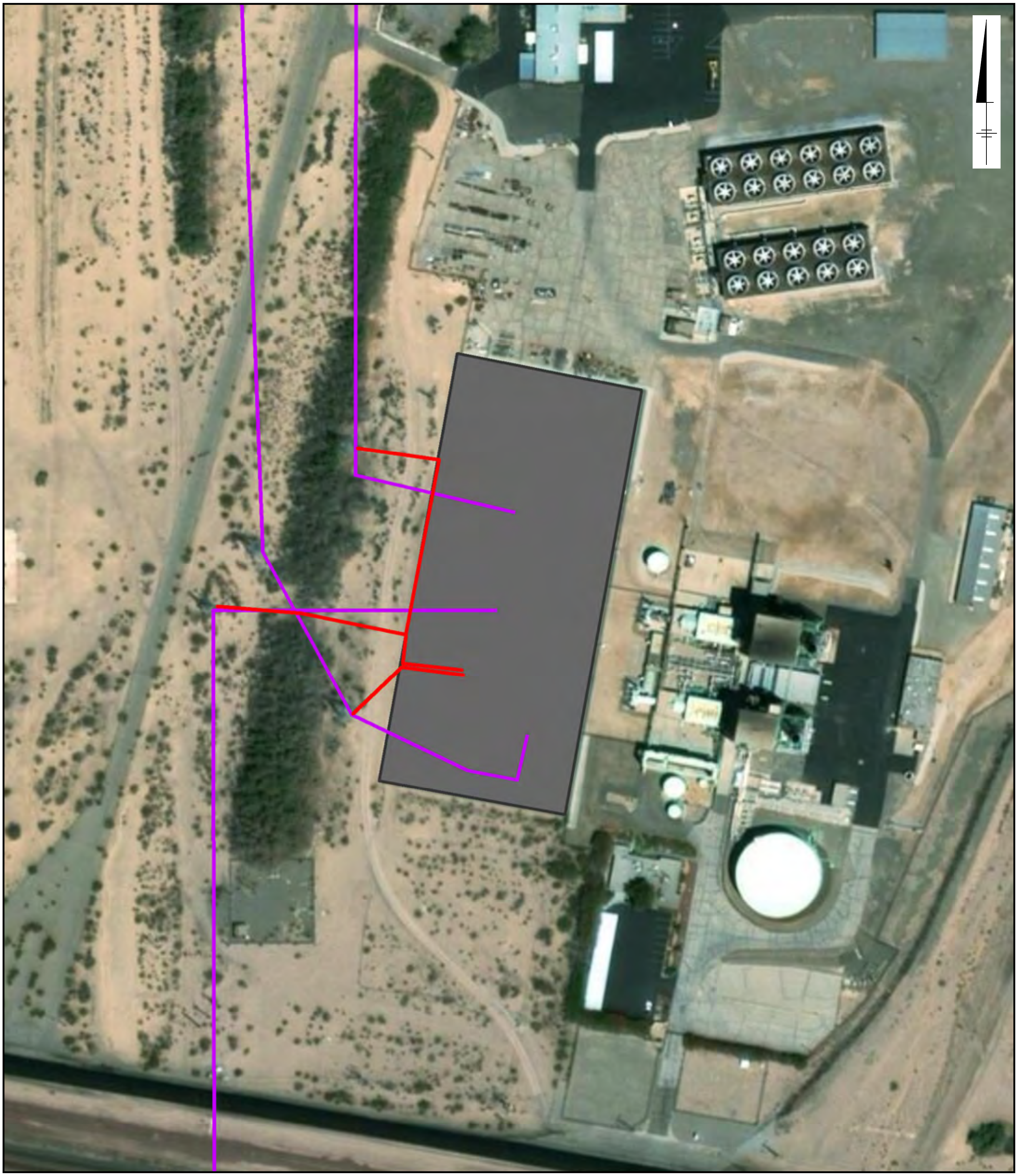

Coolwater (Ongen) Substation
Page 8 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS

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FIGURESET:
3.7-2

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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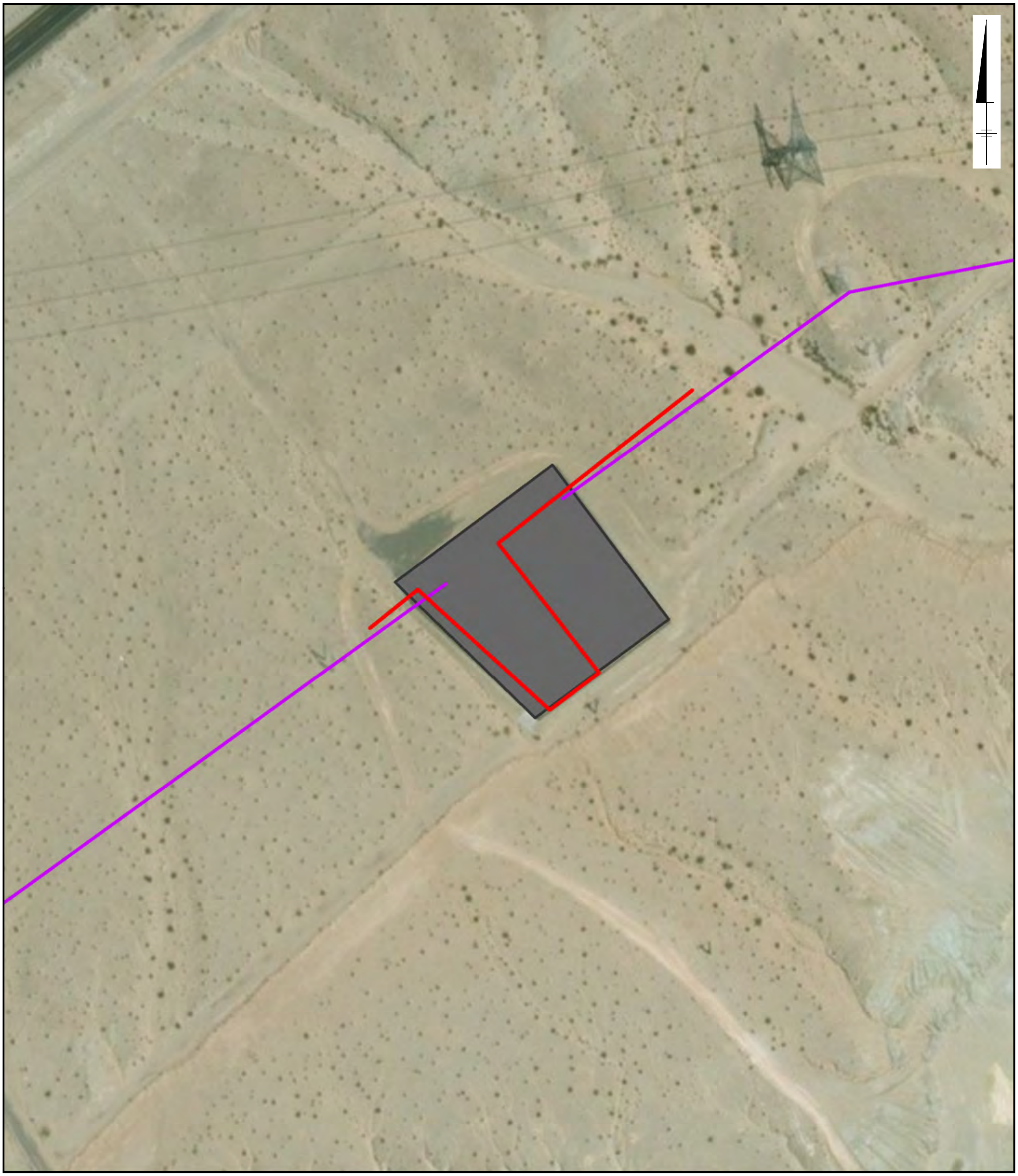

Dunn Siding Substation
Page 9 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS | SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET: 3.7-2

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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Baker Substation
Page 10 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS | SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET: 3.7-2

Mt. Pass Substation
Page 11 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS | SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET: **3.7-2**

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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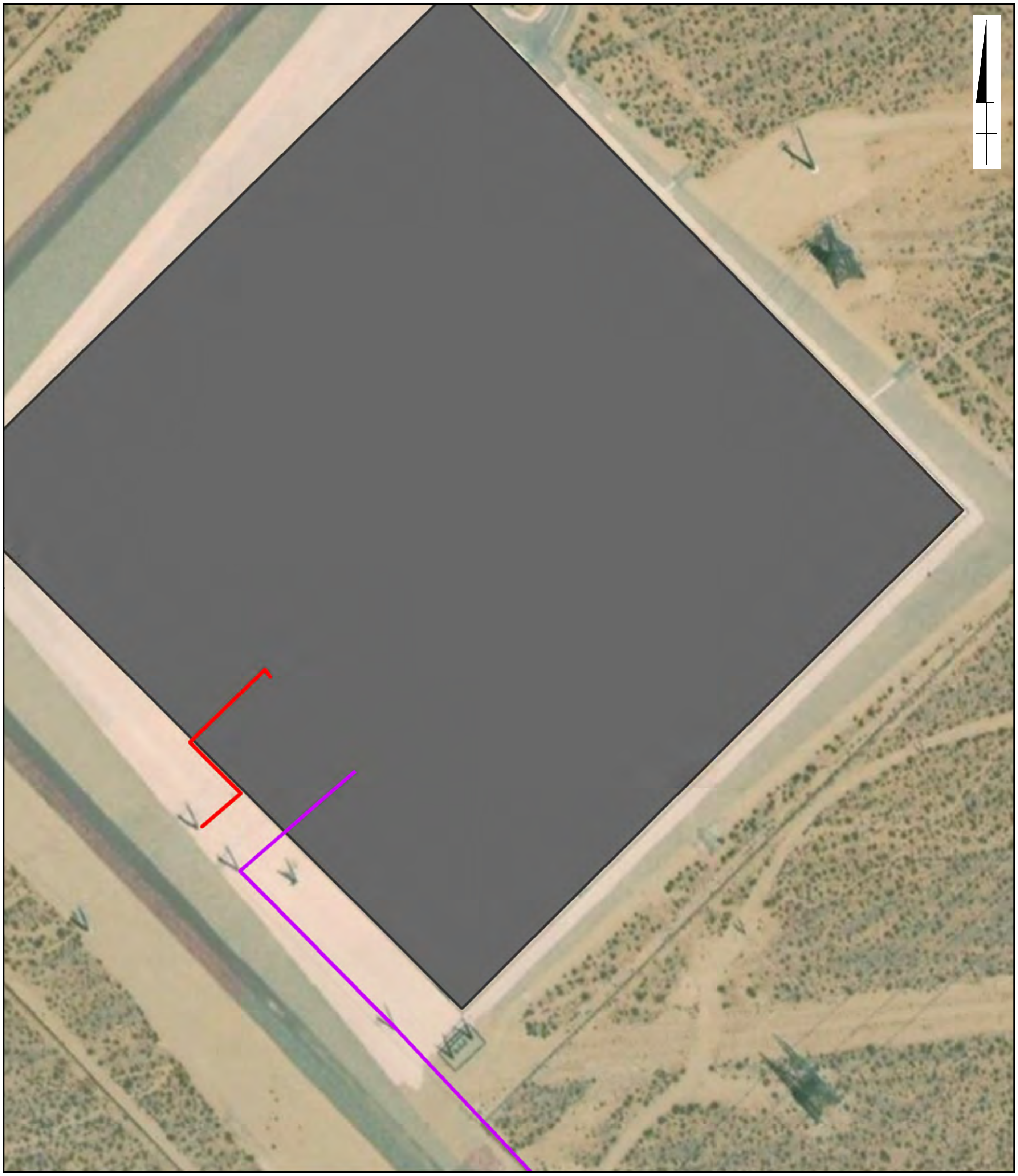

Ivanpah Substation
Page 12 of 12

Legend

- Telecom Underground Segments
- IC Project Alignment
- Area Within Substation Fence Line

I

IVANPAH-CONTROL PROJECT

TELECOMMUNICATIONS UNDERGROUND ROUTES

ARCADIS SOUTHERN CALIFORNIA EDISON An EDISON INTERNATIONAL Company

FIGURESET: **3.7-2**

City: Div/Group: Created By: Last Saved By: msi01059
Project (Project #)
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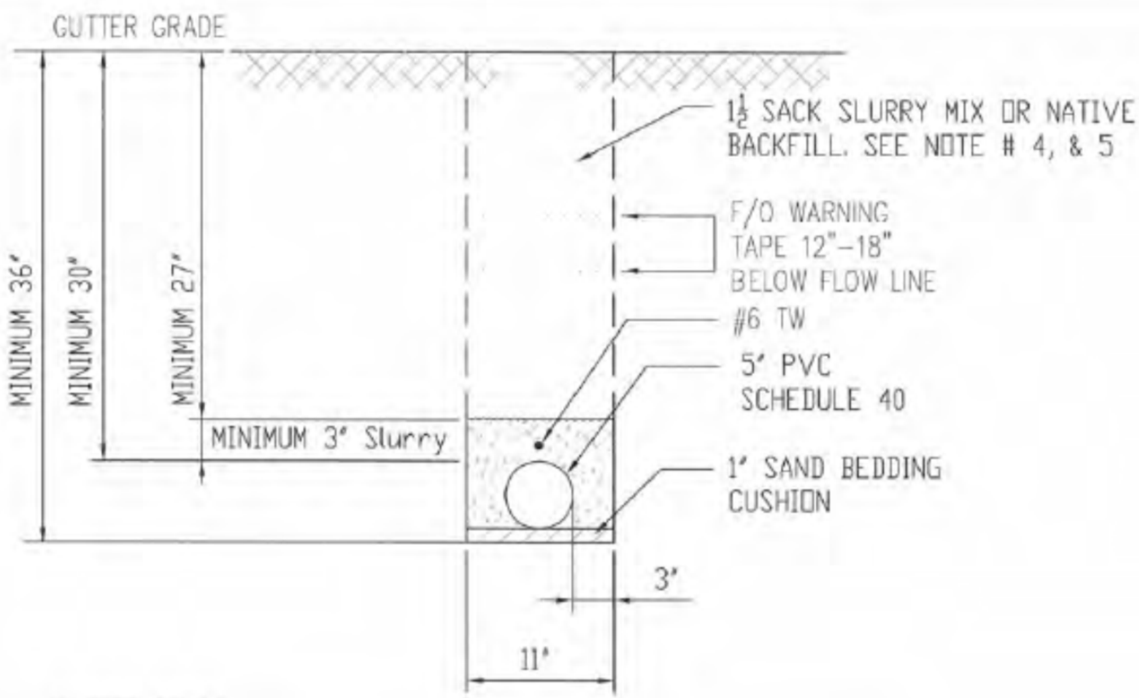

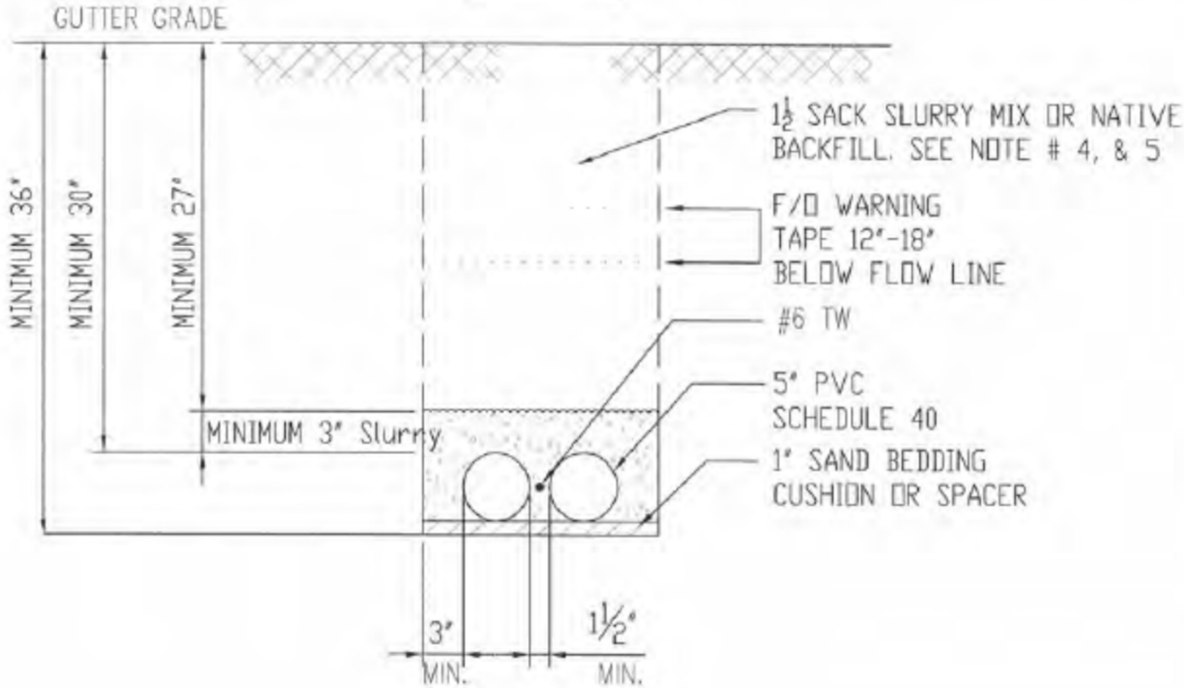

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N

IVANPAH-CONTROL PROJECT

SCE TELECOMMUNICATIONS CONDUIT INSTALL DETAILS

ARCADIS

FIGURE 3.7-3