2.0 PROJECT DESCRIPTION

2.1 NEED FOR PROJECT

ExxonMobil Production Company's (ExxonMobil's or Applicant's) proposed Santa Ynez Unit (SYU) Offshore Power System Reliability-B Phase 2 Project (OPSR-B or Project) is designed to enhance reliability of the power distribution systems to offshore facilities; these distribution systems include submarine power cables and associated electrical components on offshore platforms that are reaching the end of their useful lives and require replacement on a planned basis instead of on an emergency basis. The Project includes the replacement of two of the three existing onshore Las Flores Canyon Processing Facility (LFCPF)-to-platform power cables, retrieval of cables in State waters with the option to recover one cable in Federal waters, replacement of aging high voltage switchgear and electrical components on the platforms, and installation of new electrical equipment for the replacement power cables (Figure 1-3). The replacement and new high voltage switchgear will use current technology Gas Insulated Switchgear (GIS) equipment. These modifications would allow for continued development and production of oil and gas resources from the SYU leases.

2.2 PROJECT LOCATION

The Project involves the retrieval of existing Cables A (or B) and C1 from selected locations and installation of replacement Cables A2 (or B2), F2 and G2 (Table 1-1). The Project will use a primary cable installation vessel (CIV), which will be dynamically positioned and will not require the use of anchors. Several contingency scenarios have been included in case one of the existing out-of-service cables cannot be removed from, or a replacement cable cannot be installed into, a conduit or platform riser (i.e., Cable F2 at nearshore conduit, Cable G2 at Platform Heritage riser, Cable A2 (or B2) at nearshore conduit and at Platform Harmony riser). Alternative routes are also provided for the installation of Cable F2 and G2 in the Outer Continental Shelf (OCS). The decision on whether existing Cable A or B will be replaced will be based on a detailed analysis of the condition of each cable prior to installation. Additional Project execution details can be found in the Applicant's Execution Plan (Appendix A).

Phase 2 would require the following primary components:

- Pre-Project preparation activities: Pre-retrieval/removal surveys (Section 2.1.1); Installation aids and kelp cutting (Section 2.2.2).
- Vessel mobilization (Section 2.2.3).
- Retrieval of out-of-service cables (Section 2.2.4).
    - Prepare onshore area, tunnel, and nearshore conduits to retrieve Cables C1 and A (or B) from an onshore point at the southern end of the LFCPF

to just beyond the State-Federal jurisdictional boundary (approximately at the Outer Continental Shelf (OCS) break).
    - Retrieve approximately 10.6 miles (17.1 kilometers [km]) of Cable C1 and A (or B). This includes removal of existing concrete blocks where the Project right-of-way crosses the Pacific Offshore Pipeline Company (POPCO) gas pipeline (POPCO crossing).
    - Retrieve a 1 to 6 mile (1.6 to 9.6 km) long section of Cable A (or B) at and adjacent to Platform Harmony. Due to the restricted route available for installing the replacement cable, an additional section of Cable A (or B) may have to be retrieved from the State-Federal boundary to the platform.
    - Retrieve 1 to 2 miles (1.6 to 3.2 km) of Cable C1 at and adjacent to Platform Heritage.

- Cable replacement (Section 2.2.5).
    - Install approximately 10.6 miles (17.1 km) of replacement Cable A2 (or B2) between Platform Harmony and the southern end of the LFCPF (includes placement of concrete blocks or articulated mats at the POPCO crossing).
    - Install approximately 11.3 miles (18.2 km) of replacement Cable F2 between Platform Harmony and the southern end of the LFCPF (includes placement of concrete blocks or articulated mats at the POPCO crossing).
    - Install approximately 8.1 miles (13.0 km) of replacement Cable G2 between Platform Harmony and Platform Heritage.
- Cable execution contingencies (if necessary) (Section 2.2.6).
- Testing and energization of the cables (Section 2.2.7).
- Post-installation marine biological survey (Section 2.2.8).

2.2.1 Pre-Retrieval/Removal Surveys

Prior to the initiation of offshore cable retrieval and installation, four surveys will be completed: (1) a pre-installation soil sampling survey of the soil at the nearshore conduit terminus and at the POPCO crossing; (2) a pre-installation marine biological survey, similar to the one executed in 2011, which will be conducted with divers to define initial environmental conditions a few months before the start of the Phase 2 submarine cable retrieval/installation operations; (3) an expanded review of the areas around the proposed anchor locations where eelgrass was previously found, to determine if there are nearby locations to relocate anchors to areas of lower density eelgrass; and (4) A focused marine biological diver survey within 30 days of start of offshore activities to check for presence of abalone in area of conduit terminus. As currently planned, diver-biologists will survey all proposed nearshore (to a depth of approximately 60 feet) anchor locations and the nearshore cable routes within the area that has historically supported eelgrass, and around the conduits. Deeper water anchor locations (to

approximately 120 feet) will be surveyed by a drop-camera or Remotely Operated Vehicle (ROV).

2.2.2 Pre-Project Preparation Activities

Pre-project preparation activities will include the installation of installation aids onshore (LFCPF and tunnel) and on the platforms, CIV vessel mobilization, and nearshore kelp cutting as further discussed below.

Prior to the start of offshore construction, installation aids would be installed on the platforms and onshore to support the cable retrieval and installation activities. The majority of installation aids will be temporary and removed after the Project. Specific information on the aids or their locations will be part of the final Project design and has not been developed at this time; however, the aids will be similar to those used for the OPSR-A Project. Installation aids can include, but are not limited to, the following:

- Padeyes, rollers, sheaves, pull wire turning devices, shackles, wire rope, chains;
- Structural reinforcing to support installation loads;
- Structural anchor points to secure pulling winches and tuggers;
- Structural systems for handling of material and equipment to the work site;
- Structural systems for tie-down of installation equipment;
- Temporary scaffolding systems for access to work areas during construction;
- Pipe rollers, guides, and other miscellaneous aids to be used during construction;
- Temporary construction power system with small lighting transformer, lighting panel, power cables and receptacles to support temporary lighting, cable splicing equipment and cable testing equipment;
- Pulling heads, pulling grips, swivels, shackles, wire rope, poly rope, and tape;
- Structural steel frames, pull wire containment devices, metal loops, and pipe sleeves to direct puling and rigging cables;
- Cable rollers, roller supports, and cable lifting tools;
- Modification of tunnel cable trays;
- Saws, impact wrenches, core drills, hand tools, rags, and buckets;
- Pigging devices for gauging and cleaning, video pigs, shackles, and wire rope;
- Shoring equipment, lumber, and small metallic shapes;
- Tarps, plastic sheeting, tie-wraps, and banding;
- Solvents such as alcohol and mineral spirits for cable splicing; and

- Safety equipment of various types.

A commercial kelp cutting vessel may be required to cut off the tops of the kelp in the nearshore area near the conduit terminus in order to prevent damage to vessel propellers from entanglement in kelp during cable retrieval and installation activities. The vessel will mobilize and demobilize from a local port.

2.2.3 CIV Vessel Mobilization

The CIV (Figure 2-1) will be mobilized to Port Hueneme towed by a sea-going tug from Europe. The vessel will contain the fabricated cables from the manufacturing site. The CIV will be prepared at the Port Hueneme site for retrieval and installation of replacement power cables prior to final mobilization to the offshore Project site and commencement of construction activities.

2.2.4 Retrieval of Out-of-Service Cables

The cable retrieval phase of the OPSR-B Project includes the retrieval of the out-of-service submarine Cables A (or B) and C1 from the LFCPF, the tunnel under the highway and railroad, the buried conduits connecting the tunnel to offshore, as well as within State waters using a dynamically positioned CIV offshore and a support winch onshore. In addition, the Cable A (or B) and C1 segments adjacent to the platforms and in the platform J-Tubes will also be retrieved to facilitate reuse of existing platform risers and routes using a CIV offshore and a support winch on the platforms. The Cable A (or B) segment from the State/Federal boundary to Platform Harmony may also be retrieved to allow adequate room to install the replacement cable; if retrieved in Federal waters, it will be handled in the same manner as the retrieval of the cables in State waters. In this situation, Cable A (or B) will be retrieved to the base of the platform and from the platform J-Tube during the retrieval operations. With this approach, there will be no excavation or cutting of the cable at the State/Federal boundary or adjacent to the platform and, therefore, no concrete mats will be installed.

At this time, ExxonMobil anticipates that 12 to 18 miles of out-of-service cable will be retrieved from the LFCPF, tunnel and conduits, ocean bottom and platform risers. The retrieved cables will be cut on the ocean bottom, where required, pulled onto the CIV, scrapped and washed to remove excess sediment and marine growth, and stored on the vessel. Remaining sections of out-of-service cables will either be already on the ocean bottom or cut on the vessel deck and laid on the ocean bottom within their original corridor. Concrete mats (approximately 8 feet by 20 feet by 6 inches) will be placed on the cut ends of the remaining cables to hold them in place. When the CIV returns to port, the out-of-service cables will be removed from the vessel, cut into manageable sections, placed in trucks and transported to a local recycle facility where the cable will be recycled to the extent feasible.

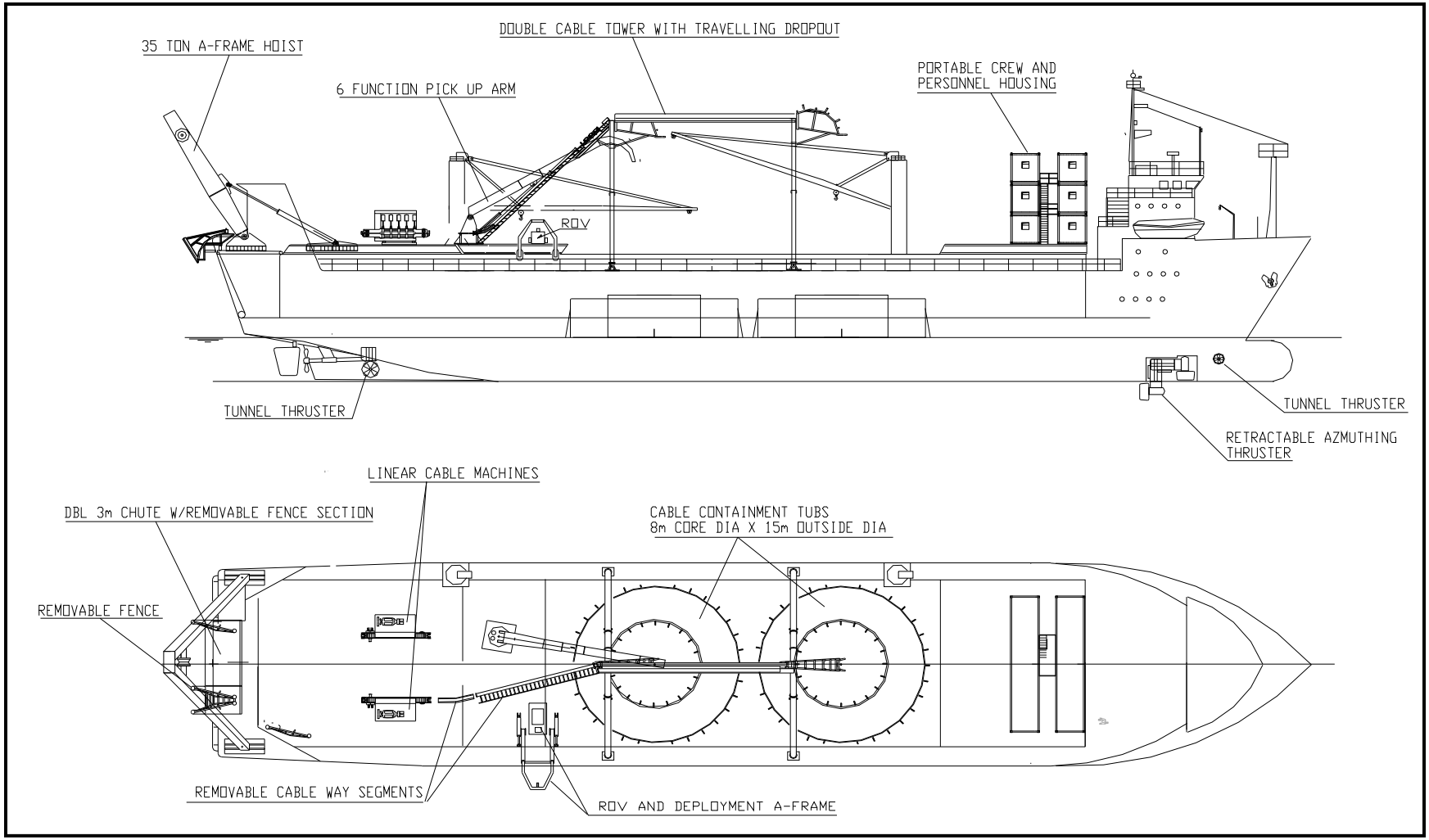


Figure 2-1. Typical Cable Installation Vessel (CIV)

2.2.4.1 LFCPF (Onshore Retrieval)

At the LFCPF, retrieval of each out-of-service submarine power cable (A [or B] and C1) will involve excavating and trenching to uncover the cables from the north side of the tunnel to past the splice locations in the fill area at the southern end of the LFCPF; access to existing manholes at both the LFCPF and El Capitan State Beach (SB) ends of the tunnel will be required (Figures 2-2 through 2-4). A winch will be installed north of the excavated area to facilitate removal of the out-of-service cables and install the replacement cables. The winch hold-down assembly will be excavated and buried prior to cable-handling activities and removed during demobilization.

The submarine power cables within the tunnel will be de-energized during retrieval and installation activities. The cable will be cut as required to facilitate removal of several sections. Portions of the excavated cable and the splice section will be cut out and removed to allow for the splicing of the replacement offshore submarine cable to the existing land-based cable. A pull line will be attached from the winch in the LFCPF to a pulling head on the cut end of the cable at the LFCPF to help control the removal operations and allow it to be reversed in case it gets stuck during recovery offshore to the CIV. The winch in the LFCPF will pay out a pull line that will be left in the tunnel and conduit during the cable removal operations to facilitate the remaining installation operations. The exact sequence of operations will be determined in detailed design.

Submarine cable segments land-side of the tunnel north bulkhead will either be cut into manageable sections, placed in trucks and transported to a local recycle facility or left intact and removed with the tunnel cable by the CIV.

Tunnel. Equipment will be brought into the tunnel and will be installed to facilitate cable removal, conduit cleaning, conduit gauging, conduit flushing and video of operations. Safety, ventilation, and other equipment will be required to support the crews doing the work. Any fresh water that has collected in the south end of tunnel from natural seepage will be removed using the accepted approach (pump water to the ditch adjacent to the LFCPF north tunnel entrance). Submarine cables in the tunnel will be placed on rollers and aids to facilitate removal. The cable tray and/or concrete bulkhead could require modification for cable removal and/or installation. For Cable A, the existing splice in the tunnel (from original installation) will be first cut out and removed. The location of the splice in the tunnel could require a larger segment of Cable A to be removed to the LFCPF side of the tunnel. The exact sequence of operations will be determined in the final detailed design plans.

2.2.4.2 Offshore Retrieval

Conduits. A mooring vessel will install dive support vessel anchors adjacent to the conduit terminus in pre-surveyed locations prior to initial activities (Figure 2-5).

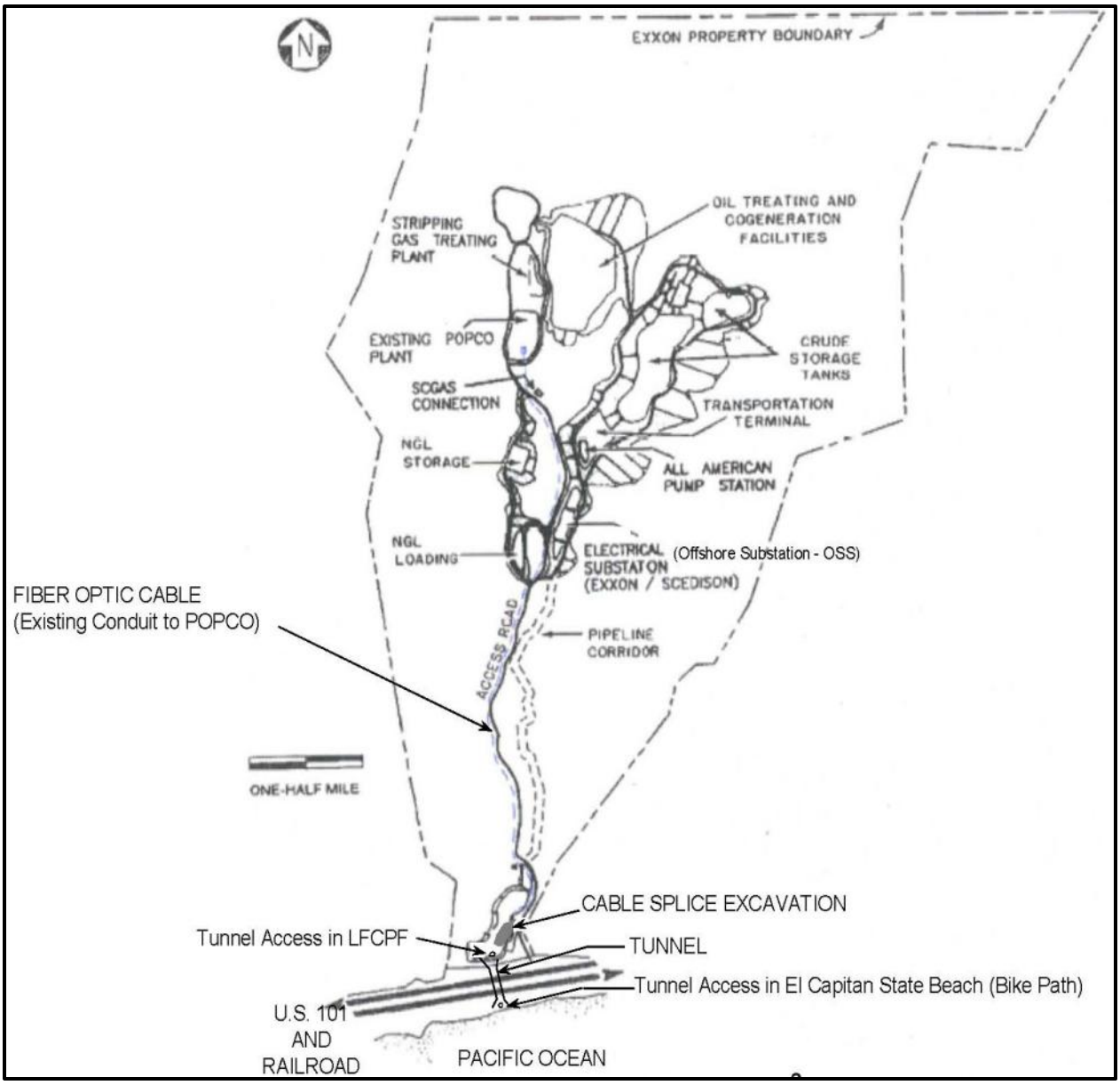


Figure 2-2. SYU LFCPF Onshore Facilities Overview

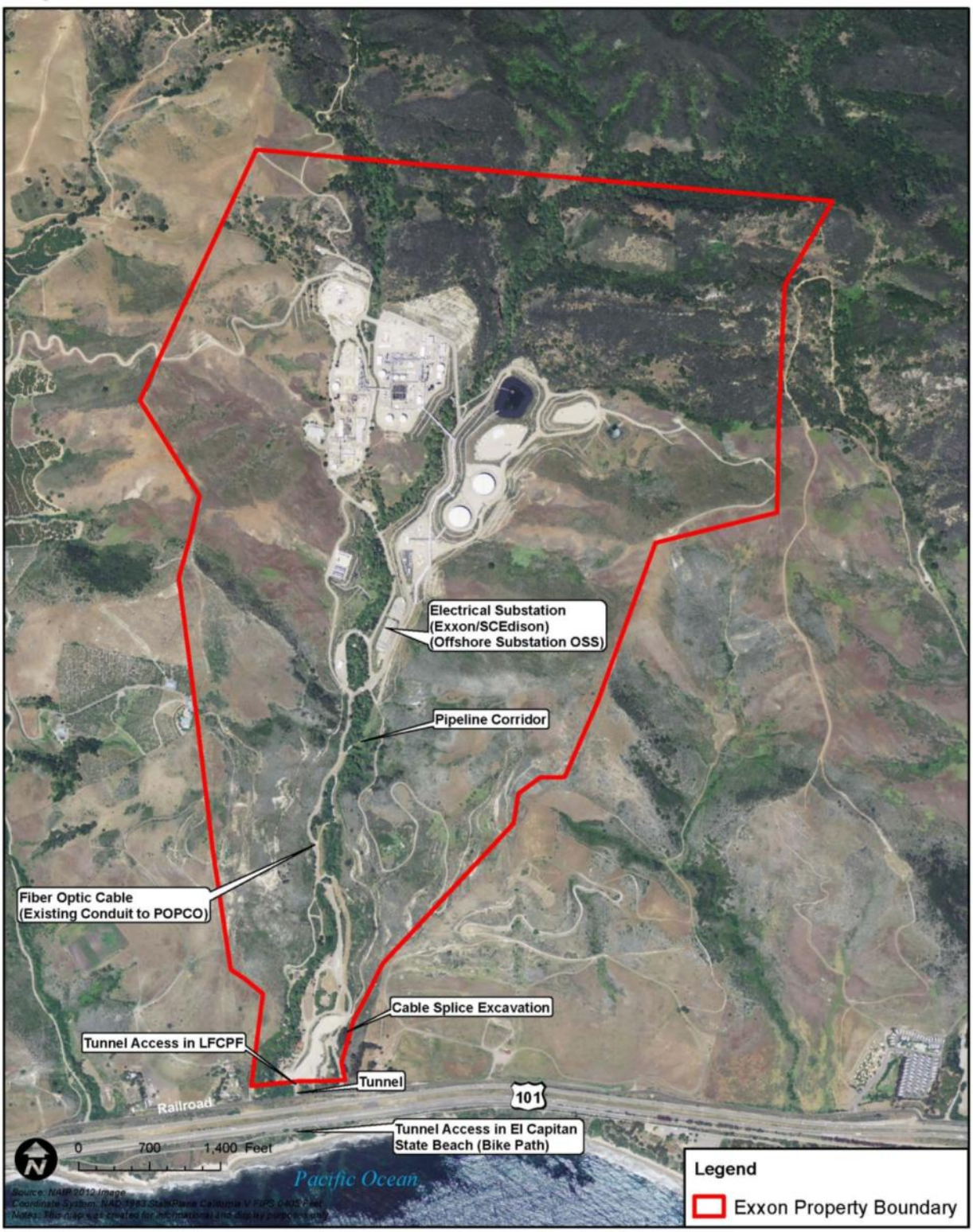
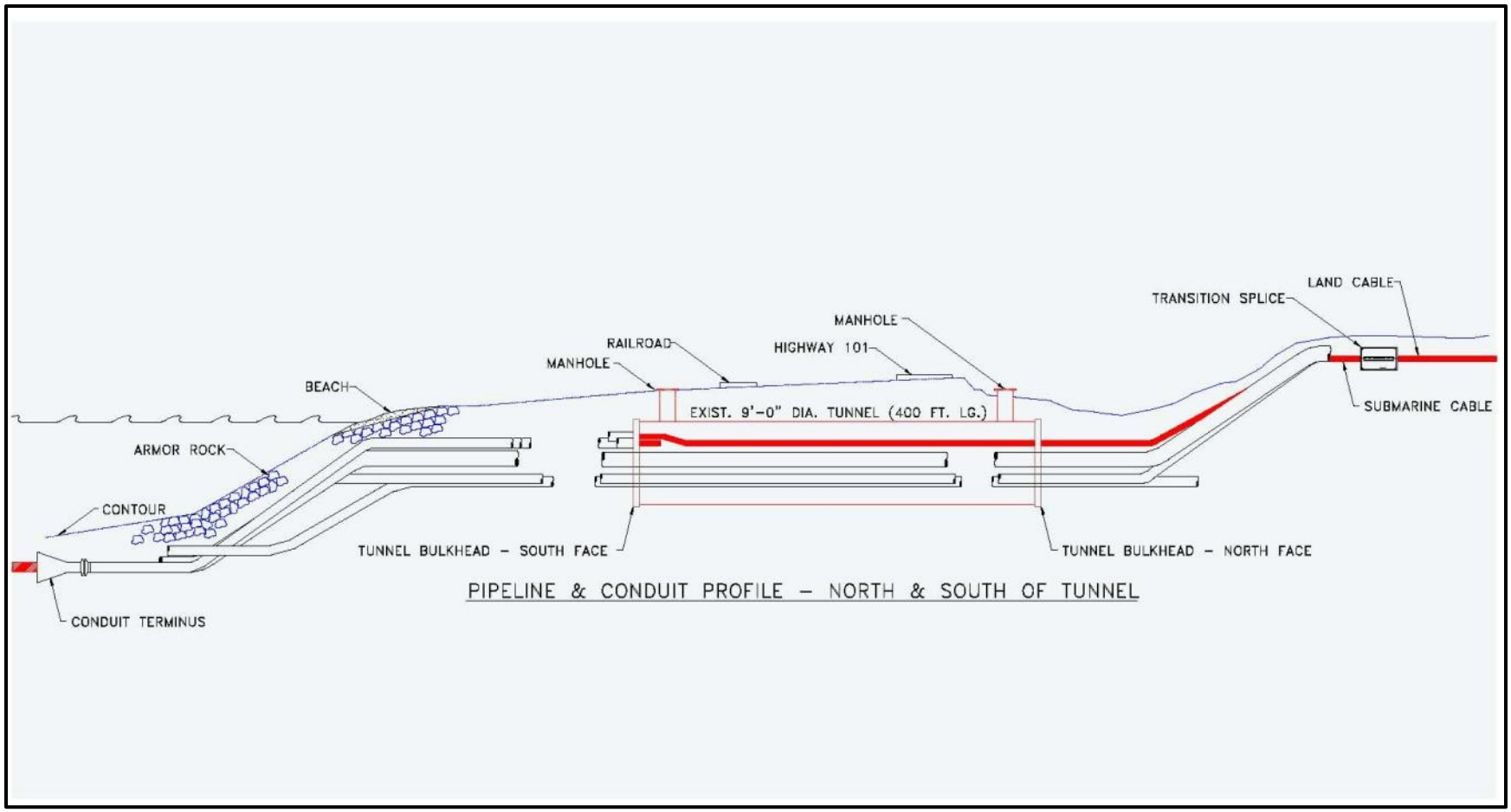
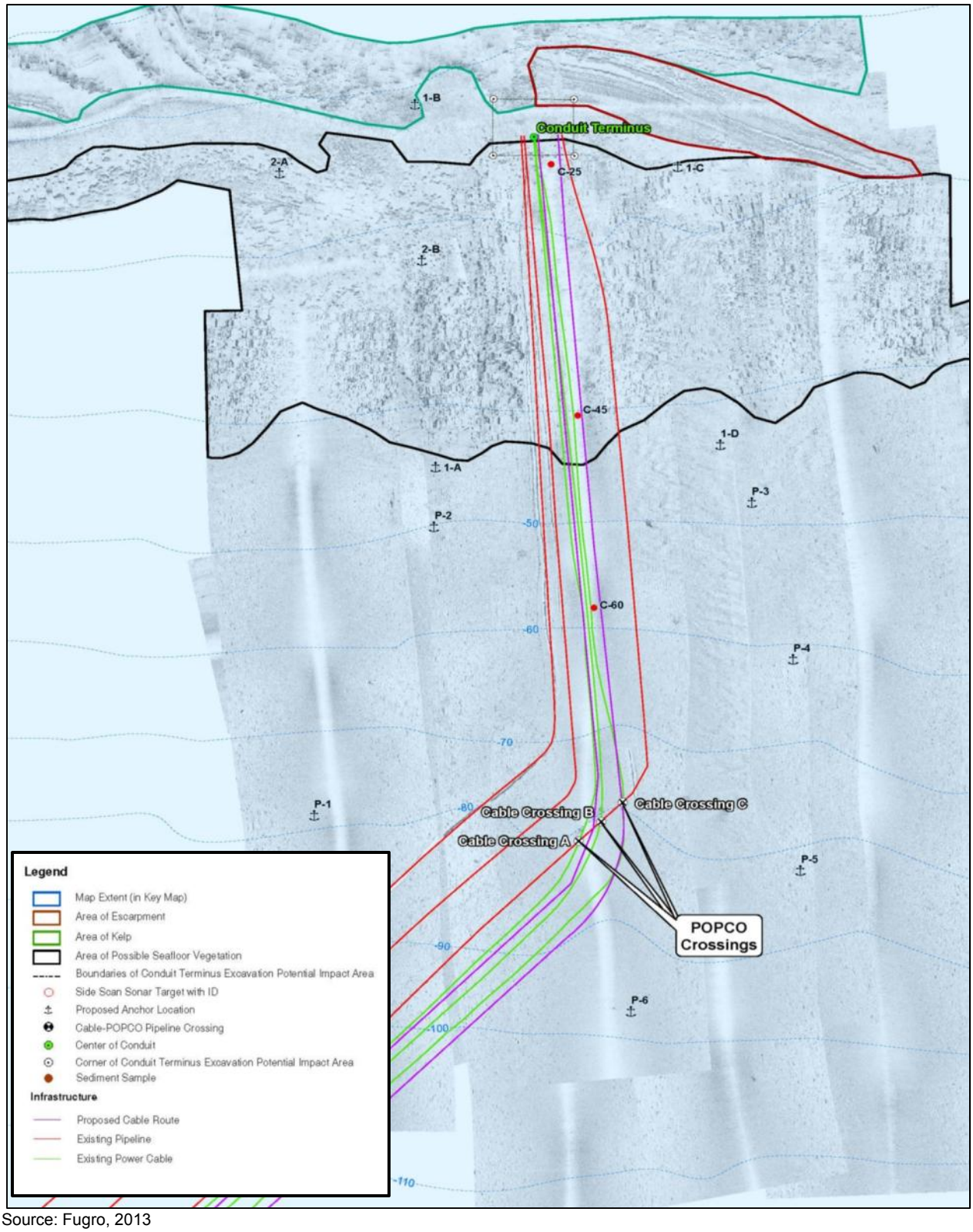


Figure 2-3. SYU LFCPF Onshore Facilities Overview (Aerial View)



Source: ExxonMobil, 2013

Figure 2-4. Diagram of Elevation of Tunnel and Conduit Area



Source: Fugro, 2013

Figure 2-5. Anchor Locations for Support Vessels

Instead of removing and re-installing the anchors for each cable movement, the Project anticipates being able to leave the anchors with surface buoys (navigation aids attached) in place for the nearshore activities.

At the nearshore terminus of the cable conduits, divers will clear any sediment cover. The conduit opening and an area around the opening will be exposed by divers using hand-held water jets and eductors to sidecast the marine sediment into an existing sand channel adjacent to the POPCO gas pipeline. In addition, if the cables are to be cut at the conduit terminus, approximately 40 to 50 feet of cable south of the conduits will be exposed by divers. The sediment removal activities could be conducted on both Cables C1 and A (or B) at the same time or individually. In addition, divers are anticipated to be required to support conduit cleaning activities including use of scraping pigs, gauging pigs, video cameras, fresh water flushing equipment, and other inspection devices and equipment. These activities are being planned due to the age of the existing conduits. Depending on the selected installation procedure (to be submitted to the CSLC staff for approval approximately 90 days prior to construction), the conduit terminus sediment removal activities could be conducted either several weeks before the start of cable retrieval activities or immediately prior to each cable retrieval. If the activities occur immediately prior to each cable retrieval two support vessels may be required onsite at the same time (conduit terminus and POPCO crossing).

In order to retrieve the ocean side of the out-of-service cable, two options are being considered in detailed design: cut cable approximately 40 to 50 feet south of the conduit terminus or adjacent to the POPCO crossing. For the option of cutting the cable south of the conduit terminus, divers will attach cable grips to both sides of the proposed cable cut position with a pull line to surface or subsurface buoys. Divers or an ROV will attach the cutting device on the cable at the designated location. The de-energized submarine cable will be cut either by divers or remotely from the support vessel. After cutting the cable, the CIV will pick up the buoy connected to the designated cable grip assembly. Based on detailed design procedures, equipment on the CIV will either first remove the cable from the LFCPF, the tunnel, and the conduit with support from the LFCPF winch and then return to the area to retrieve the cable from the nearshore to the State/Federal boundary or vice versa. During cable removal from the conduit, a pull line will remain at the end of cable removal and cleaning operations to facilitate installation of the replacement cables. The recovered cable will be scrapped and washed to remove excess sediment and marine growth and stored onboard the vessel for future recycling.

After the cable is removed from the tunnel and each conduit, the cable path through the tunnel and conduit will be prepared for installation of the replacement cables. The conduits may have been gauged during cable removal by a proofing pig. Further cleaning of the conduit could require fresh water flushes and possibly pulling other types of pigs through the conduit to remove any sand or other debris that could inhibit the cable installation. Other types of pigs or cleaning devices could be pulled through the

conduit to verify diameter and a video camera could be pulled through to inspect the conduit. These maintenance operations may need to be performed on the conduit to facilitate its reuse. These operations are required to verify that each conduit is ready for the new installation.

Once the path is cleared, the pull line will be secured through the tunnel, the conduit, and to the conduit terminus offshore. The conduit end will be temporarily plugged to prevent any material from entering the opening. The plug will facilitate pull wire rope retrieval when installation operations commence.

POPCO Crossing Area. At the POPCO crossing, a mooring vessel will install support vessel anchors in pre-surveyed locations (Figure 2-5) prior to initial activities and remove them after completion of activities. Prior to removing the out-of-service cable at the POPCO crossing, divers will expose the concrete blocks that were placed over the installed cables as well as approximately 10 feet of the cables to be retrieved on either side of the mats using hand-held water jets and eductors to sidecast the marine sediment downslope and away from sensitive habitat. If the cables are to be cut at the POPCO crossing, an additional 40 to 50 feet of cable will be exposed by divers on the side to be cut. The sediment removal activities could be conducted on both Cables C1 and A at the same time or individually. Depending on the results of detailed design procedures, the POPCO crossing sediment removal activities could be conducted either several weeks before the start of cable retrieval activities or immediately prior to each cable retrieval. If the activities occur immediately prior to each cable retrieval, then two support vessels may be required onsite at the same time (conduit terminus and POPCO crossing).

At the POPCO crossing, two alternative approaches are being considered for removing approximately 2 layers of concrete mats containing 32 to 64 concrete blocks (18 inches by 18 inches by 6 inches in size) over the out-of-service cables. In the first approach, divers would remove the concrete blocks in the mats above the cables to be retrieved (A [or B]) and C1). The blocks would be moved to a temporary storage location (approximately 15 to 20 feet away from the centerline of the current cable position as it crosses the POPCO pipelines) until the replacement cables are installed. For Cable C1 the blocks are expected to be moved to the east side away from the other cables and for Cable A (or B) the blocks are expected to be moved to the west side away from the other cables. In the second approach, divers would remove the concrete blocks above the cables to be retrieved as in the first approach, but would place the blocks in a basket or sling which would be hoisted up to the dive vessel for disposal onshore. In order to retrieve the ocean side of the out-of-service cable, two options are being considered in detailed design: cut cable approximately 40 to 50 feet south of the conduit terminus or adjacent to the POPCO crossing. For the option of cutting the cable adjacent to the POPCO crossing, divers will attach cable grips to both sides of the proposed cable cut position with a pull line to surface or subsurface buoys. Divers or an

ROV will attach the cutting device on the cable at the designated location. The de-energized submarine cable will be cut either by divers or remotely from the dive vessel. After cutting the cable, the CIV will pick up the buoy connected to the cable grip assembly. Based on detailed design procedures, equipment on the CIV will then either first remove the cable from the LFCPF, the tunnel, the conduit and the nearshore area with support from the LFCPF winch and then return to the area to retrieve the cable from the nearshore to the State/Federal Boundary or vice versa.

After removal of the out-of-service cables, divers or an ROV will inspect the area and prepare it for the installation of the replacement cables, as required.

Areas Under State Jurisdiction. As required by the CSLC, all out-of-service cables must be removed from areas under State jurisdiction. In order to retrieve the offshore side of the out-of-service cable, the CIV will pick up the buoy connected to the cable grip assembly on the cut end of the cable. Equipment on the vessel will then retrieve the cable from the nearshore location to just beyond the State/Federal boundary. The recovered cable will be scraped and washed to remove excess sediment and marine growth and stored onboard the vessel for future recycling. Just south of the State/Federal boundary, the cable will be cut and capped, if required, and then placed on the ocean bottom. The ROV will document the location of the cable on the ocean bottom. Before completing offshore operations, the CIV with support from the ROV will install a concrete mat over the cut end of the out-of-service cable on the ocean bottom to hold it in place.

Platform Risers. At Platforms Harmony and Heritage, each of the out-of-service submarine power cables (A [or B] at Platform Harmony and C1 at Platform Heritage) will be removed from its J-Tube and adjacent to the platform. Adjacent to Platform Heritage, the Cable C1 will be retrieved to a point southeast of the two repair locations and may require the removal of one or more concrete mat(s) that were installed to hold the repair sections in place. On each platform a winch will be installed to help control the pull and allow for the cable to be reversed in case it gets stuck. Winch, cable rollers, quadrant blocks and other cable removal equipment will be preinstalled on the platform. Installation of this equipment will require temporary welding to structural members for attachment points. The temporary removal of some decking may be required to allow equipment to be positioned.

The ROV from the CIV will locate the cable on the sea floor at a specified distance from the platform and document the location. The ROV will use a water jet or other similar device to uncover the cable at the cut point to allow access for the cutting tool. The ROV will confirm the correct cable by visual and tone identification, if possible. The ROV will activate the cutting tool to cut the cable. After the ROV cuts the cable on the sea floor, it will attach a recovery assembly to the J-tube side of the cable. The recovery assembly will be connected by a pull line to equipment on the CIV. In addition, the cable

on the platform side will be cut and a pulling assembly will be attached to the platform cut end. The platform pulling assembly will be attached by a pull line to the platform winch. In the case of the Cable C1, the CIV with support from the ROV will remove any concrete mats at the repair locations. The CIV will pull the cable out of the J-tube and onto the deck where it will be scraped and washed to remove excess marine growth and sediment and stored on the CIV turntable. The winch on the platform will pay out a line that will be left in the J-tube and external to the J-tube to facilitate the remaining installation operations. Before completing offshore operations, the CIV with support from the ROV will install a concrete mat over the cut end of the out-of-service cable on the ocean bottom to hold it in place.

After the cable is completely removed from the J-tube or during removal, the path through the J-tube will be prepared for installation of the replacement cable. The pull line will be used to pull scraping pigs, gauging pigs, and possibly video cameras and other types of pigs through the J-tube to verify size and remove any sand or other debris that could inhibit the cable installation. Any repairs or modification will be made as required. These operations are required to verify that the J-tube is ready for the new installation. Once the path is cleared, a pull line will be installed through the J-tube and connected to the platform. The pull line will be positioned and secured, possibly with an underwater buoy, to facilitate retrieval when pulling operations commence.

2.2.5 Cable Replacement

As shown in Figure 1-3, Cables A2 (or B2), F2, and G2 are the installed replacement cables. Note that Cables F2 and G2 have alternative routes; either outside of Cable C1 (as shown) or between Cable C and C1. Cables B (or A), D, D1 and E are existing cables, and will remain in operation. The dashed cables will be decommissioned in place. The existing Cable C1 would be replaced with two new cables: Cable F2 would be routed from Platform Harmony to the LFCPF and Cable G2 would be routed from Platform Harmony to Platform Heritage.

In State waters, Cable F2 would be located within the existing State Tidelands Lease. In the OCS, both Cable F2 and G2 would be located along the previously-surveyed and cleared routes. Existing Cable A (or B) would be replaced with the Cable A2 (or B2) from Platform Harmony to LFCPF. In State waters, Cable A2 (or B2) would be located within the existing State Tidelands Lease. In the OCS, the cables would be aligned along existing routes within previously-surveyed and cleared routes. The decision on which of the two cables will be replaced will be made following the completion of a detailed analysis of the condition of each cable prior to installation. For the proposed Project, Cable A is assumed to be replaced.

As part of the installation and integration of the replacement power cables into the SYU LFCPF facilities, there will be a sequence of planned platform electrical and production

shutdowns; the sequence would be based on preliminary design and engineering, and could change based on further study or by subsequent failure of existing cables (refer to Appendix A, Project Execution Plan, for additional details).

2.2.5.1 Power Cable Specifications

The electrical design associated with the Project will be approved by registered professional engineers as specifically required by 30 Code of Federal Regulations (CFR) 250. The submarine power cables would be fabricated in accordance with applicable ExxonMobil construction specifications and applicable industry standards as refined and applied by the cable manufacturer to meet ExxonMobil specifications (Table 2-1). Figure 2-6 provides a depiction of the previously installed power cable that is similar to that proposed for the replacement Project.

Table 2-1. Power Cable Specifications

Static Cable Design, Fabrication and Testing Standards*	• **ICEA S-97-682-2007:** Standard for Utility Shielded Power Cables Rated 5 through 46 kV; • **ICEA S-93-639-2006:** Standard for 5 to 46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy; • **AEIC CS8-07:** Specification for Extruded Dielectric Shielded Power Cables Rated 5 through 46 kV; • **ASTM B 3:** Standard Specification for Soft or Annealed Copper Wire; • **ASTM B 496:** Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors; • **IEC 60287:** Standard for Calculations of the Current Rating of Electric Cables; • **IEC 60949:** Calculation of thermally permissible short-circuit currents, taking into consideration non-adiabatic heating effects; • **ELECTRA 171:** Recommendations for Mechanical Tests on Submarine Cables; • **CIGRE TB4 490:** Recommendations for Testing of Long AC Submarine Cables with Extruded Insulation for System Voltage above 30 (36) to 500 (550) kV; • **ITU G 652:** Characteristics of a single-mode optical fiber cable.
Dynamic Cable Design and Fabrication Standards*	• **ICEA S-97-682-2007:** Standard for Utility Shielded Power Cables Rated 5 through 46 kV; • **ICEA S-93-639-2006:** Standard for 5 to 46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy; • **AEIC CS8-07:** Specification for Extruded Dielectric Shielded Power Cables Rated 5 through 46 kV; • **ASTM B 3:** Standard Specification for Soft or Annealed Copper Wire; • **ASTM B 496:** Standard Specification for Compact Round Concentric-Lay-Stranded Copper Conductors; • **IEC 60287:** Standard for Calculations of the Current Rating of Electric Cables; • **IEC 60949:** Calculation of thermally permissible short-circuit currents, taking into consideration non-adiabatic heating effects;

	• **ELECTRA 171:** Recommendations for Mechanical Tests on Submarine Cables; • **CIGRE TB1 490:** Recommendations for Testing of Long AC Submarine Cables with Extruded Insulation for System Voltage above 30 (36) to 500 (550) kV; • **ITU G 652:** Characteristics of a single-mode optical fiber cable; • **API SPEC 17E:** Specification for Subsea Umbilicals; • **BSI BS EN:** Steel Wire and Wire Products - Non-Ferrous Metallic Coatings on Steel Wire - Part 2: Zinc or Zinc Alloy Coatings; • **BSI BS EN 10257-2:** Zinc or Zinc Alloy Coated Non-Alloy Steel Wire for Armoring Either Power Cables or Telecommunication Cables - Part 2: Submarine Cables;
Dynamic Cable Testing and Installation Standards*	• **ASME SEC V:** BPVC Section V - Nondestructive Examination ; • **ASME SEC IX:** BPVC Section IX - Qualification Standard for Welding and Brazing Procedures, Welders, Brazers, and Welding and Brazing Operators; • **ASTM E739:** Standard Practice for Statistical Analysis of Linear or Linearized Stress-Life (S-N) and Strain-Life (ε-N) Fatigue Data; • **CEN EN 10204:** Metallic Products - Types of Inspection Documents; • **CIGRE ELT-068-2:** Recommendations for Mechanical tests on Submarine Cables, as published in Electra No. 68; • **ISO 9001:** Quality Management Systems - Requirements; • **ISO 1133:** Plastics - Determination of the Melt Mass-Flow Rate (MFR) and the Melt Volume-Flow Rate of Thermoplastics; • **ISO 13628-5:** Petroleum and Natural Gas Industries - Design and Operation of Subsea Production Systems - Part 5: Subsea Umbilicals.
* Standards include the applicable sections listed in this table as interpreted by ExxonMobil. Acronyms/Abbreviations used above include: AEIC - Association of Edison Illuminating Companies API - American Petroleum Institute ASME - American Society of Mechanical Engineers ASTM - American Society for Testing and Materials BSI - Broadband Specialists Inc. CEN - European Committee for Standardization CIGRE - Council on Large Electric Systems ICEA - Insulated Cable Engineers Association IEC - International Electrotechnical Commission ISO - International Organization for Standardization ITU - International Telecommunication Union	

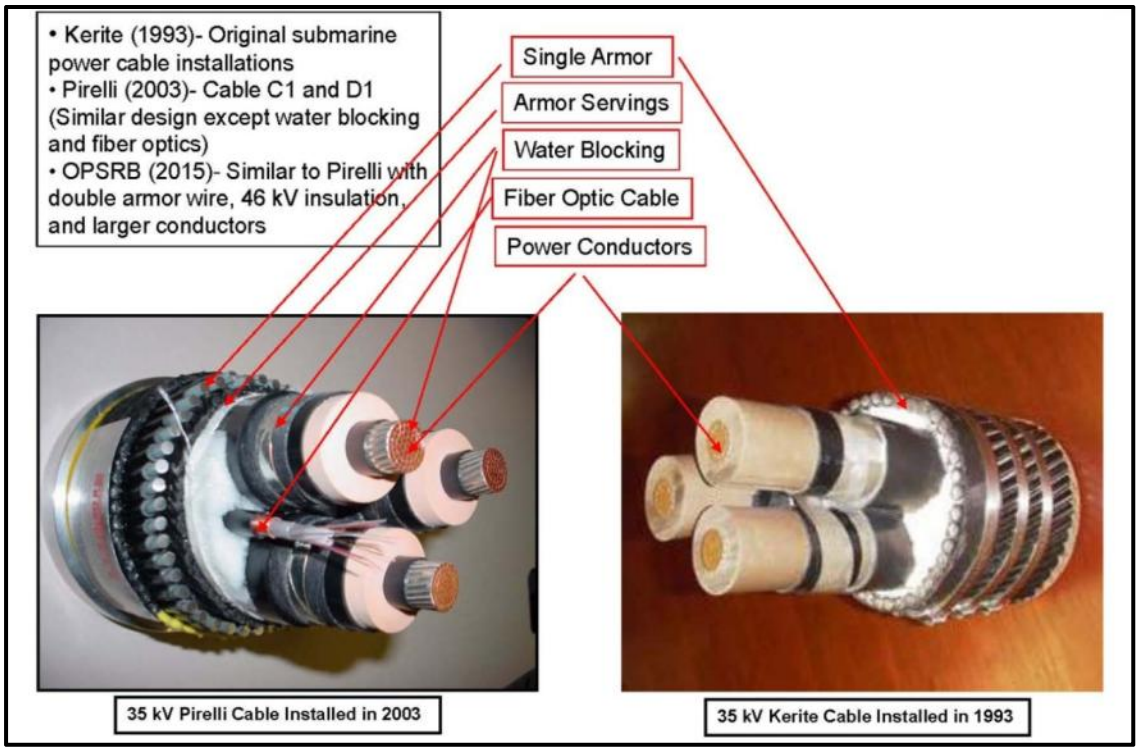


Figure 2-6. Power Cable Components

The submarine cables are being designed for 32 megawatt (MW) at 35 kilovolt (kV). The power source will be the existing ExxonMobil onsite generation at the LFCPF and the existing utility interconnect with Southern California Edison (SCE). The current offshore power demand is typically 30 to 49 MW depending on production operations.

The cable jacket is semiconducting polyethylene. The operating design temperature is 90 degree Celsius (°C). The insulation type is Ethylene Propylene Rubber. The insulation level is 46 kV - 100 percent. The cable shields are tin plated copper for the static cable and tin plated braid for the dynamic cable.

2.2.5.2 LFCPF (Onshore) Replacement

At LFCPF, the installation of the two replacement submarine cables will involve using the temporary installation aids and winches installed for the cable retrieval. Previously installed rollers and aids placed in the tunnel will facilitate installation of the cables. The LFCPF winch will pull the cable into the conduit and through the conduit and tunnel to just beyond the splice location in LFCPF. The installed cable may be washed with fresh water either in the tunnel or on the LFCPF pad to remove contaminants. The replacement submarine cable will then be spliced to the existing land-based cable. Splicing will be done using a connecting canister about 8 feet long and 1 foot in diameter. The land cable enters one end and the submarine cable enters the other end, and the two ends are connected in the middle. After the connection has been completed

the canister is closed and sealed. The fiber optic cable (approximately 0.5-inch diameter) is separated from the submarine cable in the splice canister and routed to the side where it is spliced (through at separate canister that is approximately 1 to 2 feet long by 3 to 4 inches in diameter) to a new section of fiber optic cable that has been pulled from the upper LFCPF facilities. If Cable B is replaced instead of Cable A, the Cable A land-side splice between existing submarine cable and land cable will be proactively replaced.

At LFCPF (east side of the splice location), a small amount of trenching infill and native soil will be required to install a new conduit for the fiber optic cable from the replacement cable splice location to an existing pull box in the area for routing to the upper LFCPF facilities.

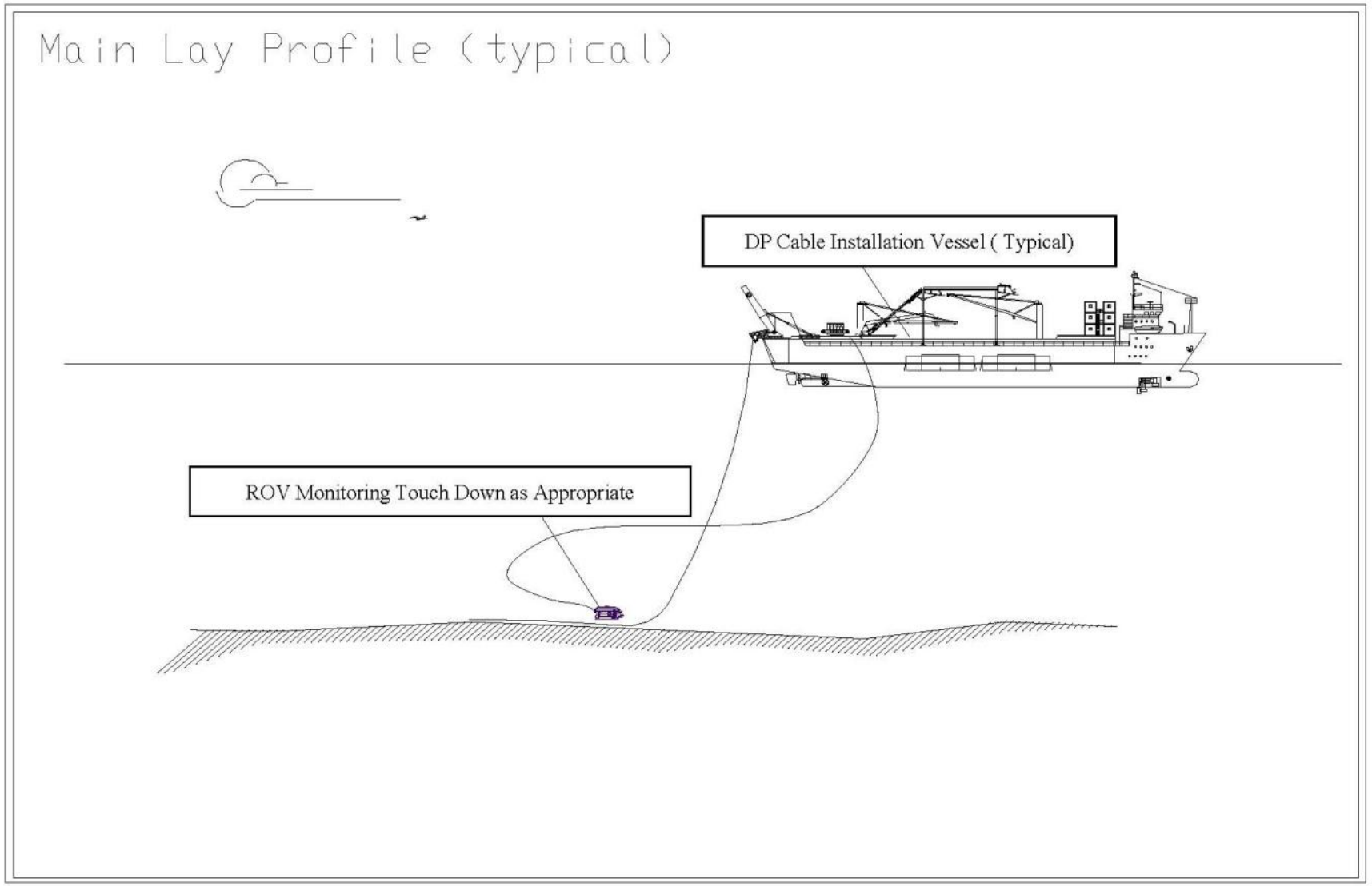
At this time ExxonMobil does not plan to replace any of the three land-based cables that connect the LFCPF Offshore Substation (OSS) with the splice connection point to submarine cables located in the lower portion of LFCPF.

2.2.5.3 Offshore Replacement

All of the cables will be installed with a dynamically positioned CIV. This vessel will not use anchors during normal installation activities. Anchoring may be required during emergency or safety situations with anchors placed within pre-surveyed locations adjacent to cable route away from pipelines, power cables, and sensitive habitat. An ROV from the vessel will be used during selected phases of the subsea installation to monitor the operations. On board determination of the touchdown point and the as-laid position using survey fixes will be periodically monitored by the ROV during installation (Figure 2-7).

Cables F2, G2, and A2 (or B2) at Platform Harmony. At Platform Harmony, three risers (two new Long I-Tubes installed during Phase 1 and one existing J-Tube) will be available for installation of Cables F2, G2, and A2 (or B2). During final construction planning, the decision will be made as to which riser to use for each submarine cable. The proposed installation plan is based on laying each replacement cable with no crossings of in-service or other replacement cables; however, a replacement cable may need to be laid across another in-service or other replacement cable near Platform Harmony due to the requirement to use an alternative riser. At Platform Heritage, the existing Cable C1 J-Tube will be reused for installation of Cable G2.

Cables A2 (or B2) and F2. For Cables A2 (or B2) and F2 at Platform Harmony, a gauging pig and/or other cleaning devices may be pulled through each riser to verify that there are no restrictions prior to pulling the replacement cable up the platform riser. On the platform, the selected device will be installed ahead of the platform winch wire.



Source: ExxonMobil, 2013

Figure 2-7. Cable Installation (Main Lay Profile - Typical)

The platform winch wire and device will be pulled through the platform riser to the CIV by the vessel winch and inspected. During these operations, the CIV will be positioned adjacent to the platform. After these operations have been completed, the replacement cable (F2 and A2 [or B2] in separate operations) will have a pulling head attached. The CIV ROV will assist in the transfer of the platform winch line in the platform riser to the CIV winch line where the platform winch line will be attached to the cable pull head. The platform winch will then pull the cable up the riser as it is being released by the CIV. The cable will be secured on the platform to a cable-hanging assembly. After inspection and testing, the submarine cable will then be spliced to the topsides power cables and fiber optic cables on the platform.

The CIV will then lay the replacement power cable on the ocean bottom from the platform to the nearshore area in the identified route. Cable F2, when installed in the Long I-Tube, will include an unsupported catenary from the top of the tube to the touchdown point. Additional cable protection system components such as bend stiffeners or Vortex-Induced Vibration (VIV) reducers (if required) could be installed at the bottom of the riser. Maintenance of the catenary shape could require the installation of bags containing sand or other types of material at the Cable F2 catenary touchdown or near Platform Harmony. Cables installed in the existing J-tube will be laid directly to the sea floor after exiting the bell mouths. A special protective duct technology product (URADUCT) will be applied to the replacement cable in the areas where an in-service, replacement, or out-of-service cable, is crossed to ensure the maintenance of an appropriate separation between the cable and provide impact and abrasion protection.

The route will include the crossing of the POPCO Gas Pipeline in approximately 75 feet of water depth. At the pipeline crossing, concrete blocks were installed below the power cables to separate the pipeline from the cables and above the installed cables to hold the cables in place. Prior to installation of the replacement cables, divers will have cleared the area and removed the concrete blocks from above the out-of-service cable. The replacement cables will be laid in the same general area as the retrieved out-of-service cable using the existing separation to the pipeline. As the replacement cables are being installed, divers or an ROV will verify that the cables are in the correct location.

After installation of the cables, one of two alternative approaches will be used to cover the installed cables with concrete blocks (or mats). In the first approach, divers would replace any out of position blocks and then move the blocks from the temporary storage location to above the installed cables. If any additional blocks are required to cover the openings, they would be of similar size and shape and obtained from the dive support vessel. In the second approach, the CIV would return to the area and use an ROV, potentially with diver support, to replace any out-of-position blocks or remove them in a sling to a vessel. The CIV supported by an ROV or divers would then place an

articulated concrete mat on top of the replacement cable openings. An ROV or divers will monitor the placement and verify the position of the mat.

As the vessel approaches the conduit terminus area, the length of replacement cable to traverse the distance to the LFCPF splice point will be measured. The cable will be cut, the end prepared, and floats attached to the cable as it is reeled overboard. Divers will be used to remove the conduit plug, excavate any material that may have refilled the area around the conduit terminus using the same procedures as before. The divers will also help guide the cable into the conduit opening and monitor the pulling activity. The cable length will be floated on the ocean surface. Divers will attach the previously installed winch wire from the winch at the LFCPF to the pull head at the cut end of the floating submarine cable. The winch will pull the replacement submarine cable from the CIV through the conduit and tunnel to the splice location where the splice between the land-based onshore and submarine cables will be performed. The cable is only expected to touch the sea bottom in the area immediately in front of the conduit (approximately 25 to 50 feet). Divers will remove the floats on the cable close to the conduit terminus and on the final straight section. Small motor craft will aid in the installation by maintaining the floating cable in the proper orientation and collecting the removed floats. After installation, divers or an ROV will determine the installed position of the cable in the nearshore area.

Cable G2. Cable G2 will be installed from Platform Harmony to Platform Heritage. For Cable G2 at Platform Harmony, a gauging pig and/or other cleaning devices may be pulled through the riser to verify that there are no restrictions prior to pulling the replacement cable up the platform riser. On the platform, the selected device will be installed ahead of the platform winch wire. The platform winch wire and device will be pulled through the platform riser to the CIV by the vessel winch and inspected. During these operations, the CIV will be positioned adjacent to the platform. After these operations have been completed, the replacement Cable G2 will have a pulling head attached. For the submarine cable installation, the submarine cable from the CIV will be pulled through one of the prepared risers onto the platform using platform-based temporary equipment. On the platform, the submarine cables will be secured, inspected, tested, and spliced to the platform-topside power cables. The CIV will lay the replacement submarine cable on the ocean bottom from Platform Harmony to Platform Heritage in the selected route.

Cable G2, when installed in the Long I-Tube at Platform Harmony, will include an unsupported catenary from the top of the tube to the touchdown. Additional cable protection system components such as bend stiffeners or VIV reducers (if required) could be installed at the bottom of the riser. Maintenance of the catenary shape could require the installation of bags containing sand or other types of material at the Cable G2 catenary touchdown point or near the Platform Heritage. A special protective duct technology product (URADUCT) will be applied to the replacement cable in the area of

the cable crossings to ensure the maintenance of an appropriate separation between the cable as well as provide impact and abrasion protection.

For Cable G2 at Platform Heritage, a gauging pig and/or other cleaning devices may be pulled through the existing J-tube to verify that there are no restrictions prior to pulling the replacement cable up the platform riser. On the platform, the selected device will be installed ahead of the platform winch wire. The platform winch wire and device will be pulled through the platform riser to the CIV by the vessel winch and inspected. During these operations, the CIV will be positioned adjacent to the platform. After completion of these operations, the replacement Cable G2 will have a pulling head attached.

As the vessel approaches within about 1,500 feet of Platform Heritage during the G2 replacement cable lay, the vessel will be required to unwind approximately 1,500 feet of cable to allow access to the end of the cable. Two options are being considered in the detailed design procedures for this operation.

In the preferred first option, the unwound cable would be held onboard via two sectors in an “S” bend configuration so that the cut position can be accessed without the need to lay out the cable on the ocean bottom. Once the cable end is identified, cut and capped with a pulling head, the pulling head would be attached to the J-Tube winch wire to prepare for pulling the cable into and up the platform J-Tube riser.

In the second option, the CIV would lay approximately 1,500 feet of cable on the ocean bottom adjacent to the proposed route within the surveyed area. Once the cable end is identified, cut and capped with a pulling head, the pulling head would be attached to the J-Tube winch wire and the vessel will pick up the cable from the ocean bottom as it is placed in a sector to prepare for pulling the cable into and up the platform J-Tube riser. In either option, as the cable is being pulled up the riser with platform-based temporary equipment, the sector will be lowered to the ocean bottom. The CIV ROV will help to remove the sector and allow the cable to lie down on the ocean bottom. The cable that is removed from the sector is anticipated to form a small omega shape on the sea floor due to the cable bight. On the platform, the submarine cables will be secured, inspected, tested, and spliced to the platform power cables.

The CIV support tug may be required to transport the CIV between ending points and starting points of each segment of the sequences within SYU, depending on current American Bureau of Shipping (ABS) regulations. When not required, the tug may stand by at the boat buoy near Platform Harmony (or Hondo) or leave the area.

2.2.6 Cable Execution Contingencies

Several Cable Execution Contingencies (CEC) and installation contingency scenarios have been included in the OPSR-B Project (reference OPSR-B Execution Plan -

Appendix A) to account for situations that could arise during the work activities. In addition, several alternative cable routes within the OCS have been included.

The Project team has identified several scenarios where one of the existing out-of-service power cables cannot be removed from, or a replacement cable cannot be installed in, a conduit or platform riser. These are described below as CEC # 1, CEC # 2, CEC # 3 and CEC # 4. The proposed contingency measure involves laying the cable that cannot be installed in the conduit or riser on the ocean floor parallel to the installed cable that is approaching the conduit or J-tube. The cables will remain on the ocean bottom until an appropriate installation approach can be developed, reviewed and approved by the agencies and implemented. From an installation approach, using one of these contingencies would not be expected to have a significant impact on the environmental analysis associated with the Project. The probability of one of these contingencies occurring is considered to be very low.

In the nearshore area under CEC # 1 and CEC # 3, if one or both of the out-of-service cables (C1 or A [or B]) cannot be removed from a conduit or a replacement cable cannot be installed in the conduit, the contingency measure would be implemented. For the situation where the out-of-service cable cannot be removed from the conduit, the out-of-service cable would be cut outside the conduit terminus and retrieved as planned in State waters to a point just inside Federal waters. The approach will involve installing the replacement cable from the platform to a location south of the POPCO crossing and then laying the cable in the required radius to execute a 180 degree turn. The cable would then be laid adjacent and parallel to the replacement cable along the installed route until the length required to reach the planned splice location is on the ocean bottom. The CIV, with support from the ROV, will install a concrete mat over the end of the cable on the ocean bottom to hold it in place. For the situation where one or both of the replacement cables cannot be installed in the conduit, the CIV would retrieve the cable back onto the vessel to a point south of the POPCO crossing and execute a similar procedure to lay the cable adjacent and parallel to the replacement cable along the installed route until the required length is on the ocean bottom. Since the replacement cables would be occupying State land outside the existing authorized lease area while a contingency plan is implemented to bypass or replace the failed conduits, the Lease will be amended to include a temporary use area should it be required.

In the OCS (near Platforms Heritage and Harmony) under CEC # 2 and CEC # 4, a similar approach would be taken if one or more of the out-of-service cables (C1 or A [or B]) cannot be removed from a platform riser or a replacement cable cannot be installed in the riser, the contingency measure would be implemented. For the situation where the out-of-service cable cannot be removed from the platform riser, the out-of-service cable would be cut outside the riser terminus at some distance from the platform and retrieved as planned. The approach will involve installing the replacement cable up to a point a suitable distance away from the platform and then laying the cable in the

required radius to execute a 180 degree turn away from the platform essentially adjacent and parallel to the replacement cable segment. The CIV would then proceed to lay the cable length required to reach the intended destination along the designated route. The CIV, with support from the ROV, will install a concrete mat over the end of the cable on the ocean bottom to hold it in place.

For the situation where one or both of the replacement cables cannot be installed in any of the platform risers, a similar approach would be followed.

2.2.6.1 Alternative Routes for Cables F2 and G2

The Project Team has identified alternative routes for the installation of Cables F2 and G2 in the OCS. The determination of which route is selected will depend on final evaluation of survey data and operational considerations. The selected route could be adjusted during detailed installation evaluations. All of the routes will be within the previously surveyed and cleared areas.

1. Installation of approximately 11.3 miles (18.2 km) of replacement power Cable F2 between Platform Harmony and the southern end of the LFCPF: The route through the CSLC right-of-way will remain the same. The primary route in Federal waters is the southern route where the cable would be laid outside and south of Cable C1. The alternative northern route would involve laying Cable F2 between Cables C1 and C in Federal waters.
2. Installation of approximately 8.1 miles (13.0 km) of replacement power Cable G2 between Platform Harmony and Platform Heritage: The primary route in the Federal waters is the southern route where the cable would be laid outside and south of Cable C1. The alternative northern route would involve laying the Cable G2 between Cables C1 and C in Federal waters.

2.2.7 Testing and Energization

Following installation of the replacement cables and connection to the platform and land-based cables, several special tests would be executed to verify that the submarine power cables, splices, and fiber optic members are ready to be placed in operation in the SYU power system. Upon completion of the testing of the cables and all of the interconnecting equipment, energization would begin with some circuits being energized during the submarine cable installation process. Energization plans would be implemented to monitor and load balance the LFCPF and platform power distribution system components.

2.2.8 Post-Installation Marine Biological Survey

A post-installation marine biological survey, using the same methods as described in the pre-Project biological surveys (Section 2.1.2 of the Applicant's Execution Plan [Appendix A]), will be conducted soon after the completion of the Phase 2 submarine cable installation operations to define nearshore Project-related environmental impacts. As currently planned, diver-biologists will survey all proposed nearshore (to a depth of approximately 60 feet) locations and the nearshore cable routes. Deeper water locations (to approximately 120 feet) will be surveyed by a drop-camera or ROV.

2.3 EQUIPMENT/PERSONNEL REQUIREMENTS

2.3.1 Equipment Requirements

Table 2-2 summarizes the Phase 2 equipment requirements.

Table 2-2. Construction Equipment Anticipated for Phase 2 Activities

Equipment Type	Number	Duration of Use
Onshore LFCPF		
Backhoe	1-2	6-9 mo (part time)
Excavator	1-2	6-9 mo (part time)
Skip Loader	1-2	6-9 mo (part time)
Dump Truck	1-2	6-9 mo (part time)
Water Truck	1-2	6-9 mo (part time)
Truck Crane	1-2	6-9 mo (part time)
Bobcat	2-3	6-9 mo (part time)
Soil Compactors	2-3	2-3 mo (part time)
Concrete Slurry Truck	2-3	1-2 mo (part time)
Weld Machines	1-2	2-3 mo (part time)
Air Hammers	2-3	2-3 mo (part time)
Ride on Sheepsfoot	1	2-3 mo (part time)
Hydro-Vac Truck	1	2-3 mo (part time)
Hydro Excavator	1	2-3 mo (part time)
Cable Pull Winch	1	2-3 mo (part time)
Generators	2-3	6-9 mo (part time)
Air Compressors	2-3	6-9 mo (part time)
Portable Lights	4-6	6-9 mo (part time)
Rigging and Installation Aids	NA	2-3 mo (part time)
Temporary Office Trailers	1-2	6-9 mo (part time)
Portable Restrooms	3-4	6-9 mo (part time)
Equipment Storage Units	3-4	6-9 mo (part time)
Tunnel De-Watering Equipment	1	2-3 mo (part time)
Conduit Cleaning Equipment	1	2-3 mo (part time)
Cable Cleaning Equipment	1	2-3 mo (part time)
Temporary Electrical Service	NA	6-9 mo (part time)
Video Equipment	NA	2-3 mo (part time)
Splicing Equipment	NA	2-3 mo (part time)
Test Equipment	NA	2-3 mo (part time)
Safety Equipment	NA	6-9 mo (part time)
Misc. Construction Equipment	NA	6-9 mo (part time)

Equipment Type	Number	Duration of Use
Platform Harmony		
Cable Pull Winch	1	4-5 mo (part time)
Generator	1	4-5 mo (part time)
Air Compressors	2-3	4-5 mo (part time)
Air Tuggers	3-4	4-5 mo (part time)
Hydraulic Winches and Power Units	1-2	4-5 mo (part time)
Weld Machines	3-4	4-5 mo (part time)
Rigging and Installation Aids	NA	4-5 mo (part time)
Equipment Storage Units	3-6	4-5 mo (part time)
Scaffolding	NA	4-5 mo (part time)
Splicing Equipment	NA	4-5 mo (part time)
Test Equipment	NA	4-5 mo (part time)
Safety Equipment	NA	4-5 mo (part time)
Misc. Construction Equipment	NA	4-5 mo (part time)
Platform Heritage		
Cable Pull Winch	1	4-5 mo (part time)
Generator	1	4-5 mo (part time)
Air Compressors	2-3	4-5 mo (part time)
Air Tuggers	3-4	4-5 mo (part time)
Hydraulic Winches and Power Units	1-2	4-5 mo (part time)
Weld Machines	3-4	4-5 mo (part time)
Rigging and Installation Aids	NA	4-5 mo (part time)
Equipment Storage Units	3-6	4-5 mo (part time)
Scaffolding	NA	4-5 mo (part time)
Splicing Equipment	NA	4-5 mo (part time)
Test Equipment	NA	4-5 mo (part time)
Safety Equipment	NA	4-5 mo (part time)
Misc. Construction Equipment	NA	4-5 mo (part time)
Marine Vessels		
Cable Installation Vessel	1	30-60 days
- ROV	2	
- Cable Machines	2	
- Cable Storage Areas	2	
- Deck Crane	1	
- Misc. Construction Equipment	NA	
Support Tug	1	10-30 days
- Transfer Boat	1	10-30 days
- Misc. Support Equipment		
Small Nearshore Survey Boats	3-4	5-10 days
- Misc. Support Equipment		
Dive Boat	1-2	30-60 days
- Dive Compressors	2	
- Dive Safety Equipment	NA	
- Misc. Support Equipment	NA	
Mooring Vessel	1	10-15 days
- Anchors for Dive Boats	4-6	
- Surface Buoys	4-6	
- Misc. Support Equipment	NA	
Nearshore Installation Support Skiffs	3-4	10-20 days

2.3.2 Offshore Vessel Requirements

All marine cable retrieval and installation activities will be conducted using a dynamic-positioning CIV that does not require the use of anchors. A typical CIV is shown in Figure 2-1. The CIV will be towed to Port Hueneme by a sea-going tug from Europe. The CIV will contain the fabricated cables from the manufacturing site.

A CIV support tug could be required during certain field operations. The CIV support tug may use the boat buoy near Platform Harmony when on standby in the field or leave the area. One or more support vessels with temporary anchors will be required in the nearshore area to support cable retrieval and installation operations (Figure 2.5). Anchor handling vessels will be used to install and remove anchors for the dive vessels. In addition, several small motor craft (skiffs) will be used to support cable activities in the nearshore area.

Mobilization of equipment and supplies to Platforms Harmony and Heritage will be from Port Hueneme using a regularly scheduled SYU Dedicated Project Vessel (DPV) supply boat throughout the OPSR-B Phase 2 activities. Personnel required for the Phase 2 work will be transported to the platforms from Ellwood Pier and will be returned to Ellwood Pier using regularly scheduled SYU DPV crew boats. A transfer boat will be required to transfer personnel and materials between the CIV and Port Hueneme due to customs restrictions. The existing Platform Harmony and Heritage cranes will be used to transfer all equipment and supplies to and from the SYU supply boats that service the platform. Based on the current design approach, a maximum total of four marine vessels are expected to be in the offshore Project area at any one time.

2.3.3 Personnel Requirements

The work associated with the excavation and trenching will generally be conducted during daytime shifts (12 to 14 hours/day). Work associated with the retrieval and installation of the cables as well as the splicing is expected to be conducted on a 24-hour-per-day basis. The offshore platform pre-work will be conducted during daytime shifts. Offshore construction work in support of the CIV cable installation activities will be conducted on a 24-hour-per-day basis.

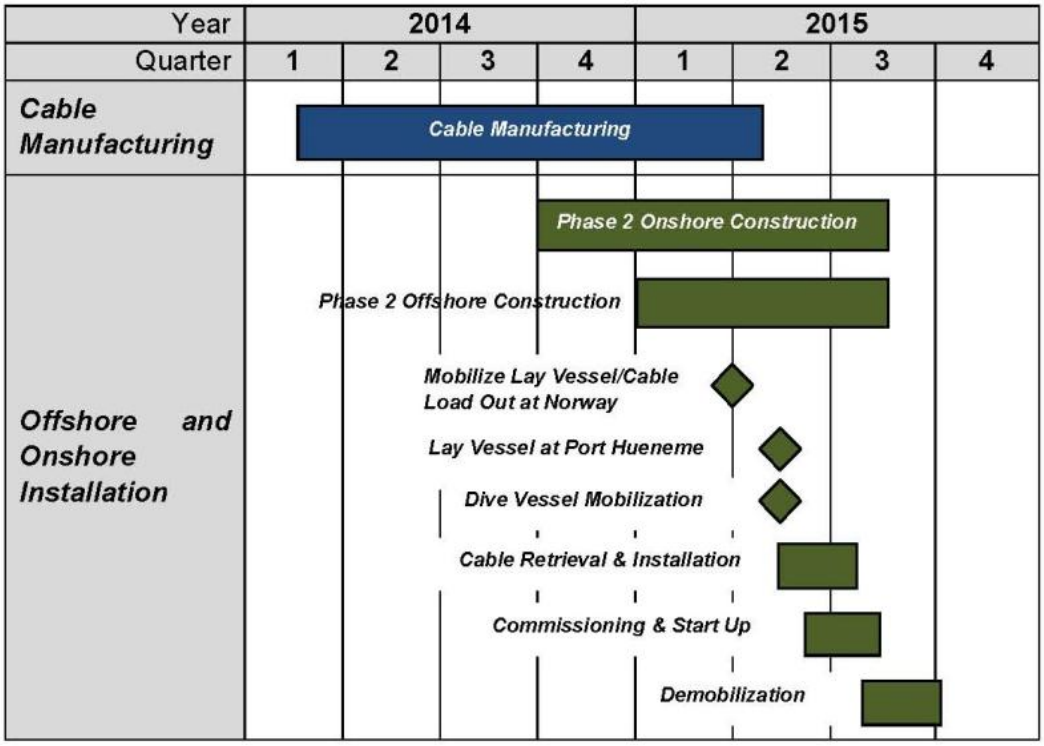
Personnel required for the Phase 2 work will be transported to the platforms from Ellwood Pier and will be returned to Ellwood Pier using regularly scheduled SYU DPV crew boats. Personnel required to access the CIV foreign flagged vessel will be transported to the CIV from Port Hueneme and will return to Port Hueneme due to custom requirements.

2.4 PROJECT CONSTRUCTION SCHEDULE

ExxonMobil estimates that the Project would require approximately 8 to 12 months. The Phase 1 installation activities commenced in June 2013 after BSEE approved the Phase 1 activities as minor platform modifications in May 2013, and are expected to be completed by about the 1st Quarter 2015.

The Phase 2 cable retrieval and installation activities are expected to commence on or about the 4th Quarter of 2014 and be completed by early 4rd Quarter 2015. The offshore cable retrieval and installation portion of Phase 2 is expected to require 1 to 2 months and be conducted during mid to late 2015. Table 2-3 provides a summary of the currently proposed Project schedule. The proposed schedule is dependent upon cable fabrication and transport from the manufacturer in Europe.

Table 2-3. Proposed Project Schedule



2.5 SAFETY AND ENVIRONMENTAL MANAGEMENT SYSTEMS

ExxonMobil will fully implement and apply the various components of the Safety and Environmental Management Systems (SEMS) Program for the OPSR-B Project. There are no anticipated changes or additions to the ExxonMobil SEMS Program resulting from the OPSR-B Project.

2.5.1 Cable Protection System Components

Cable protection systems may require items such as bend stiffeners or VIV reducers. The Onshore Substation (OSS) equipment at LFCPF has existing components which limit destructive ground faults for a 35 kV offshore system. Any cable protection system components will be defined in the detailed installation plans and drawings that will be developed during the detailed design phase of the work by late 2014 or early 2015.

The GIS (gas insulated switchgear) equipment on Platform Harmony will have Siemens multifunction protective relays as primary protection and backup protection. The offshore power system (includes circuit breakers at OSS, existing and replacement submarine power cables, Harmony GIS equipment, Harmony and Heritage transformers, and other components) are protected by their design ratings and primary and application dependent secondary protective components applied in accordance with industry standards such as National Electric Code and API-14F and good engineering practices.

2.5.2 Crossing Protection

At the POPCO crossing, two alternative approaches are being considered for providing a protective cover over the installed cables: (1) Divers would remove the concrete blocks in the mattresses above the cables to be retrieved (A (or B) and C1) and replace them after work is complete with the existing blocks or with blocks of similar size and shape as the current ones; or (2) an articulated concrete mat would be placed on top of the replacement cable openings (example shown in Figure 2-8). An ROV or divers will monitor the placement and verify the position of the mat.

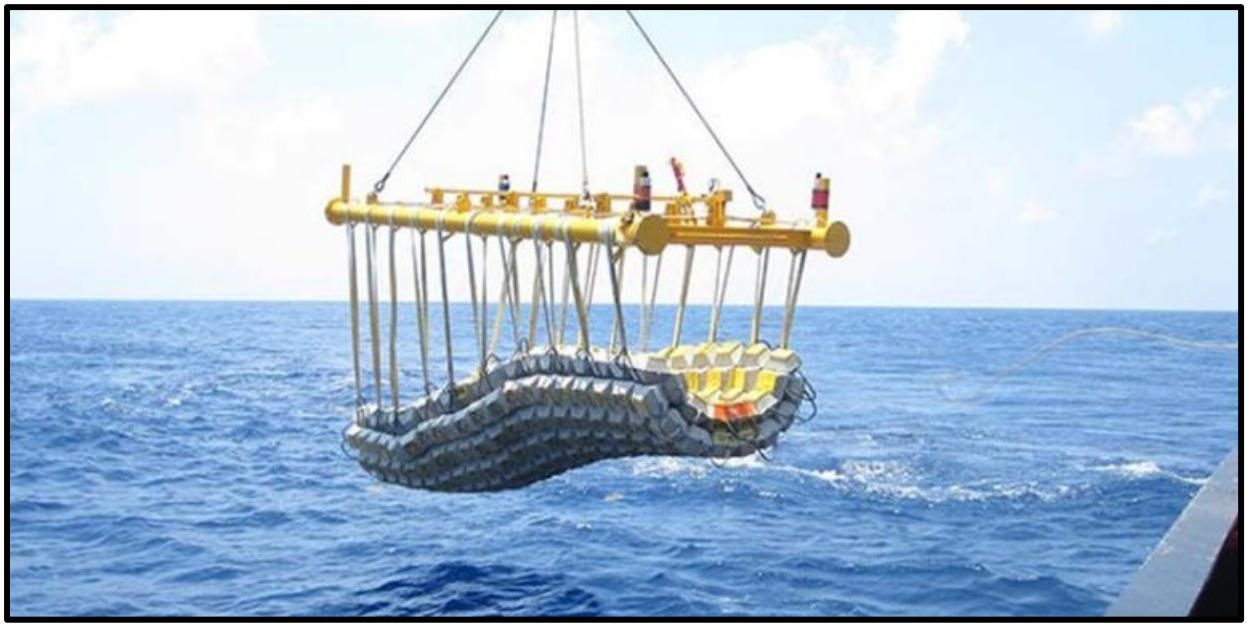


Figure 2-8. Typical Articulated Concrete Protection Mat

2.5.3 Bags Containing Sand or Other Materials

An installation measure being considered includes the placement of bags on top of installed Cables F2 and G2 adjacent to Platform Harmony at the catenary touchdown points and at the location where the cable makes a sharp turn (F2 towards shore and G2 towards Platform Heritage). The other location is on installed Cable A2 adjacent to Platform Harmony at the catenary touchdown point. The bags could be required to maintain the touchdown point. The bags are estimated to be approximately 1 ton in weight and would be lowered by either the cable installation vessel or a support vessel on top of the installed cable to help hold the cable in place and minimize any unintended movement as the cable is being laid. The bags will be located near the platform jacket base (expected to be less than 1,000 feet).

2.6 PROJECT OPERATIONS

The contractual required service life of the replacement power cable is 30 years. The subsea portion of the submarine cable will continue to be monitored within current regulatory inspection requirements. The power cable electrical load will be monitored by Siemens multifunction protective relays on Platform Harmony at the GIS equipment.