2. Project Description

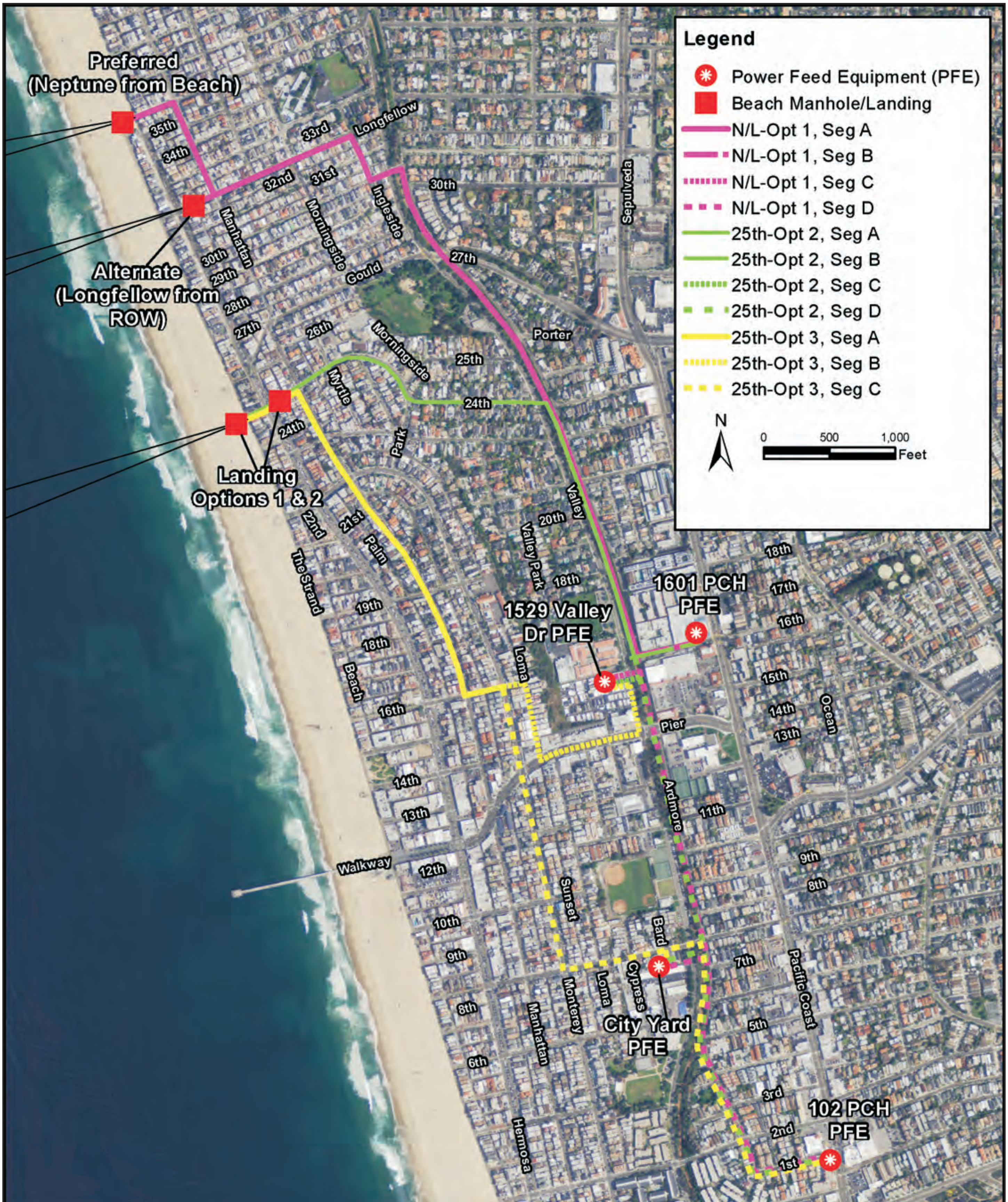
MC Global BP4 (applicant) proposes to install and operate up to four submarine cable systems connecting the United States to countries on the western Pacific Rim such as Southeast Asia, China, Australia, and Japan. The United States landings for these cables will be in Hermosa Beach, California (see Figures 1-1 and 2-1). The proposed Project would be implemented in four phases consisting of one phase for each of the four cable systems. At this time, two cable system connections have been identified. These would be accommodated in the first two phases of the proposed Project. Other cables would follow in future phases as additional connection points in other countries are identified, as conceptually illustrated in Figure 1-1. The components of the four proposed phases are described in Section 2.1, *Phases,* below. Each cable system would entail installing a marine fiber-optic cable system on the seafloor across the Pacific Ocean, landing at one of two sites in Hermosa Beach, and then connecting to a terminal on land at one of four potential power feed equipment (PFE) facility locations.

Phase 1 would include two landing sites located on the beach west of Neptune Avenue between 35th Street and 1st Place (Neptune Avenue landing site) and west of 25th Street between Hermosa Avenue and Palm Drive (25th Street landing site). The Phase 1 marine cable would land at the Neptune Avenue cable landing site. Phase 2 would utilize the 25th Street landing site. Phases 3 and 4 would use one or the other of the landing sites depending on final cable alignment. Ultimately, each cable landing site would support two cables.

The four potential PFE facility sites would be located within the City of Hermosa Beach. Buried terrestrial conduit systems would be installed within public street rights-of-way (ROWs) to connect cable systems from the landing sites to the PFE facilities and to a local telecommunications carrier. Other appurtenant facilities necessary for operation of the cable systems would be installed during various phases of work as described below.

All components of the proposed Project are analyzed in this EIR, including optional components. All four phases are included in the analysis even though specific dates for implementation of Phases 3 and 4 have not been established. Supplemental CEQA review of Phases 3 and 4 may be needed depending on the environmental conditions that exist at that time and on whether any components of those phases differ substantially from those analyzed in this EIR.

The EIR focuses on effects within Hermosa Beach and nearby jurisdictions, including marine areas within California's jurisdiction that extend 3 nautical miles from the mean high tide line. Effects within marine areas under federal jurisdiction are also discussed, which includes areas on the continental shelf where the submarine cables will be buried to the extent feasible. The continental shelf generally includes areas where seawater depth is no greater than approximately 5,904 feet (1,800 meters). Potential effects associated with laying the submarine cables in deeper water, beyond the jurisdiction of the United States, are only discussed in a general way as these effects are outside the purview of both state and federal regulation. In these deep waters, the cables would be laid directly on the ocean floor and would not be buried.



Source: ICF International,
City of Hermosa Beach,
NAIP Imagery, 2014

Figure 2-1

Terrestrial Facilities Concept Layout

2.1 Phases

The four phases are described below.

- **Phase 1: Southeast Asia to the United States (SEA–US) and support facilities.** This cable system would be the first cable to land as part of the proposed Project and would use the 25th Street cable landing site. The SEA–US cable system would have landings in Hawaii, Guam, the Philippines, and Indonesia. The SEA–US cable system would include marine and terrestrial fiber-optic cable, ground cable, and power cable. The major work elements comprising Phase 1 subject to local, state, or federal jurisdiction are listed below.
  - One PFE facility would be installed for the SEA–US cable system. The PFE location would be determined during final design and consultation with the City.
  - One ocean ground bed (OGB) would be installed for the SEA–US cable system at the 25th Avenue cable landing site. The ocean ground bed would consist of anodes installed into holes drilled in the beach down to the seawater level below the beach surface.
  - Four marine directional bores (one for each of the four cable systems) would be conducted to provide a housing for the fiber-optic conduit. Two directional bores would be conducted on the beach at the Neptune Avenue cable landing site, and two at the 25th Street landing site. Each directional bore has an alternative bore site located on the respective existing city streets for use if the cable landings are unavailable. Each directional bore would extend approximately 4,000 feet offshore into the Pacific Ocean.
  - Two landing manholes (LMHs) would be installed at the directional bore sites to provide access to the conduit, one at the Neptune Avenue cable landing site and one at the 25th Street landing site.
  - A buried terrestrial conduit system would be constructed from the landing manhole at the 25th Street landing site to the PFE facility for the SEA–US cable system and interconnect with the local telecommunication carrier interconnection point within the City. The interconnection point will be identified during final design and consultation with the City.
- **Phase 2: China to the United States (China–US).** This cable system would be the second cable to land and would use the 25th Street landing site. The China–US cable system would connect directly to China. The China–US Cable System would include marine and terrestrial fiber-optic cable, ground cable, and power cable. The major work elements of Phase 2 are listed below.
  - One PFE facility, one ocean ground bed, and other ancillary facilities.
  - One terrestrial conduit system to connect from the Neptune Avenue manhole (installed as part of Phase 1) to the PFE facility for this cable to the local telecommunication carrier interconnection point within the City.
- **Phase 3.** The third cable system is projected to land between 2017 and 2020. The cross-Pacific connection point has not been identified. This cable would use either the Neptune Avenue or 25th Street landing site. The major work elements of Phase 3 would be the same as Phase 2 and include the marine and terrestrial cable systems, a PFE facility, an ocean ground bed, and ancillary facilities.
- **Phase 4.** The fourth cable system is projected to land between 2020 and 2025. The cross-Pacific connection point has not been identified. This cable would use either the Neptune Avenue or 25th Street landing site. The major work elements of Phase 4 would be the same as Phase 2 and include the marine and terrestrial cable systems, a PFE facility, an ocean ground bed, and ancillary facilities.

2.2 Project Objectives

The objective of the proposed Project is to install four fiber-optic telecommunication cables across the Pacific Ocean to provide additional telecommunications capacity between the Los Angeles Basin and Asian and other Pacific Rim countries. The applicant intends to install the cables in four separate phases, which will allow the applicant to identify optimal cross-Pacific connection points based on demand. The Project has been designed to achieve the following objectives:

- Provide the first direct telecommunications link to the Philippines and Indonesia
- Provide for increased telecommunications reliability between the United States and Pacific Rim cities and countries by avoiding historically seismically unstable zones
- Provide for increased diversity of telecommunications pathways between the United States and Pacific Rim Cities and Countries
- Provide for increased data transmittal speeds
- Provide for a more streamlined ability for telecommunications connectivity between the Los Angeles basin and Pacific Rim cities and countries
- Respond to Asia's increasing demand for connectivity to the United States.

2.3 Proposed Construction Schedule

Terrestrial and nearshore construction activities would occur during daylight 7 days per week except for conduit installation and cable pulling. Once initiated, these activities would require up to 48 hours of continuous effort. Offshore construction activities are proposed to occur 24 hours per day, 7 days per week. The anticipated implementation schedules for each of the four phases of the proposed Project are shown in Table 2-1 and described below.

- Phase 1: Southeast Asia to the United States (SEA–US) and support facilities. Construction second quarter 2016; cable landing third quarter 2016.
- Phase 2: China to the United States (China–US). Cable landing in 2016.
- Phase 3: Third cable system. Cable landing before 2020.
- Phase 4: Fourth cable system. Cable landing before 2025.

Table 2-1. Anticipated Construction Schedules by Phase and Activity

Phase and Component	Target Start Date	Proposed Hours	Duration
Phase 1			
Terrestrial conduit installation	Spring 2016	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	4 weeks
Manhole installation	Spring 2016	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	2 day/site
Directional bores – marine	Spring 2016	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m., Sun: Pump Circulation, 30 minutes, twice a day.	3–4 weeks/site
OGB and LMH	Spring 2016	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	3 days
Terrestrial innerduct and cable pulling	Spring 2016	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	1 week
PFE facility (construction and testing)	Spring 2016	Daylight, 6 days/week	3 months
Pre-lay grapnel run	Spring 2016	24 hours/day, 7 days/week	1 week
Marine cable landing	Spring 2016	24 hours/day once commenced	1–2 days/ cable
Marine cable lay	Spring 2016	24 hours/day, 7 days/week	4 weeks
Marine cable burial (diver-assisted)	Spring 2016	Daylight, 7 days/week	3 weeks
Marine cable burial (ROV-assisted)	Spring 2016	24 hours/day, 7 days/week	1 weeks
Phase 2			
OGB installation	Fall 2016	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	3 days
Terrestrial conduit installation (if needed)	Fall 2016	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	4 weeks
Terrestrial innerduct & cable pulling	Fall 2016	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	1 week
PFE facility (construction and testing)	Fall 2016	Daylight, 6 days/week	3 months
Pre-lay grapnel run	Fall 2016	24 hours/day, 7 days/week	1 week
Marine cable landing	Fall 2016	24 hours/day once commenced	1–2 days
Marine cable lay	Fall 2016	24 hours/day, 7 days/week	4 weeks
Marine cable burial (diver-assisted)	Fall 2016	Daylight, 7 days/week	3 weeks
Marine cable burial (ROV-assisted)	Fall 2016	24 hours/day, 7 days/week	1 weeks
Phase 3			
OGB installation	Fall 2020	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	3 days
Terrestrial conduit installation (if needed)	Fall 2020	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	4 weeks
Terrestrial innerduct & cable pulling	Fall 2020	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	1 week
PFE facility (construction and testing)	Fall 2020	Daylight, 6 days/week	3 months
Pre-lay grapnel run	Fall 2020	24 hours/day, 7 days/week	1 week
Marine cable landing	Fall 2020	24 hours/day once commenced	1–2 days
Marine cable lay	Fall 2020	24 hours/day, 7 days/week	4 weeks
Marine cable burial (diver-assisted)	Fall 2020	Daylight, 7 days/week	3 weeks
Marine cable burial (ROV-assisted)	Fall 2020	24 hours/day, 7 days/week	1 weeks

Table 2-1. Anticipated Construction Schedules by Phase and Activity

Phase and Component	Target Start Date	Proposed Hours	Duration
Phase 4			
OGB installation	Fall 2025	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	3 days
Terrestrial conduit installation (if needed)	Fall 2025	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	4 weeks
Terrestrial innerduct & cable pulling	Fall 2025	M-F 8:00 a.m. to 4:00 p.m., Sat 9:00 a.m. to 4:00 p.m.	1 week
PFE facility (construction and testing)	Fall 2025	Daylight, 6 days/week	3 months
Pre-lay grapnel run	Fall 2025	24 hours/day, 7 days/week	1 week
Marine cable landing	Fall 2025	24 hours/day once commenced	1–2 days
Marine cable lay	Fall 2025	24 hours/day, 7 days/week	4 weeks
Marine cable burial (diver-assisted)	Fall 2025	Daylight, 7 days/week	3 weeks
Marine cable burial (ROV-assisted)	Fall 2025	24 hours/day, 7 days/week	1 weeks

(RTI, 2015b, Table 2-4)

2.4 Terrestrial Segments

Terrestrial Segments The terrestrial segments of the cable systems refer to those segments located above the mean high water (MHW) line. Terrestrial segments are located with the City of Hermosa Beach (See Figure 2-1). Marine segments are addressed in Section 2.5, *Marine Segments*.

2.4.1 Terrestrial Components

Components of the terrestrial cable systems include all facilities located above the MHW line required to support the proposed Project. These features include:

- Cable landing sites and directional bores;
- Landing manholes (LMHs);
- Ocean Ground Beds (OGBs);
- Terrestrial buried conduits, innerducts, fiber-optic, power, ground cables, and intermediate manholes;
- Power Feed Equipment (PFE) facilities; and
- Surface cable markers.

2.4.1.1 Cable Landing Sites and Directional Bores

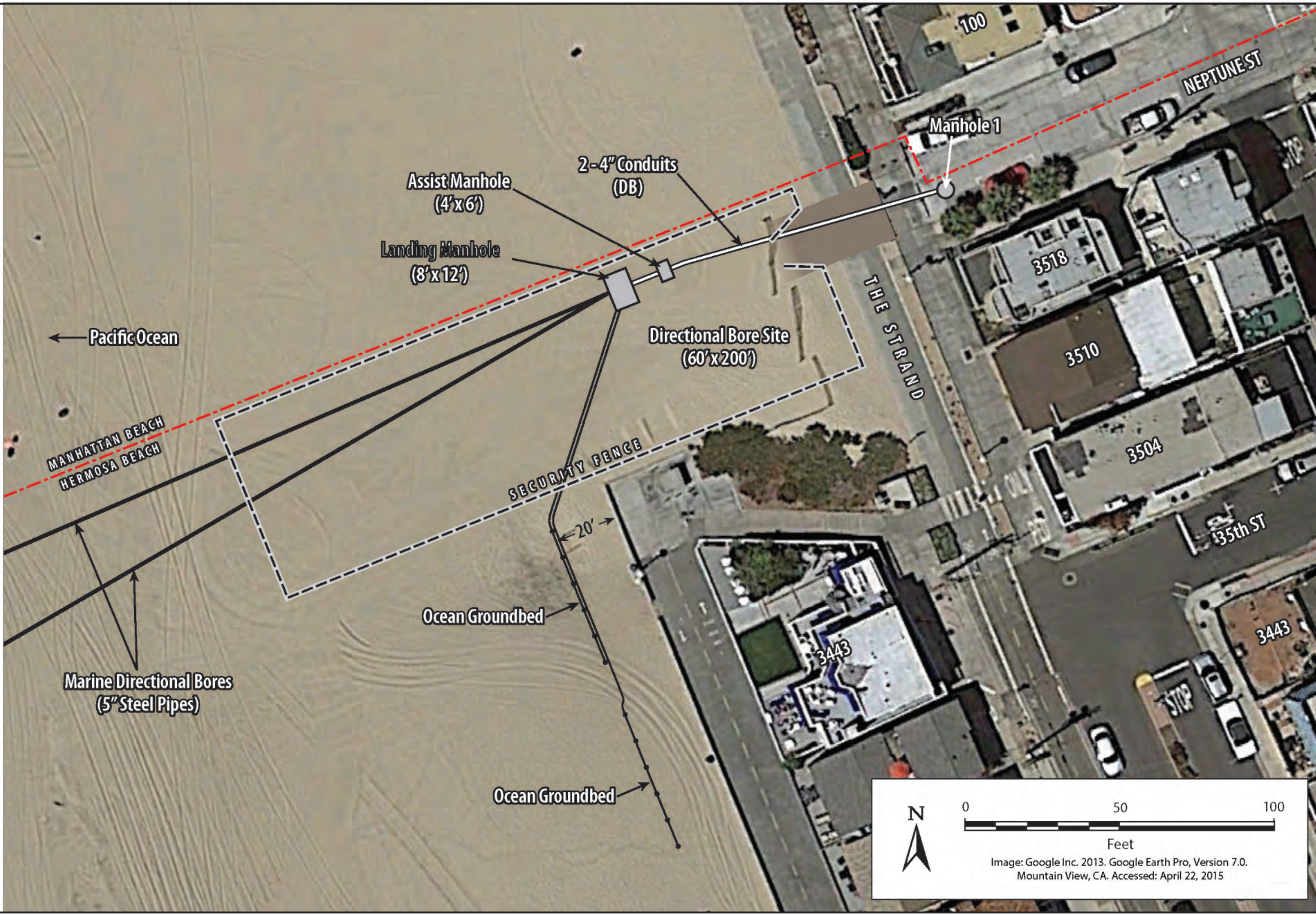
Two cable landing sites have been proposed on the beach at Neptune Avenue and 25th Street. Two landing sites are needed to provide separation between the cable systems to increase reliability and system security. Both landing sites would be constructed during Phase 1 to take advantage of construction efficiencies.

Each of the proposed cable landing sites has an alternative site located off the beach on existing city streets or walkways. The preferred bore site at both locations is on the beach. The applicant’s preferred locations are the beach landing sites because they allow for a larger construction space and minimize disturbance to existing roadways and private residences. The alternative sites are less desirable from a construction standpoint and would be used if the preferred sites on the beach are not allowed by the City or other permitting entity.

Neptune Avenue Landing

The proposed Neptune Avenue landing site is located on the beach just west of the intersection of Ocean Drive and Neptune Avenue (Figures 2-2 and 2-3). The LMH would be placed near the bore entry and would have a minimum cover of 2 feet (0.6 meter).

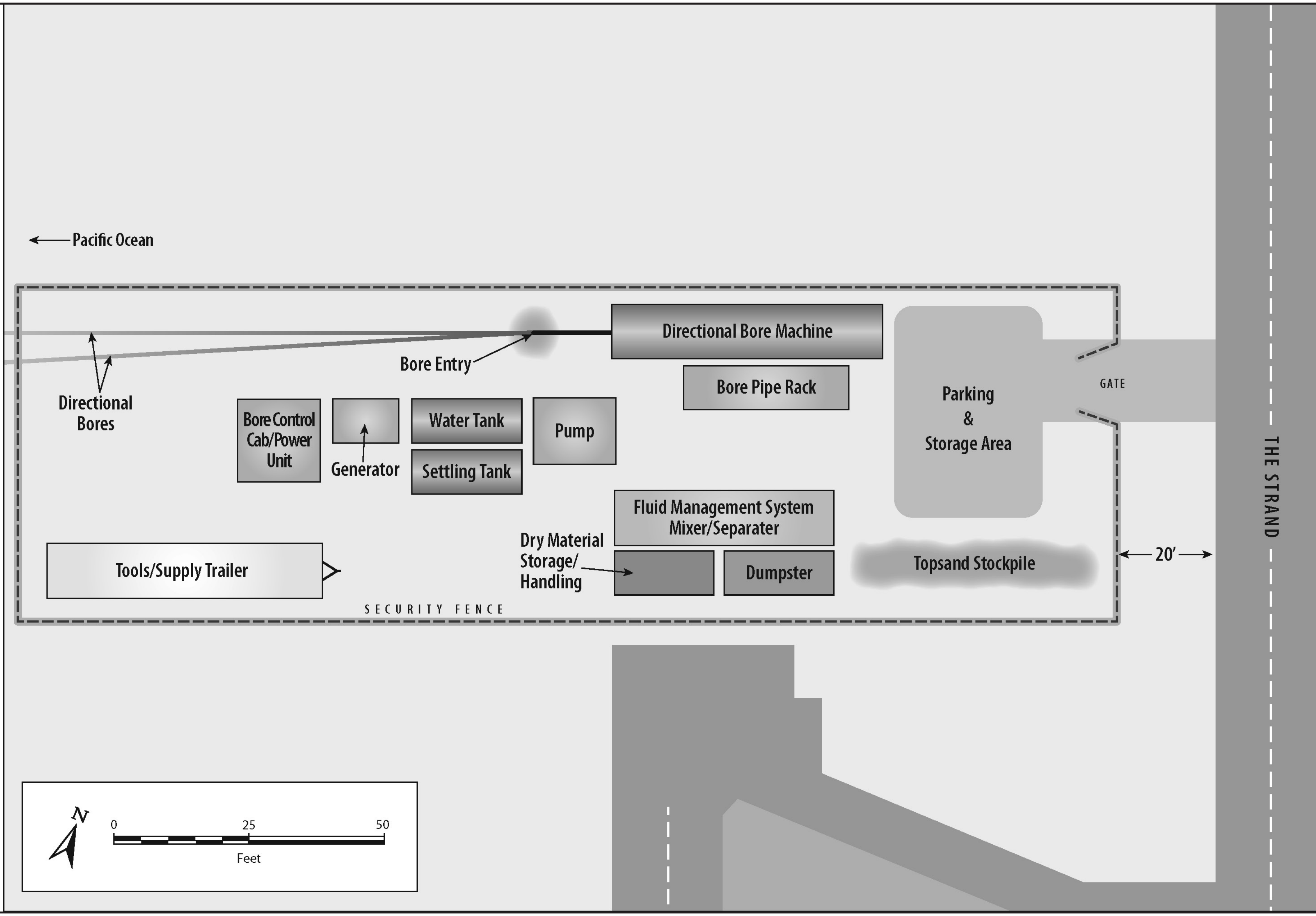
The alternative landing site would be located within the Longfellow Avenue ROW immediately east of Hermosa Avenue (Figure 2-4). This location would serve as the alternative site for the directional bores and the LMH placement. If selected, the LMH would be installed near the bore entry point and its lid would be flush with the existing paved surface.



Source: ICF

Figure 2-2

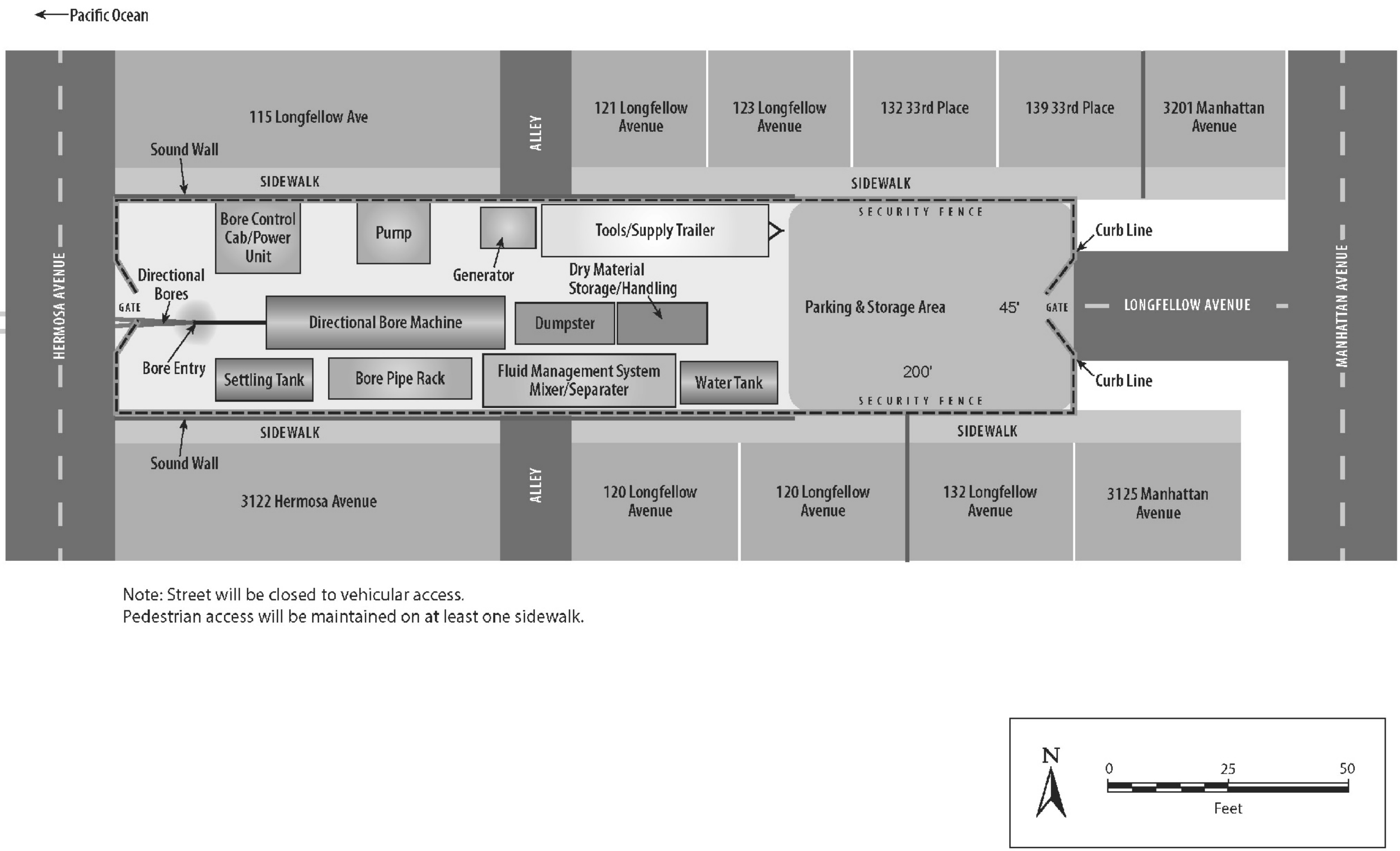
Neptune Ave Preferred Landing Site Plan



Source: ICF

Figure 2-3

Neptune Avenue Preferred Cable Landing Site Plan



Source: ICF

Figure 2-4

Longfellow Avenue Alternate Cable Landing Site

25th Street Landing

The proposed 25th Street landing site is located on the beach just west of the intersection of 25th Street and Hermosa Avenue (Figures 2-5 and 2-6). The LMH would be placed near the bore entry point and would have a minimum cover of 2 feet (0.6 meter).

The alternative landing site would be located within the 25th Street ROW immediately east of Hermosa Avenue (Figure 2-7). This location would serve as the alternative site for the directional bores and the LMH placement.

2.4.1.2 Landing Manholes

Each of the landing sites would require the placement of one LMH at the landward end of the directional bores. The LMH would accommodate the two directional bores at each location. The LMH contains the splice where the terrestrial cable and the submarine cable connect. The LMH would be connected to the PFE facilities by a terrestrial conduit system described below. The LMHs would be approximately 8 feet (2 meters) wide, 12 feet (3.7 meters) long, and 9 feet (2.7 meters) deep, and would be buried with a cast-iron manhole cover 36 inches (91 centimeters) in diameter appearing at grade level when constructed in the street. If placed on the beach, the manhole would be buried under 2 feet (0.6 meter) of sand. The manhole covers would be marked with appropriate identification and would be secured (i.e., locked and bolted) as required by the City.

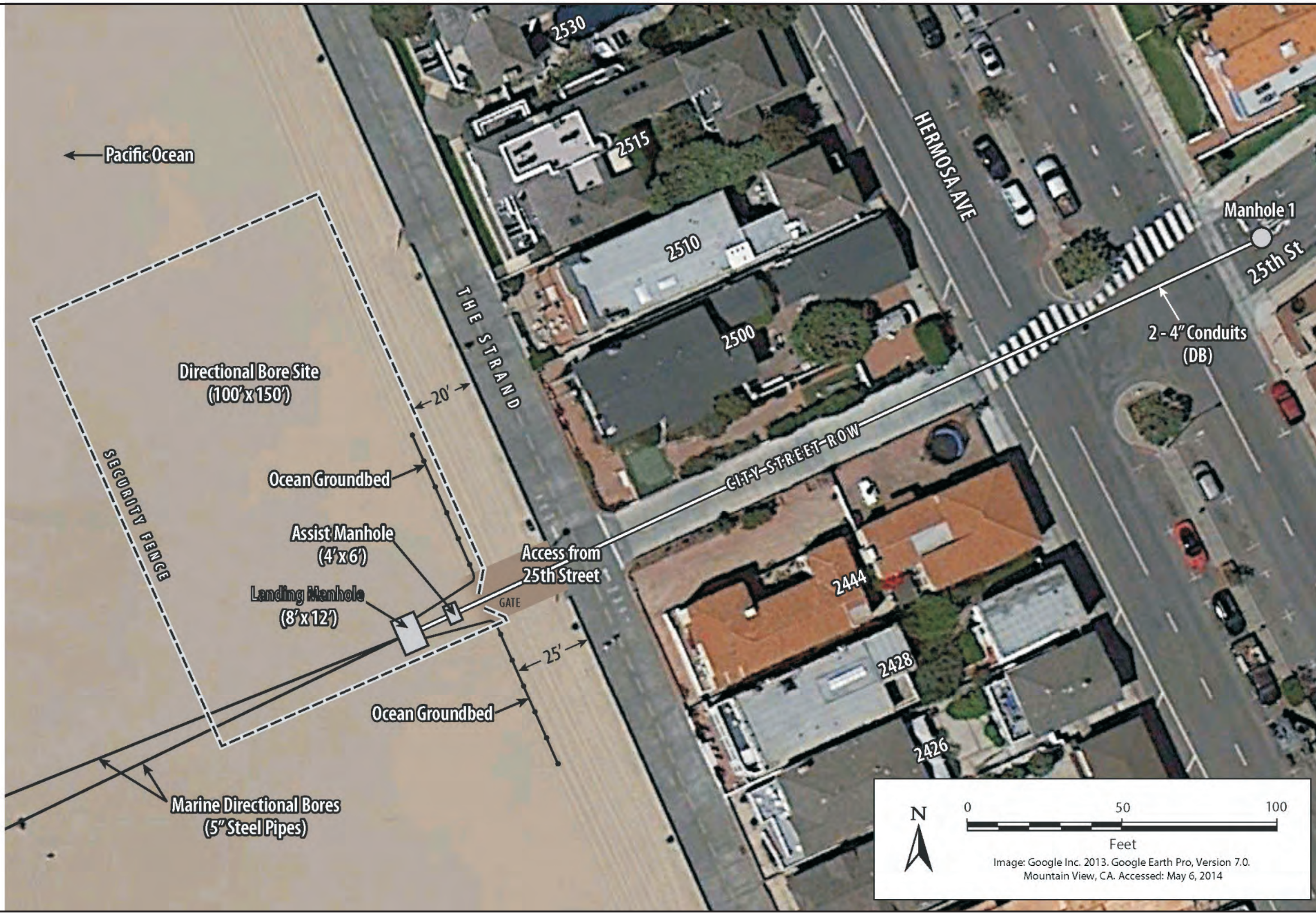
In addition to each LMH, a separate surface access vault would be placed on the land side of each manhole. The surface access vault would be a 4-foot (1.2-meter) wide, 5-foot (1.5-meter) long, and 2.5-foot- (0.7-meter) deep concrete box with a steel traffic lid. The surface access vault would allow for the submarine cable installation without additional surface disturbance. The surface access vault would be buried under sand or constructed at grade depending on the location.

2.4.1.3 Ocean Ground Bed Installation

An earth array ground bed would be installed for each cable system at each landing site for cathodic protection to control corrosion and to provide a ground for the electricity that powers the submarine cable amplifiers. The ground bed would consist of anodes installed into holes drilled down to the seawater level approximately 20 feet (6.1 meters) deep (see Figure 2-8). Each anode would be placed into its own hole, and a copper ground cable (DC) would connect the tops of the anodes to one another. The copper ground cable would connect to the LMH. At the completion of construction, the OGB anodes would be covered with sand and be approximately 10 feet (3 meters) below grade. The ground cable from the anodes to the LMH would be 6 feet (1.8 meters) below grade and would be protected by placing sacks of concrete on top of the cable. The concrete sacks would absorb water over time, hardening to form a concrete cap.

2.4.1.4 Terrestrial Conduit Systems

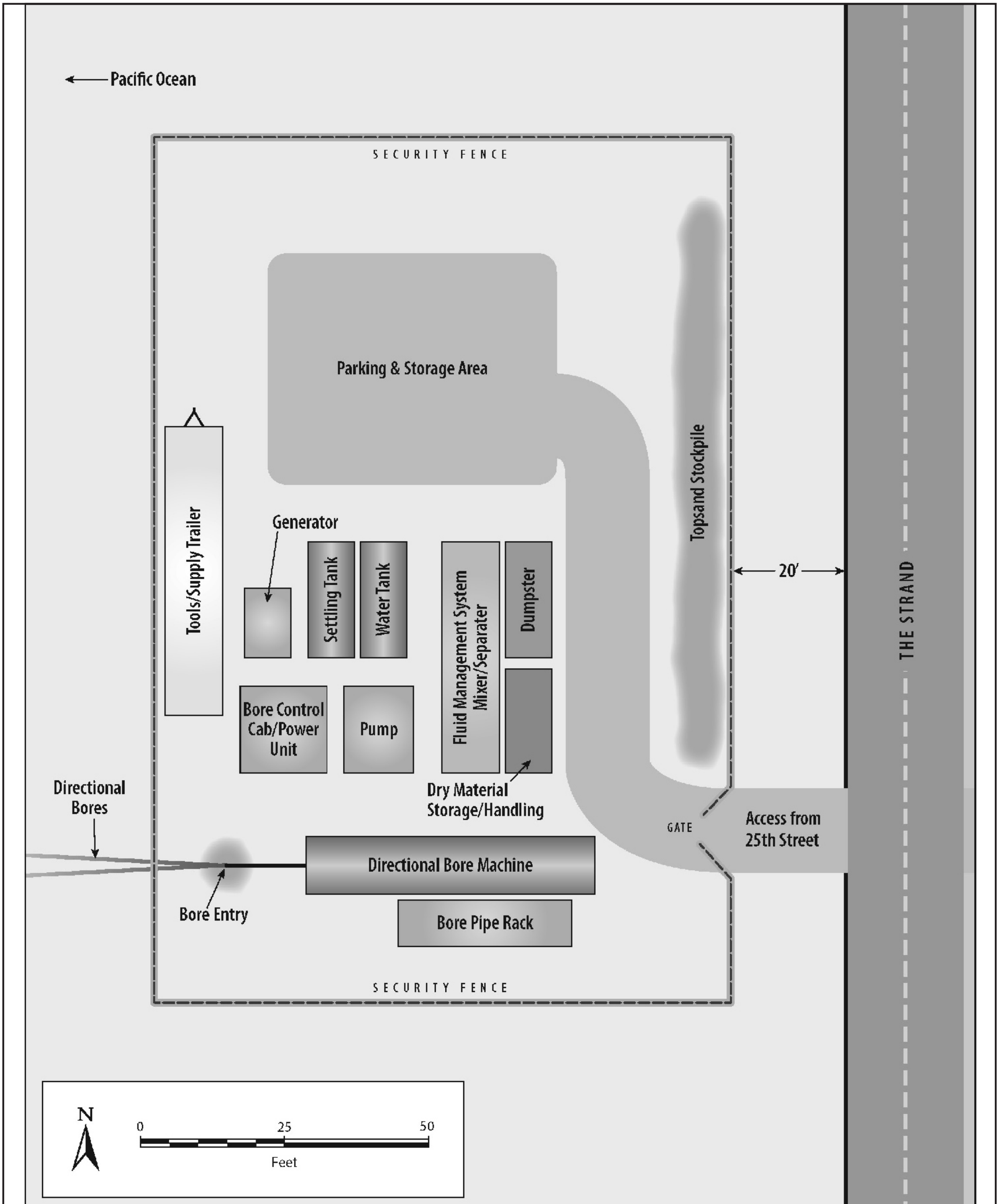
The terrestrial conduit systems provide the link from the cable landing site to existing or future fiber-optic infrastructure. Separate alignments would be used to connect the two cable landings with proposed PFE facilities. The alignments of each system would follow public ROWs from their landing points to their respective PFE facilities as described in Section 2.4.3, *Terrestrial Alignments and Locations*, and shown on Figure 2-1 (Terrestrial Facilities Conceptual Layout).



Source: ICF

Figure 2-5

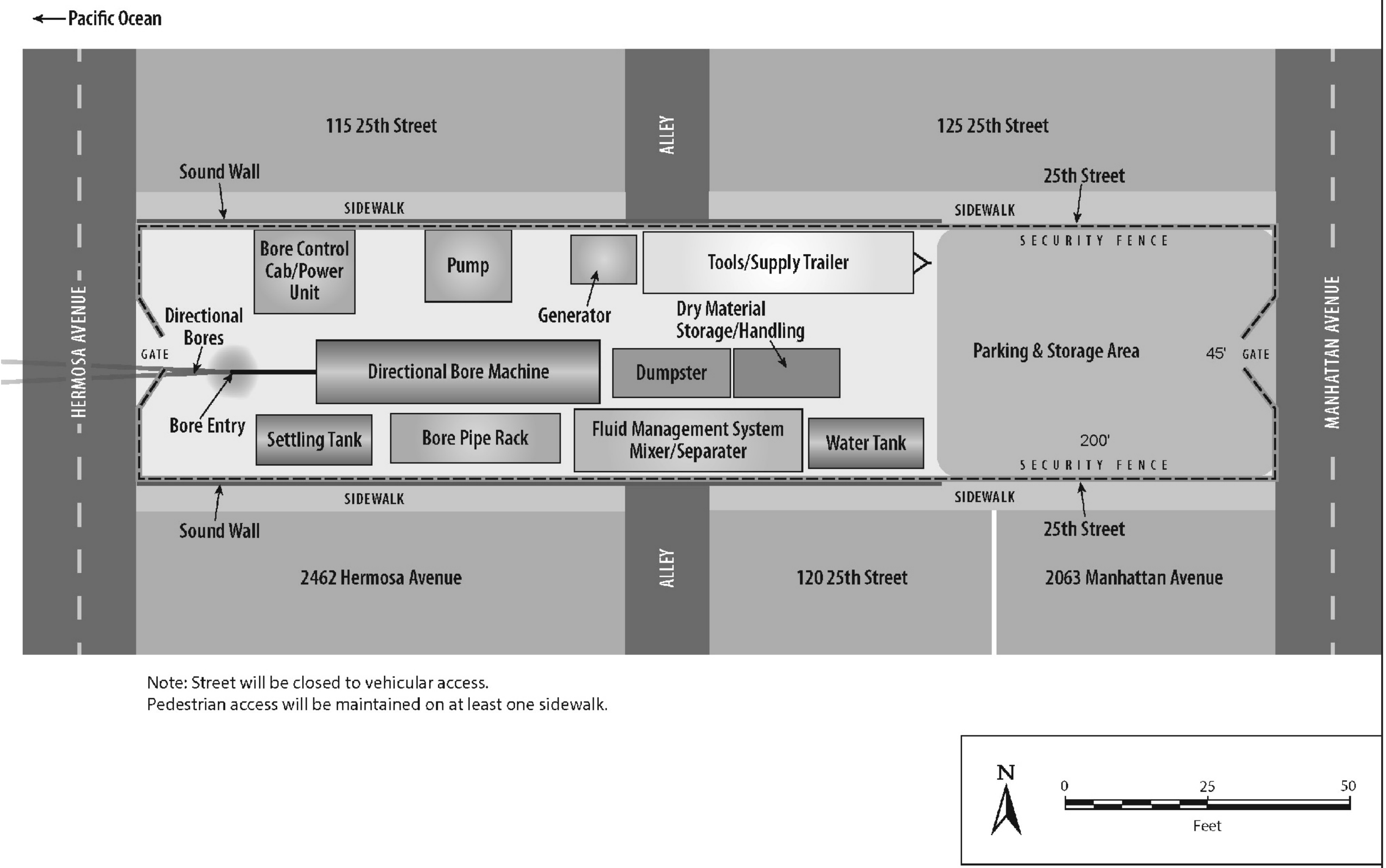
25th Street Preferred Site



Source: ICF

Figure 2-6

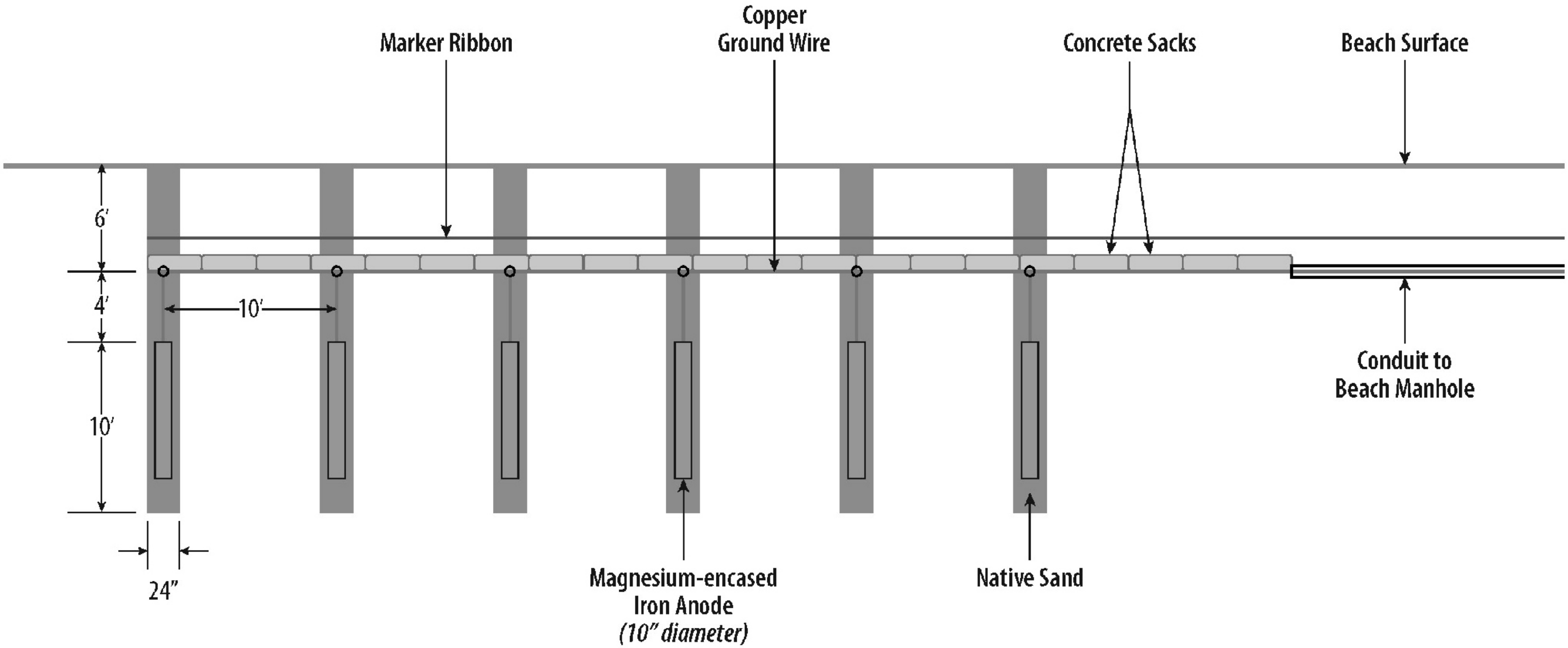
25th Street Preferred Cable Landing Site



Source: ICF

Figure 2-7

25th Street Optional Cable Landing Site



Source: ICF

Figure 2-8

Proposed Ground Beds

PFE Facility to LMH Conduit

Three 4-inch-diameter (10-centimeter-diameter) polyvinyl chloride (PVC) or high-density polyethelene (HPDE) conduits, each containing three innerducts, would be installed in a duct bank along each terrestrial route from the PFE facility to the LMH at each cable landing. One conduit—the in-service conduit—would house the active telecommunications cable. The second conduit is for installation of a future cable in Phase 2, 3, or 4. The third conduit would be for possible future maintenance or replacement. This conduit would be utilized if circumstances require installation of a replacement cable for some unforeseen reason. If a cable needs to be replaced, the spare conduit would facilitate such replacement without new excavation or interruption to service.

Orange warning tape would be buried approximately one foot (0.3 meter) deep (or would be installed using the trenchless installation method described in Section 2.4.2.2) to alert individuals digging above the cable. This warning tape would be buried during installation of the conduit.

Innerducts

As shown in Figure 2-9 (Terrestrial Conduit, Innerduct, and Fiber-optic Cable), each of the 4-inch (10-centimeter) PVC conduits described above would house three 1.25-inch (3.2-centimeter) PVC innerducts. The three innerducts housed in the in-service conduit would contain the terrestrial cables described below in *Terrestrial Segment Cables*. Installation of the innerducts and terrestrial cables is described in Section 2.4.2.7, *Innerduct and Terrestrial Cable Pulling*.

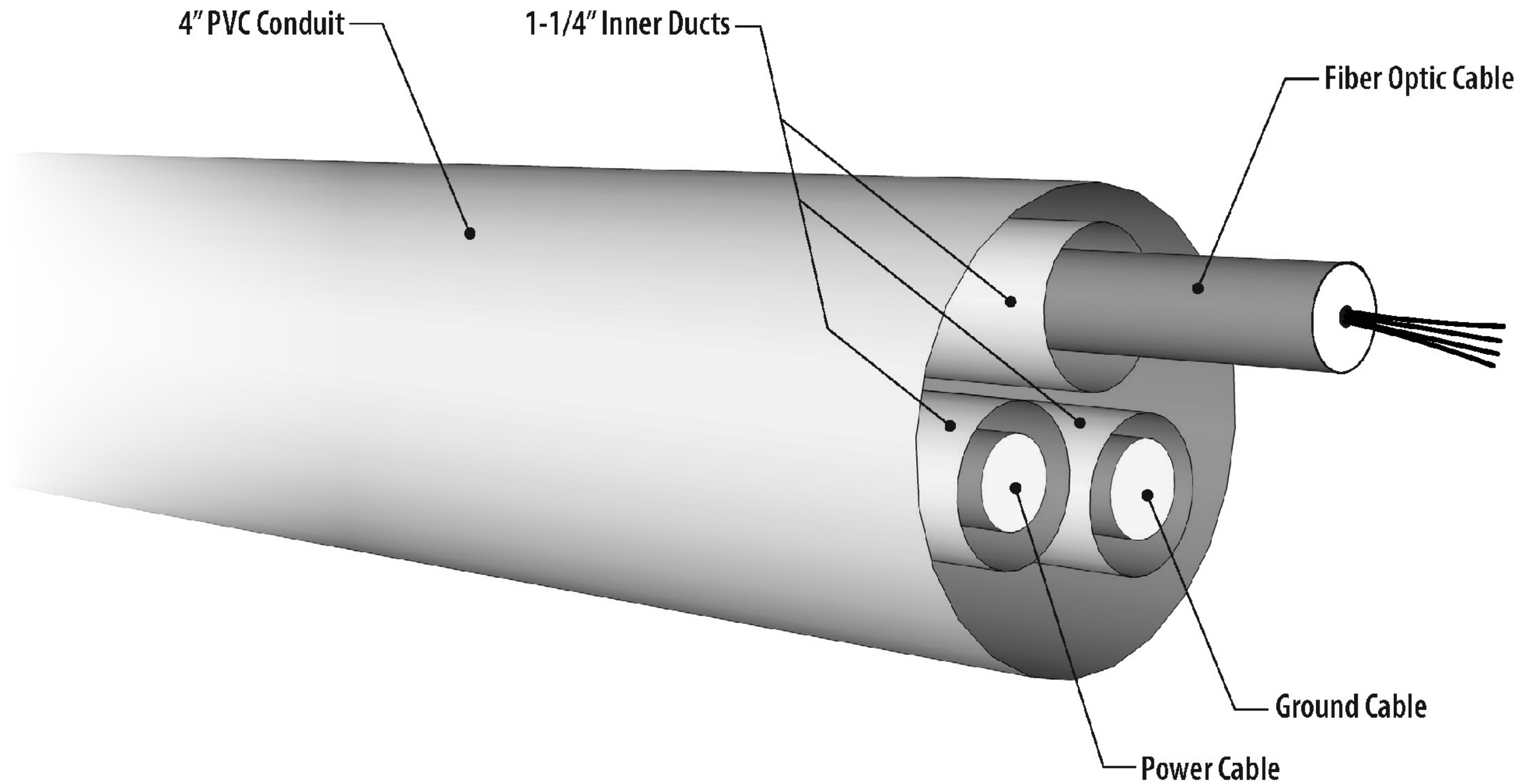
Terrestrial Segment Cables

Each cable conduit in the duct bank connecting the LMH to a PFE would contain three separate cables in the innerducts. The first cable would be a fiber-optic cable used to transmit telecommunications data throughout the system (Figure 2-9). The second cable would be an insulated copper power cable used to transmit power from the PFE facility to the marine cable. The third cable would be an insulated copper ground cable used as part of the electrical equipment ground system and would connect the PFE facilities to the OGB at the beach. Each group of three cables, fiber-optic, power, and ground, would constitute one cable system.

Intermediate Manholes

Pre-cast concrete manholes would be placed at intervals of approximately 1,200 feet (366 meters) to 2,500 feet (762 meters) along the routes between the PFE facilities and the LMHs. The manholes are necessary to allow access to the conduit system for cable installation and maintenance. Typically, the manholes would be approximately 4 square feet (0.4 square meter) and 6 feet (2 meters) deep, with a cast-iron manhole cover measuring 36 inches (91 centimeters) in diameter appearing at grade level. All manhole covers would be marked with appropriate identification and would be secured (i.e., locked and bolted) as required by the City. Depending on the final alignments of the routes, 8 to 12 intermediate manholes are expected for the entire Project.

Three 4-inch-diameter (10-centimeter-diameter) PVC conduits would enter and exit each intermediate manhole between the PFE facility and the LMH.



Source: ICF

Figure 2-9

Terrestrial Conduit, Innerduct, and Fiber-Optic Cable

2.4.1.5 Power Feed Equipment Facilities

Each marine cable contains a copper electrical conductor necessary to regenerate the light signal being transmitted through the fiber-optic cable as it crosses the Pacific Ocean. The electrical power is supplied by standard commercial sources on the terrestrial end of the cable. The commercial power is converted to direct current (DC), and the voltage and amperage (amp) are converted to match the needs of the signal regenerating technology. Once converted, the electrical current is applied to and carried by the marine fiber-optic cable. The PFE facility necessary to convert and apply the electrical current will be housed in either an existing commercial building or in a freestanding structure constructed for that purpose. Several possible PFE facility locations have been identified and are shown on Figure 2-1. These PFE locations are considered likely possible locations for the PFE facilities and are subject to change as each phase of the Project is implemented. Landowner consent has not been obtained for the possible use of these locations for PFE facilities. The cable would be connected from the PFE facility to downtown Los Angeles via existing fiber-optic cable from a third-party provider. The interconnection to the local telecommunications carrier will be at the PFE for each cable. The local provider will provide access to fiber-optic cable at those locations. Existing fiber-optic cables and conduits would be used to the maximum extent possible. Incidental construction would be completed under existing authorizations and conditions.

Each PFE facility would require approximately 740 square feet (69 square meters) of space and would be powered by commercially delivered electricity. Each PFE facility would also contain emergency backup generators in the event of local or regional power outages. The following equipment would be needed at each PFE facility: one 80-kilowatt (kW) (107-horsepower) diesel generator; one 700-gallon fuel (diesel) tank; two 6-kW air conditioning units; and one 80-kW pad-mounted transformer. The applicant’s normal operations at the PFE facility would require approximately 50 kW of 480-volt alternating current (AC) service, or approximately 105 amps. A typical floor plan is shown in Figure 2-10 (Power Feed Equipment Facility).

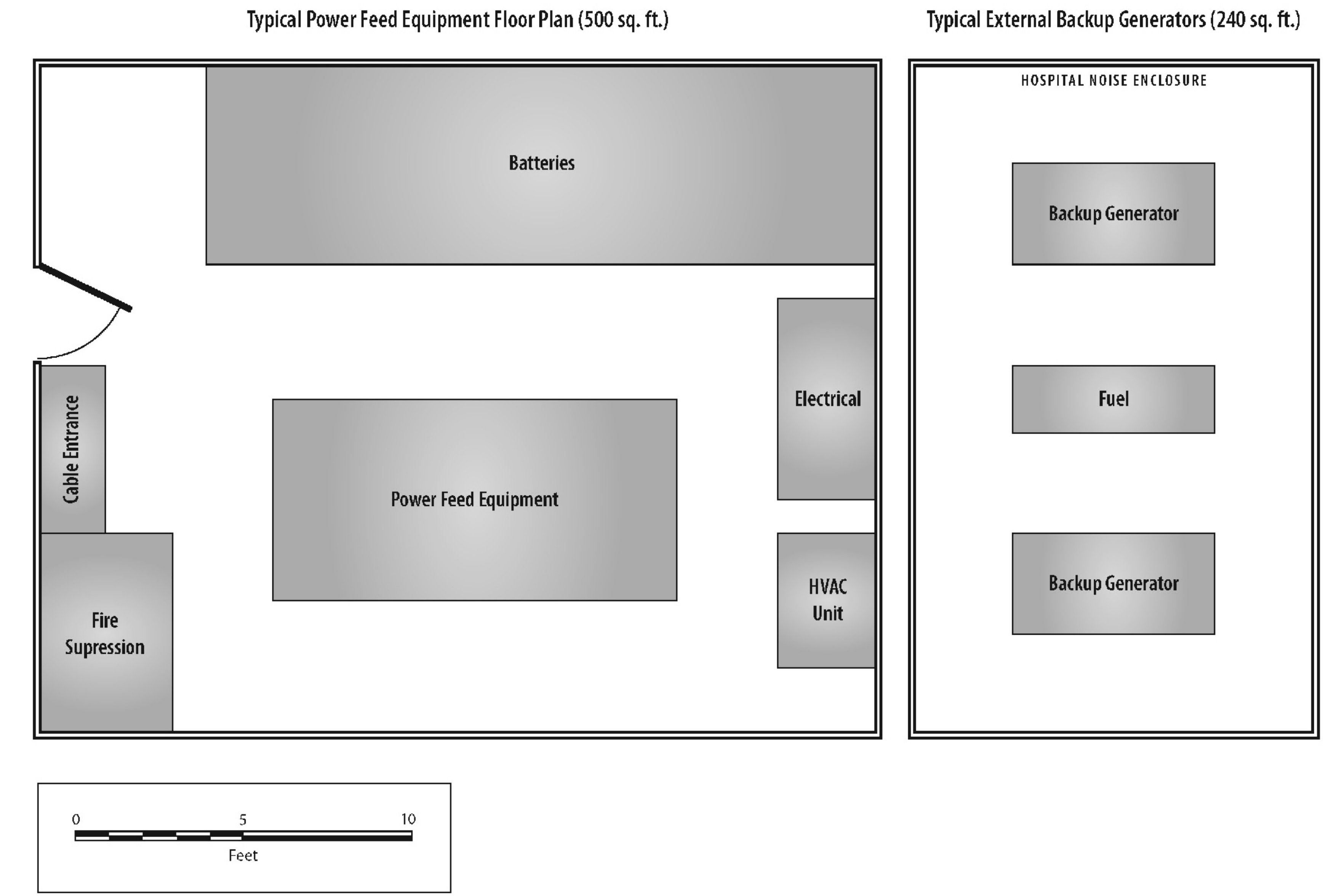
The PFE facilities would not be staffed. A technician would make periodic service calls to each facility as needed and during monthly routine system testing. The facilities would only be accessed during normal working hours (i.e., Monday through Friday, 8:00 a.m. to 5:00 p.m.), except in emergencies.

For the environmental assessment, all four proposed PFE locations will be evaluated to ensure that any changes in future projects needs would be incorporated into the analysis. However, the Project may not require all four facilities once fully constructed. The proposed locations for the power feed equipment are 1529 Valley Drive inside an existing commercial building, 1601 Pacific Coast Highway inside an existing commercial building, 102 Pacific Coast Highway inside the existing commercial building, and/or the City of Hermosa Beach Maintenance Yard at 6th Street and Valley Drive.

2.4.1.6 Surface Cable Markers

Cable markers would be located along the terrestrial route at intervals of 500 to 1,000 feet (152 to 305 meters) to mark the location of the cable in open areas, such as the Greenbelt. The markers would consist of wood poles measuring 4 to 6 square inches (26 to 39 centimeters square) by 4 feet (1.2 meters) tall. They would be placed at the edge of the ROW. Signs would be placed on the posts to indicate the presence of a buried cable.

No markers would be used where the route lies within a roadway or across the beach.



Source: ICF

Figure 2-10

Power Feed Equipment Facility

2.4.2 Terrestrial Construction

Terrestrial construction activities would entail delivery of staging materials and equipment, surface preparation, trenching, PVC and steel conduit placement, backfilling, trenchless installation, directional boring, conventional boring, manhole installation, innerduct and cable pulling, and surface restoration.

The applicant is proposing to work during daylight hours 7 days per week. Work on the weekends would mainly be conducted between 9:00 a.m. to 4:00 p.m. on Saturday. The only construction activity planned on Sunday would be circulation of the marine directional bore pump for 30 minutes, two times a day. No other weekend work is proposed. Work after hours during the evening may be required as the bore pump could require circulation if the contractor believes there is a risk of the bore pope seizing. Table 2-2 shows the equipment and personnel likely to be required for terrestrial construction activities.

Table 2-2. Equipment and Personnel Required for Terrestrial Construction Activities

Equipment	Personnel
Trench Construction	
1 concrete/asphalt saw	1 foreperson
1 backhoe, trencher, or excavator	2 operators
1 pickup truck	3 laborers
1 dump truck	1 inspector
1 asphalt truck	
1 pavement roller	
1 equipment and supply trailer	
2 handheld vibratory compactors	
Power Feed Equipment (PFE) Construction and Deliveries	
1 crane	1 foreman
1 backhoe	2 operators
1 equipment truck	3 laborers
1 pickup truck	1 inspector
Terrestrial (Trenchless) Conduit Installation	
1 bore machine with self-contained water mixing tank	1 foreperson
1 one ton truck	1 operator
1 pickup truck	3 laborers
1 supply and equipment trailer	1 inspector
1 handheld vibratory compactor	
Manhole Installation	
1 excavator	1 foreperson
1 delivery truck with boom	2 operators
1 dump truck	1 laborer
1 equipment and supply trailer	1 inspector
1 handheld vibratory compactor	
Innerduct and Terrestrial Cable Pulling	
1 cable-pulling truck	1 foreperson
1 pickup truck with cable reel trailer	3 laborers
1 supply and equipment truck	1 inspector
Marine Directional Bores	
1 HDD Powerplant	1 foreperson
1 pickup truck	3 operators
1 welder	6 laborers
1 generator	
1 tractor trailer	

Table 2-2. Equipment and Personnel Required for Terrestrial Construction Activities

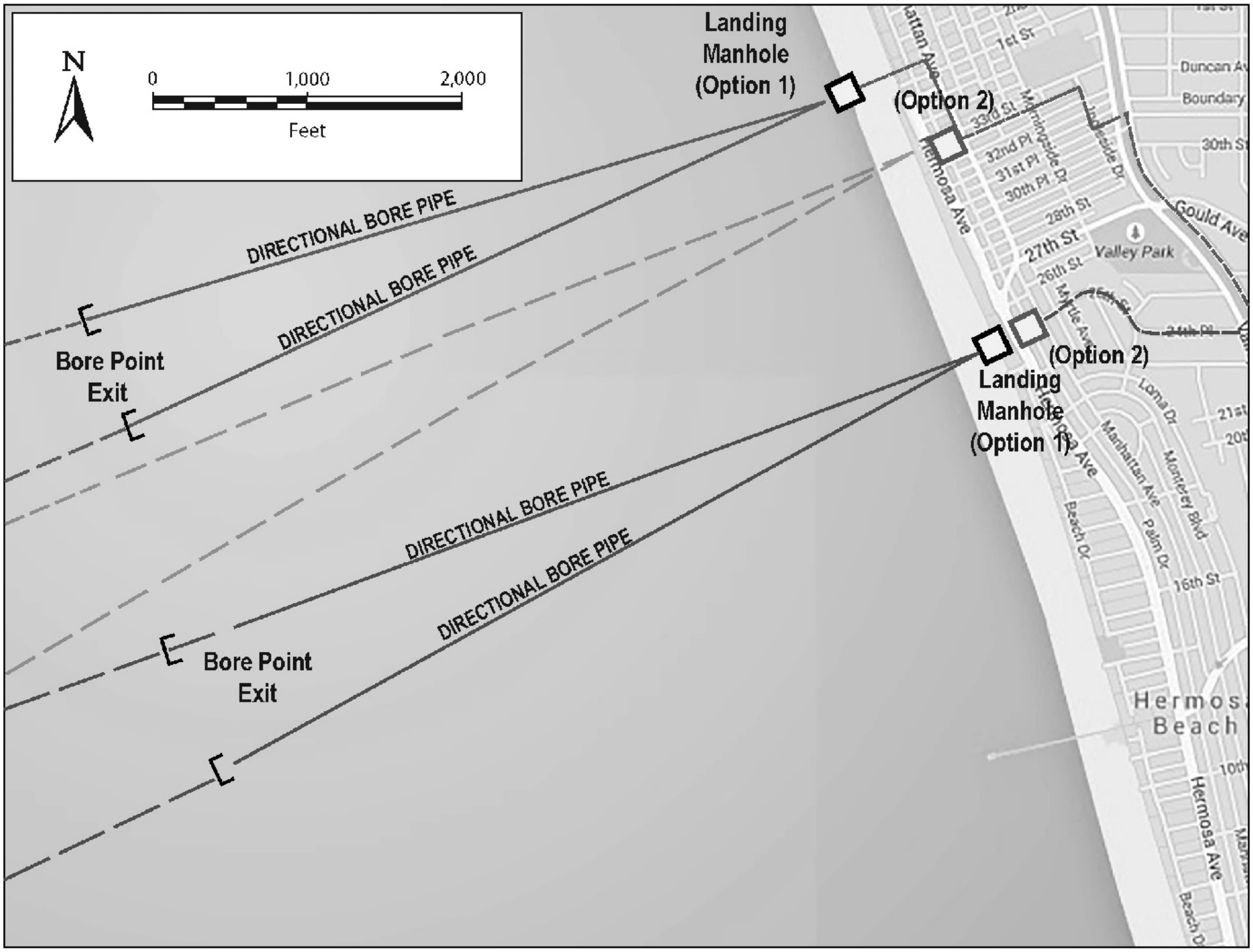
Equipment	Personnel
1 fluid management system	
1 directional bore machine	
1 control shack	
1 equipment and supply trailer	
Ocean Ground Bed Installation	
1 backhoe	1 foreperson
1 well-drilling machine	2 operators
1 one ton truck	2 laborers
1 pickup truck	
1 equipment and supply trailer	
Conventional Boring	
1 bore machine	1 foreperson
1 backhoe or excavator	1 operator
1 supply and equipment trailer	3 laborers
1 pickup truck	1 inspector
1 saw cutter	
1 handheld vibratory compactor	
Marine Cable Pulling	
1 backhoe	3 forepersons
1 pickup truck	2 operators
1 hydraulic winch	2 laborers
1 crane or boom truck	3 inspectors
1 generator	
1 equipment and supply trailer	

(RTI, 2015b. Table 2-1)

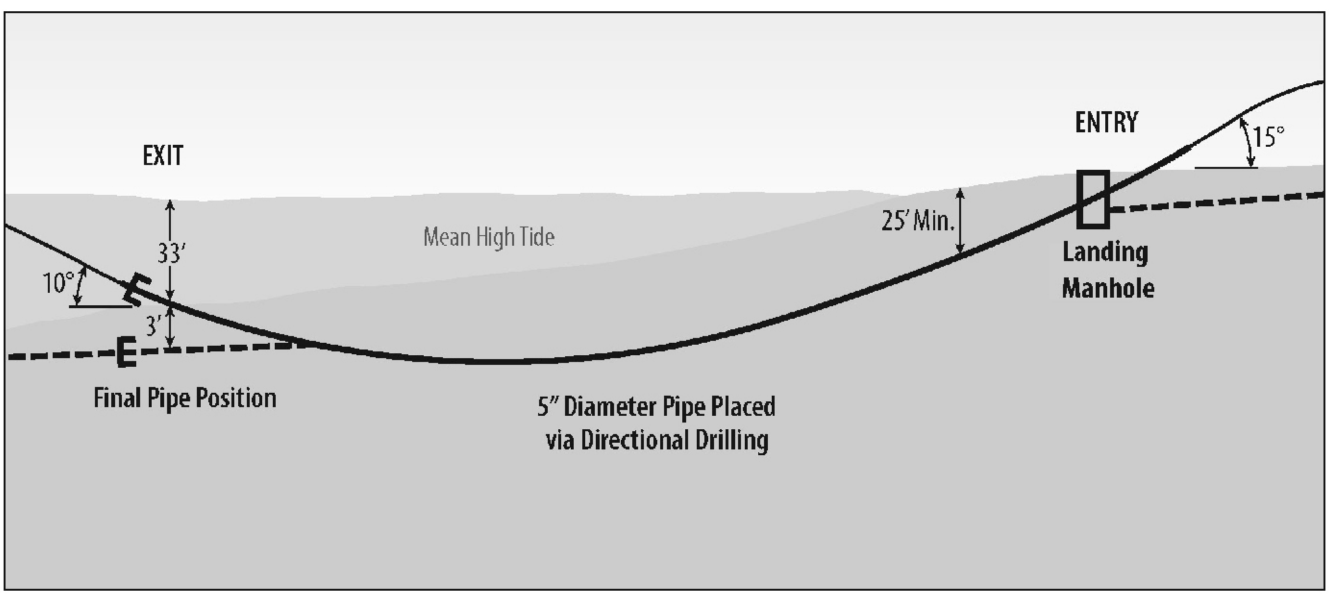
Terrestrial activities that would require excavations or ground disturbance would include boring, trenching, and manhole placement. Table 2-3 presents the estimated ground disturbance expected from these activities. Prior to construction activities, all known underground utilities known to occur along the proposed terrestrial cable routes will be identified. Once the utilities are marked they will be precisely located using a process called “potholing.” This process uses a water or air jet and a vacuum to excavate a small hole, typically less than 6 inches in diameter, down to the utility. The jet uses high-pressure air or water to erode the soil while the vacuum hose removes the mud or dirt from the pothole. The removed material is stored in an onboard tank and later disposed of at an approved landfill or site.

2.4.2.1 Directional Bores

Two 6-inch-diameter steel conduits are required to connect each LMH on shore to a point beyond the surf zone approximately 4,000 feet (1,219 meters) offshore. These conduits would be installed using directional bores (a process also known as horizontal directional drilling [HDD]). The use of directional bores would allow the conduits to be installed without disruption to the seafloor or beach within the surf zone; the pipes would be buried between 25 and 50 feet (9.1 and 15.2 meters) below the beach and the ocean floor. Two directional bores are planned at each of the landing sites, for a total of four directional bores (Figure 2-11).



Marine Directional Bore Plan View



Marine Directional Bore Profile View (Typical)

Source: ICF

Figure 2-11

Marine HDD Plan

Directional bores are guided by a drill head fitted with a steering tool using magnetometers and inertial devices to track the direction of advance (horizontal and vertical) and the absolute location. The steel conduit would be advanced in 30-foot (9.3-meter) sections through the boreholes as they are created. Surveys would be conducted in 15- and 30-foot (4.6- and 9.3-meter) increments to verify the drill position and path. The directional bore machine occupies the bore entry site and drills steel casing into the ground at an angle. Once the bore casing reaches the desired depth, it is leveled out as the drilling continues to push the pipe horizontally through the ground. Once it reaches the appropriate distance offshore, the drill head is guided to the surface and the bore is complete. This operation would be repeated a total of four times for the Project and completed during Phase 1.

Land Survey and Bore Design

Prior to directional bore operations, a detailed engineering plan and profile drawing would be produced. This drawing would depict the horizontal and vertical alignment that would best fit the landing site conditions based on previous surveys of the land and seafloor. In addition, a soil boring sample would be taken to determine the subsurface geology; this information is used to select the correct depths, mud mixes, and drilling head types. The sub-bottom profile of the ocean floor and the proposed bore path alignment would also be used to verify the depths provided are correct and to establish a true running line and elevation for the drill path. At the proposed exit point, (i.e., where the HDD operation proposes to “daylight” on the seabed offshore), a marine support crew would set a buoy at the exit and this distance would be measured and verified. The depth of the bore path is also intended to hinder the release of drilling mud to the service while remaining above unknown subterranean formations that may occur at greater depths.

Bore Site Preparation and Set-up

The bore sites, if conducted from the beach, are expected to encompass approximately 15,000 square feet (1,394 square meters), measuring approximately 100 feet (30.5 meters) by 150 feet (45.7 meters), and would be at least 20 feet (12.2 meters) west of the Strand. Figures 2-1 through 2-7 show the proposed beach and optional bore sites. The existing top sand (uppermost 1 foot [0.3 meter]) at each bore site would be pushed to the perimeter of the area to create a berm. A 6- to 8-foot-high (1.8- to 2.4-meter-high) chain-link fence would be constructed inside the berm of the bore site staging area. The posts supporting the fence would be driven into the sand, and the chain-link fencing would be covered with privacy fabric. The eastern fence would be covered with sound-dampening blankets. No structures or public equipment would need to be relocated at either bore site. The bore site would include lights to illuminate the site in the event of night time construction activities. During the night the lights could be illuminated for approximately 45 minutes if the boring contractor believes there is a risk of the bore pipe seizing. The lights on the bore site may also be utilized of the marine cable pulling activities extend into the evening, because once the marine cable pulling has begun it cannot be stopped. While the cable pulling is typically completed within 6 to 7 hours, if problems arise such as equipment breakdown, the pulling operation would continue into the night, requiring the use of the lights.

If the optional bore sites are used, the bores would be conducted from the street ROW. These locations would dictate a smaller, more compact bore site. The bore sites, if conducted from city streets, would encompass approximately 8,000 square feet (744 square meters) and would measure approximately 40 feet (12.2 meters) by 200 feet (61 meters).

Entry pits for the bores would measure approximately 10 feet (3 meters) wide by 12 feet (3.7 meters) long and 4 feet (1.2 meters) deep. The entry pit would also serve as the fluid return pit that would collect the drilling fluid that returns to the bore site. The pits are sufficiently sized to allow the drilling fluid returns from the drilling operations to be collected and recycled. Due to the non-toxic inert nature of the drilling fluid, no lining is necessary.

Boring Procedures

After mobilization and preparation of the drill rig, support equipment, and verification of relevant permit requirements, HDD operations would begin. Marine boring activities would be conducted during daylight hours, 7 days per week and continue until the bore has been completed, approximately 3 or 4 weeks per site, as detailed in Table 2-1.

The bore rig operates on a carriage assembly that travels by hydraulic power along the frame of the bore rig. The bore proceeds downward from the surface at an angle until the desired depth is achieved. At this point, the angle is gradually reduced and the drill remains relatively horizontal as it is guided to the proposed exit point. The bore pipe would be advanced along the pre-determined drill path while drilling fluid is pumped down the inside of the bore pipe and exited through the drill head. As each section of pipe is installed, the steel conduit used to house the fiber-optic and power cables would be advanced through the bore hole as it is created. Drilling fluid would then return to the entry point through the annulus between the outside of the drill pipe and the formation being bored.

Two types of drill heads could be used, depending on geologic conditions: a spud jet or an in-hole mud motor. Spud jets force the drilling fluid through the jet bit to erode the earth material and create the bore hole into which the conduit is inserted. This type of drill head is used in soft soils such as sands, silts, and clays—the expected composition of material to be encountered during the Project. An in-hole mud motor uses drilling fluids to rotate a drill head though hard rock such as limestone, sandstone, and granite; this type of head would be used if these conditions were encountered.

As discussed above, a drilling fluid (typically a solution of bentonite clay and water) would be circulated into the bore hole to prevent it from caving in and to coat the wall of the bore hole to minimize fluid losses to permeable rock and soil types. Drilling fluid also serves as a lubricant for the drill head and carries the cuttings (pieces of drilled rock) back to the entry pit, where the cuttings are removed. Clean drilling fluids are then recirculated into the bore hole. The drilling fluid—a non-toxic, inert material—would be used for drilling all but the final approximately 30 feet (9 meters) of the bore hole. To minimize the potential for release of silty material into the marine environment, the last section of the bore hole would be drilled using potable water as a drilling fluid. Spent drilling fluids (except for those lost to the surrounding subsurface material) and cuttings would be collected and disposed of at a permitted landfill.

Given the variety of geologic conditions that may be encountered, it is possible that some of the drilling fluids would be absorbed in fractures within the surrounding subsurface material. In cases where the fracture is lateral and subterranean, lost fluids would never surface. In other cases, drilling fluids may reach the surface (e.g., the fracture comes close enough to the surface that the pressure causes the release of drilling fluid above ground), referred to as a “frac-out). A frac-out occurs when the drilling fluids reach the surface, usually through fractures in the surrounding rock or sand.

Prior to drilling, the geologic characteristics of the substrate would be evaluated so that the most appropriate route for the conduit installation can be determined. During drilling, the potential for losing drilling fluids to the substrate would be assessed by monitoring the volume of the drilling fluid that is returning to the bore entry point and by monitoring for changes in the drilling fluid's pressure. If a loss of fluid volume or pressure is detected, drilling may be stopped or slowed to allow close observation for a surface release. If a release is discovered, the driller would take feasible measures to reduce the quantity of fluid released by lowering drilling fluid pressures and/or thickening the drilling fluid. However, both are dependent on geologic conditions. Any surface releases above the high-tide line would be contained by excavating a small pit over the release point or by placing straw bales, sand bags, or other suitable materials around the release point. Any drilling fluid that comes to the surface will be contained and removed once the bore is complete. Containment and collection are impractical for releases below MHW; consequently, some drilling fluids might dissipate in the sea water.

Bentonite (sodium montmorillonite) is natural clay that is a major ingredient of most water-based drilling fluids. It is considered inert and non-toxic, and has been approved for use by the U.S. Environmental Protection Agency. Any drilling fluids released to the marine environment through subsurface fractures would likely be dispersed rapidly by currents and wave-induced turbulence.

Site Clean-Up

Once the bore is complete and the temporary pull-line installed, the pipe would be capped and back-filled and the bore site would be de-mobilized. De-mobilization of the site would involve removal of the equipment, construction materials, and all other associated items from the work area . The work area would be returned to its original condition as described in Section 2.4.2.9, *Surface Restoration*. Excess drilling fluid and sediment excavated during the drilling operations would be removed from the collection pit and transported to an approved disposal site. The concrete anchor used to stabilize the drilling rig would be broken up and removed from the site and any excavation backfilled. Backfill activities are described below in Section 2.4.2.5, *Trench and Bore Pit Backfilling*.

2.4.2.2 Trenchless Conduit Installation

Approximately 90 percent of terrestrial conduit installation is expected to utilize trenchless construction rather than utility trenching. This construction technique would be used for the majority of construction within the City of Hermosa Beach streets, except in locations where the existing conditions require the use of an alternate technique. Trenchless technology uses small guided bores that can be steered. This approach allows the bore machine to sit at normal ground level, to bore down under an obstruction or along an alignment, and to be steered back up to the surface at a distant point. Once the bore reaches the opposite side of the resource or obstruction being avoided, the conduit is attached to the bore pipe and pulled back through the bore opening.

The bore machine would use a drilling fluid in the drilling process. The drilling fluid is typically a fine clay (such as bentonite) mixed with water. The clay-and-water mixture coats the wall of the borehole to help hold it open and to provide lubrication for the drill stem and pipe being installed. The drilling fluid is circulated back to the bore site for filtering and reuse. The bore machines would be able to complete approximately 500 feet (152.4 meters) per day.

Trenchless construction only disturbs the ground surface at the bore entry/exit pits, which would be spaced approximately 500 feet (152.4 meters) apart. Entry/exit pits, excavated at each end of the bore, measure approximately 4 feet (1.2 meters) wide and 8 feet (2.4 meters) long and 5 feet (1.5 meters) deep, for a total of 32 square feet (3 square meters). Activities around each pit, such as the laydown of equipment and material, would occupy approximately 500 square feet (46.5 square meters).

2.4.2.3 Conventional Boring

It is not expected that conventional boring would be widely used on the Project. However, the methodology is included in case it becomes necessary in an isolated incident for a reason that cannot be foreseen at this time, such as an underground geologic formation, or the presence of underground utilities in the area which might preclude the use of trenchless construction. Conventional boring is accomplished by simultaneously boring a horizontal hole and pushing a conduit under an obstruction (e.g., a road). A push pit approximately 6 feet (1.8 meters) wide and 25 feet (7.6 meters) long would be excavated to slightly deeper than the 4-foot (1.2-meter) conduit design depth. The pit accommodates the drilling and jacking equipment and the equipment operators. The actual boring process involves driving (or pushing) a rotating auger in a conduit from the push pit under the obstruction. As the auger and conduit are advanced, excavated material is carried out of the excavation through the casing. The process continues until the bore is completed into the receiving pit, an excavation that permits access to the auger and casing. In the final step, the auger is extracted and the conduit installed within the casing.

Conventional boring disturbs the ground surface at entry and exit pits. Each pit would encompass approximately 150 square feet (13.9 square meters). Activities around each pit, such as the laydown of equipment and material, would occupy approximately 500 square feet (46.5 square meters).

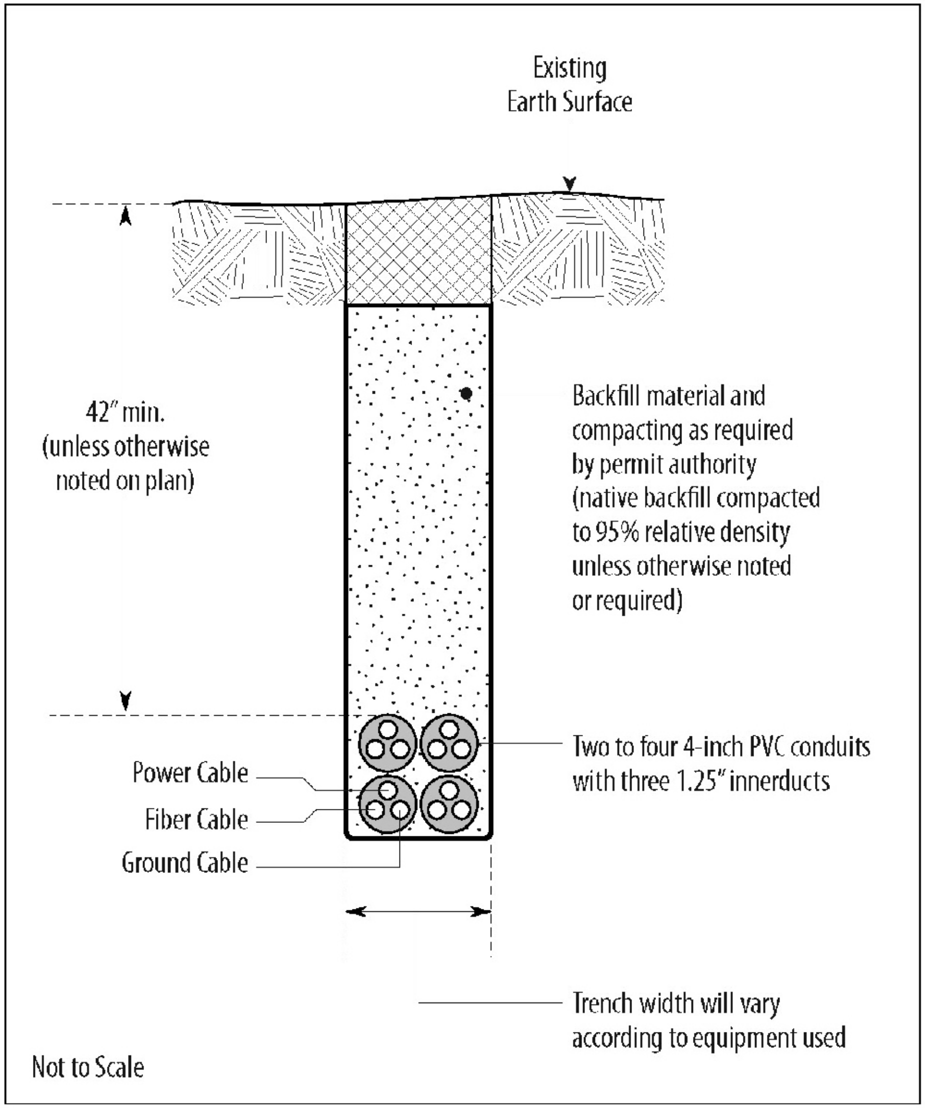
2.4.2.4 Trench Construction

Short segments of the terrestrial conduit system could be installed using trenching methods where boring is infeasible or undesirable. Short segments of trenching would likely be required at manhole locations and connection points to existing structures for the PFE facilities. The trenches would typically be 12 to 18 inches (31 to 46 centimeters) wide and 48 to 60 inches (122 to 152 centimeters) deep (depending on underground utilities encountered). Figure 2-12 shows details of installing trenches under earth and under asphalt. In some cases where numerous underground utilities are located closely together and the exact depth is unknown, trenching may be used to install new conduit rather than utilizing trenchless construction to prevent potential damage to the existing utilities.

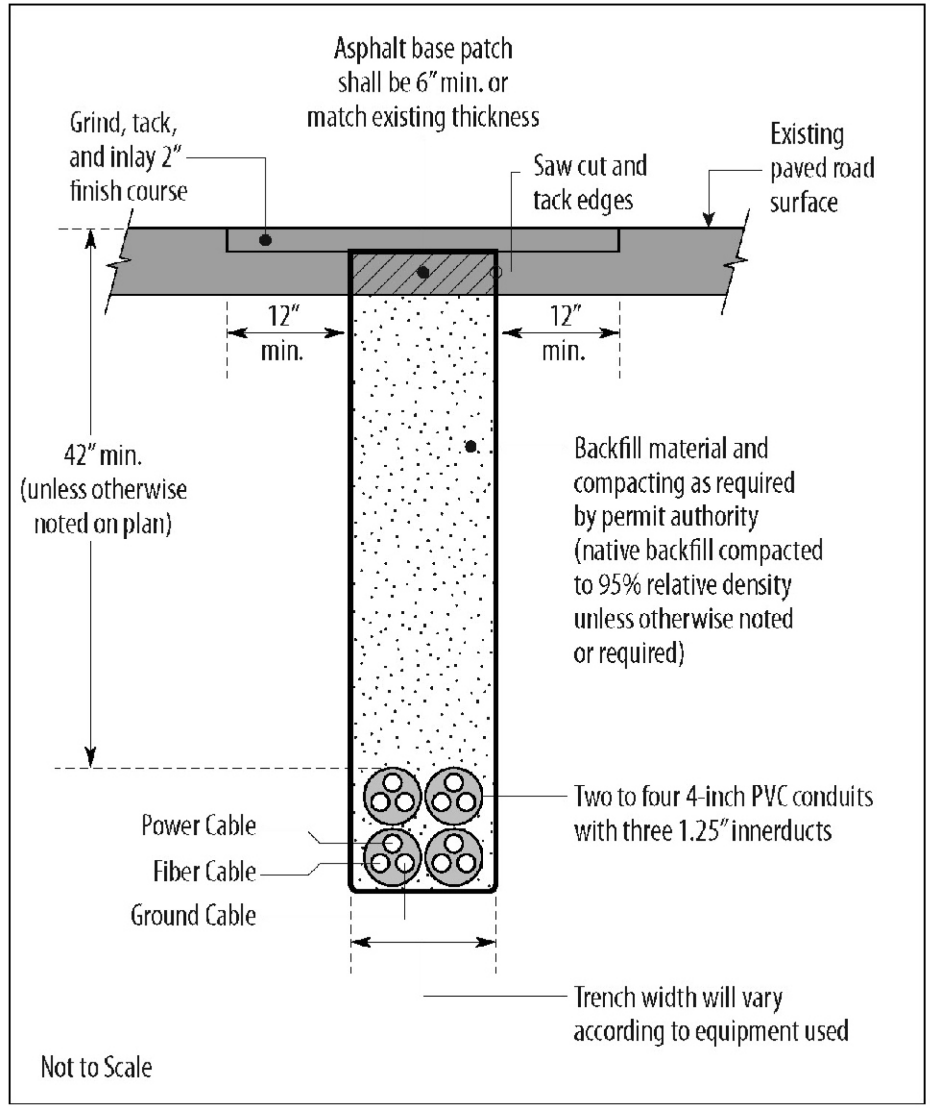
Trenches would be excavated with a rubber-tired backhoe or similar excavating equipment. Conduit placement would begin immediately following trench excavation. Where existing utilities are encountered, a minimum clearance of 12 inches (31 centimeters) would be maintained between the utility and the conduit. Generally, when existing utilities are encountered, the new facilities would be placed below the utilities so as not to interfere with their future maintenance.

2.4.2.5 Trench and Bore Pit Backfilling

Trench and bore pit backfilling would begin immediately after the conduits are installed. Backfilling would be accomplished with a rubber-tired backhoe or similar equipment. Backfill material would be compacted to eliminate erosion and soil settlement in conformance with *Specifications for Public Works Construction*, adopted by the City (Hermosa Beach 1998, revised 2004).



Detail of Trench Under Earth



Detail of Trench Under Asphalt

Source: ICF

Figure 2-12

Trench Detail

The backfill material would consist of native soil, imported aggregate base, or sand-cement slurry, and would conform to the specifications of the local jurisdiction. Material removed during trenching that would not be replaced would be disposed of at locations approved to receive clean fill.

Compaction of the backfill would be accomplished with a pneumatic drum roller, backhoe-mounted vibratory compactor, or hand-operated vibratory compactor. Water would be added to the material, as necessary, to obtain the relative density required by City specifications.

The backfilling activities are typically conducted by the excavation crew. The equipment and labor needed to carry out the work are included in the allocations for bores, trenches, and manholes.

2.4.2.6 Manhole Installation

Manhole installation entails excavating with a rubber-tired backhoe or excavator, placing the manhole in the excavation, and backfilling around the manhole. Backfilling is accomplished by placing backfill material with a rubber-tired backhoe/loader and compacting the backfill with a hand-operated vibratory compactor. Manholes may be installed before trenching. Traffic control would be the same as described for trenching operations (Section 2.4.2.11, *Traffic Control*).

A typical manhole placement crew can install one to two intermediate manholes per day. Each manhole excavation would be approximately 8 by 10 feet (2.4 by 3.0 meters). Activities around each pit, such as the laydown of equipment and material, would encompass approximately 1,000 square feet (93 square meters). The installation of each LMH would take two days to complete.

2.4.2.7 Innerduct and Terrestrial Cable Pulling

Once the conduit system is constructed, an innerduct (typically high-density polyethylene piping) would be pulled into the conduits and the cable installed. The innerduct and cable pulling processes are essentially the same. The innerducts and the cable would be installed by pulling them from one intermediate manhole to the next. Equipment required for this operation includes trailers to transport the innerduct and cable, and truck-mounted mechanical pulling equipment. Although cable pulling does not disturb the ground surface physically, traffic control may be required for manholes located in traffic lanes.

To reduce friction while pulling the cable into the innerduct, a pulling lubricant (e.g., Polywater Lubricant, manufactured by American Polywater Corporation) would be used. The lubricant would be introduced without pressure directly into the inner cell of the conduit, typically at a rate of less than 1 gallon per 1,000 feet (305 meters). The lubricant dries to a nontoxic powder that remains in the conduit and manhole system.

Innerduct and terrestrial cable pulling would not involve subsurface excavation. One lane of traffic would be occupied by the pulling activities for a distance of approximately 40 feet (12 meters). Cable pulling activities around each manhole would require approximately 500 square feet (46.5 square meters).

2.4.2.8 Marine Cable Pulling

Installing the marine cable through the directional bore pipe and into the LMH would require operations at both the LMH and the marine exit point of the bore pipe. A winch would be set up on shore just east of the LMH to pull the marine cable. A wire would be attached to the winch and to the end of the marine cable on the cable vessel. The winch would pull the marine cable through the steel conduit into the LMH, where the cable would be anchored in place. The pulling operation would be supported on the marine side as described in Section 2.3.2.6, *Cable-Pulling Support*.

2.4.2.9 Surface Restoration

Surface restoration is the final step in the construction process. Generally, restoration involves returning the Project site to its preconstruction condition or better.

In urban areas where paved surfaces have been disturbed, restoration entails pavement repair, curb and gutter reconstruction, and pavement re-striping, if needed. Typical pavement repair involves cutting and removing a strip of asphalt wider than the trench along its entire length. This is then replaced with new asphalt after backfilling and compaction are completed. Compacting backfill to a minimum of 95 percent relative density in two courses provides for a structurally sound repair.

In unpaved areas, restoration would entail grading to restore original contours; installing erosion-control devices at locations susceptible to erosion; and seeding, mulching, and fertilizing to return the site to preconstruction conditions.

On the beach, all construction materials would be removed, and the original top sand, stockpiled in the initial site preparation process, would be spread back over the site. The site would be graded and groomed to its original condition.

2.4.2.10 Staging Areas

Staging areas are not expected to be necessary for the work. Though the contractor that would implement the work has not yet been hired, it is expected that they would operate out of local yards. Materials needed to install the terrestrial components of the work would be brought into the Project site daily. The directional bore sites would be large enough to provide for materials storage needs.

However, it is possible that a local staging area would be developed for the work. If so, it would be located in an existing paved or disturbed area. For planning purposes, a possible staging area has been identified: a field at the northern end of Redondo Beach in vacant lots beneath the overhead power transmission lines. Reportedly, this area has been used previously for construction Projects in Hermosa Beach. The main staging area of approximately 500 by 500 feet (152 by 152 meters) would be used primarily to support terrestrial construction. The equipment and materials (e.g., backhoes, conduit, cable) would be delivered to this site at the beginning of Project construction. The equipment and materials would be transported to the individual work sites daily as needed.

Approximately 30 tractor-trailer loads of construction equipment and materials would be delivered to the main staging area. At the beginning of the Project, equipment and materials would arrive at the rate of approximately five trucks per day. Trucks would access the site using existing highways and roads. Gravel would be added to the site at the access point off Francisca Avenue and at critical locations within the staging area to control dust and prevent tracking mud onto public roads. The main staging area would be occupied from approximately two weeks prior to the beginning of construction until approximately two weeks following the end of construction.

2.4.2.11 Traffic Control

Because the terrestrial alignment would be mainly within public road ROWs, traffic would be controlled and coordinated. Traffic control would conform to the specifications of the local jurisdiction.

Materials would be delivered directly to the beach staging areas at the commencement of construction. Approximately 20 tractor-trailer loads of construction equipment and materials would be delivered to each of these staging areas. In addition, one fuel truck would make a delivery to the staging area every two days on average, and there would be approximately three deliveries of materials and supplies weekly. The deliveries would be made by a medium-duty class 6 truck or similar. Fuel delivery amounts would be roughly 1,000 to 1,500 gallons of fuel. The fuel will be stored in on-site fuel storage tanks. Trucks accessing the Longfellow Avenue bore site would typically use Pacific Coast Highway, Gould Avenue, Hermosa Avenue, and Longfellow Avenue in Hermosa Beach and 1st Street, 2nd Street, and Manhattan Avenue in Manhattan Beach. Trucks accessing the 25th Street bore site would typically use Pacific Coast Highway, Gould Avenue, Hermosa Avenue, and 25th Street.

Each load would take approximately 10 to 20 minutes to unload within the bore site perimeter. Standard traffic and pedestrian control measures would be implemented to ensure that vehicle and pedestrian access is not unduly disturbed. Though it would not be necessary to close any of the streets or the Strand, temporary delays while trucks cross over the Strand would be likely. Flaggers would be in place to alert recreational users and vehicles of crossing construction traffic. Standard construction cones, signs, and traffic control personnel would be in place to notify pedestrians of the construction vehicle crossings. Pedestrian and recreational traffic along the Strand would be maintained, and no extended access closures would be necessary.

Where access to any residential or commercial driveway is obstructed by an open trench or pit, steel plates would be placed over the excavation to provide temporary access.

During construction, Project personnel would need to access the work site. For the activities taking place close to the beach, the construction workers would be shuttled from a location away from the beach or downtown areas. The contractor would provide a shuttle for workers so as not to use public parking spaces available near the beach and downtown shopping areas. There also would be initial and periodic delivery traffic associated with the provision of construction supplies (e.g., conduit, steel pipe, manholes).

2.4.3 Terrestrial Alignments and Locations

Terrestrial conduit systems would be constructed to connect the LMHs to the PFE facilities. If fully built-out, a total of four terrestrial conduit routes would connect the two LMHs to four separate PFE facilities, two conduit routes per LMH.

The terrestrial conduit routes are proposed to be installed in public ROWs (streets) and areas zoned as Open Space (i.e., the Greenbelt and the beach). The PFE facilities would be located on existing commercial properties or at the City yard. Land uses adjacent to the conduit routes are mainly residential, commercial, and recreational. The precise location of the PFE facilities and the associated conduit routes within the ROWs would be determined during final design and in consultation with the City. A Project vicinity map with possible terrestrial routes and facility locations is shown in Figure 2-1.

Table 2-3. Land Disturbance for Construction Activities

Activity	Disturbance					Beach Area		Non-Beach Area	
	Length (feet)	Width (feet)	Depth (feet)	Area (square feet)	Quantity	Square Feet	Acres	Square Feet	Acres
Directional Bore Sites or Pits (LMH – Ocean)									
If from Beach (sand)	150	100	4	15,000	2	30,000	0.689		
If from Street [a]	15	10	NA	150	2	a		300	0.007
Landing manholes [b]									
If on Beach (sand)	16	12	10	192	2	a		384	0.009
If on Street									
Intermediate Manholes (every 2,000 feet)									
In Streets	10	8		80	6	480	0.011	480	0.011
In Greenbelt	10	8		80	6	480	0.011	480	0.011
Trenchless Construction (pits at 300 feet)									
In Streets	8	4	5	32	70	2,240	0.051	2,240	0.051
In Greenbelt	8	4	5	32	70	2,240	0.051	2,240	0.051
Conventional Bores (assume 4)									
In Streets	24	6	5	144	2	288	0.007	288	0.007
In Greenbelt	24	6	5	144	2	288	0.007	288	0.007
Trenching (for tie-ins and miscellaneous) – 10% of total conduit length									
In Streets	1	1.5	4	2	1,056	1,584	0.036	1,584	0.036
In Greenbelt	1	15	4	15	1,056	15,840	0.364	15,840	0.364
Total (maximum case)						53,440	1.227	23,824	0.547

(RTI, 2015b, Table 2-2)

[a] Disturbance on street would be only the pit. The pit area is included in the Landing manhole dimension.

[b] If on beach, the disturbance area is already included in the overall site disturbance.

2.5 Marine Segments

The marine segments of the cable systems refer to those segments between the MHW line and the outer limit of the continental shelf—that is, areas where seawater depth is no greater than approximately 5,904 feet (1,800 meters) (E&E, 2001).

2.5.1 Marine Components

The components of the cable systems that would be installed between the MHW line and a seawater depth of 5,904 feet (1,800 meters) are listed below (E&E, 2001).

- Marine conduit
- Marine cables
- Splice boxes
- Cable regenerators

2.5.1.1 Marine Conduit

The marine conduit that would extend from the landing sites west into the ocean is described in Section 2.4.2.1, *Directional Bores*.

2.5.1.2 Marine Cables

Two marine cable specifications would be used to provide an appropriate degree of protection for the cable from geologic and sedimentary conditions encountered during installation, as well as from potential interactions with fishing gear. Both designs involve surrounding a core of optical fibers with rings of wires, copper sheathing, and polyethylene insulation.

The greatest degree of protection would be provided by the double-armored design, which is used in areas of rocky or coarse substrate and where protection from fishing gear may be warranted. The double-armored cable incorporates two surrounding layers of galvanized wires, which are coated with tar, two layers of polypropylene sheathing, and an outer layer of tar-soaked nylon yarn to reduce corrosion (Figure 2-13).

The second type is a light-weight-armored cable, similar in design to the double-armored cable but with only a single surrounding polypropylene sheath and ring of galvanized wires. The light-weight-armored cable would be used where the risk of damage due to substrate conditions or fishing is reduced by the burial of the cable in soft-bottom sediments using a cable plow or remotely operated vehicle (ROV). Both cables would be less than 2 inches (5 centimeters) in diameter.

2.5.1.3 Cable Regenerators

Light pulses can be transmitted only approximately 35 miles (56 kilometers) along the cable before they need to be regenerated. This regeneration would be done by regenerator equipment attached to the cable at the appropriate intervals. The regeneration equipment would operate from 48 volts of DC electricity. The marine cable would contain a copper conductor to transmit the DC electrical power to the regenerators. The DC power system for the regenerators would be housed at the PFE facility and contain protective equipment that can detect either a sharp decrease or sharp increase in electrical current flow. Upon detection of abnormal current flow, the DC power system would be shut down. The DC generates a magnetic field on the order of 5 milligauss at a distance of 3.28 feet (1 meter) from the cable. The field diminishes with distance from the cable (such that at 33 feet [10 meters] it would be approximately 0.5 milligauss). Please see Section 3.7 *Hazards* for an expanded discussion on EMF.

2.5.2 Marine Construction

Two 5-inch (13-centimeter) steel conduits would be installed from each LMH into the ocean at each of the cable landing sites. Each conduit would contain a marine fiber-optic cable. Table 2-4 shows the construction method associated with various ranges of water depth. The exact vessels to be used in the Project are not known at this time. The construction support vessels will likely be ships of opportunity hired locally and depending on availability at the time of construction. The applicant has committed to compliance with the USEPA voluntary vessel speed reduction program and will limit the vessel speeds to 9 knots during the relocation and transit to the marine work stations. During cable laying operations, vessel speed will be reduced further. For more information on the vessel speed reduction please see Section 3.2.2, *Air Quality.*

Table 2-4. Summary of Proposed Marine Construction Methods

Route Description	Installation Method
Landing manhole to water depths of 40 feet (12 meters)	Directional bore
Water depths of 40–98 feet (12–30 meters)	Diver-assisted post-lay burial
Water depths of 98–3,937 feet (30–1,200 meters)	Cable plow, diver- or ROV-assisted post-lay burial
Water depths greater than 3,937 feet (1,200 meters)	Direct-surface lay

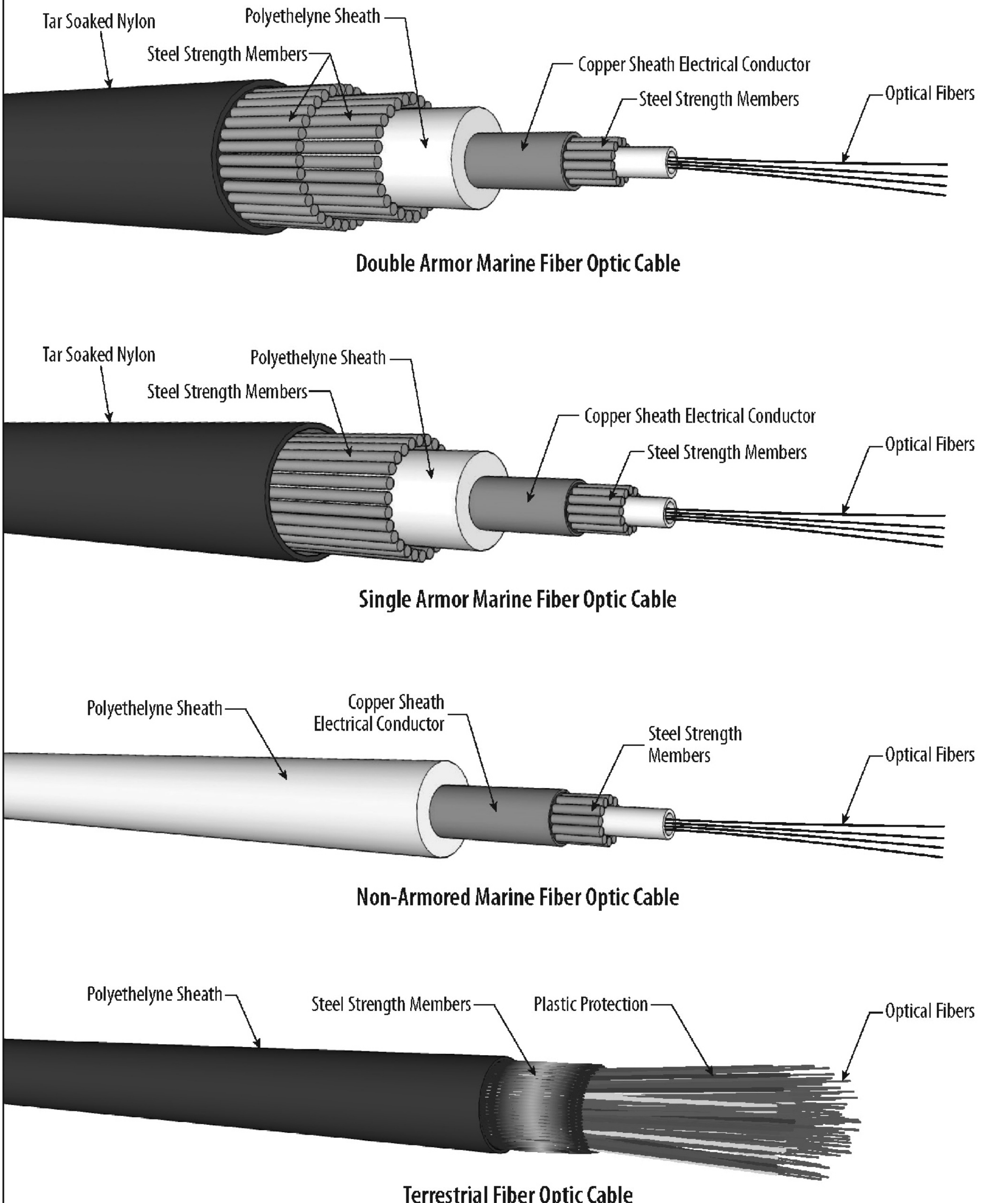
(RTI, 2015b, Table 2-3)

2.5.2.1 Directional Bore Support

The first marine task would be support of the directional bore operations. The primary work boat, which would serve as a dive platform, would arrive and set up on station within approximately 50 feet (15 meters) of the bore exit point. This boat would be a 100- to 200-foot (30- to 60-meter) construction work boat similar to the Motor Vessel (M/V) *American Patriot*. The work boat would use a four-point mooring with an anchor spread of approximately 328 feet (100 meters), as shown schematically in Figure 2-14. This boat would be accompanied by a smaller secondary work boat, similar to the M/V *American Endeavor*, which would set and retrieve anchors, as well as shuttle crew between the work boat and the shore.

There are three portions of the Project that would take place in the “near shore” area that would require daily crew change and supply delivery – HDD support, cable pulling support, and diver post-lay burial. Though the exact port is not known at this time, it is assumed that the initial mobilization and demobilizations will be from/to the Port of Long Beach. The daily trips will be to/from Kings Harbor in Redondo Beach. No helicopters will be used for transport or any other purposes. All anchors would be set and retrieved vertically to avoid dragging them across the seafloor.

The directional bore support would be needed for approximately two days per bore pipe. Operations would only occur during the daytime in accordance with the City’s noise ordinance. The main dive platform, similar to the M/V American Endeavor would be anchored on station and a support vessel hired locally would deliver the work crew in the morning, along with the day’s supplies. The support vessel would likely stay on station until the end of the work day when it would return to port with the work crew.



Source: ICF

Figure 2-13

Fiber-Optic Cables

Bore Exit

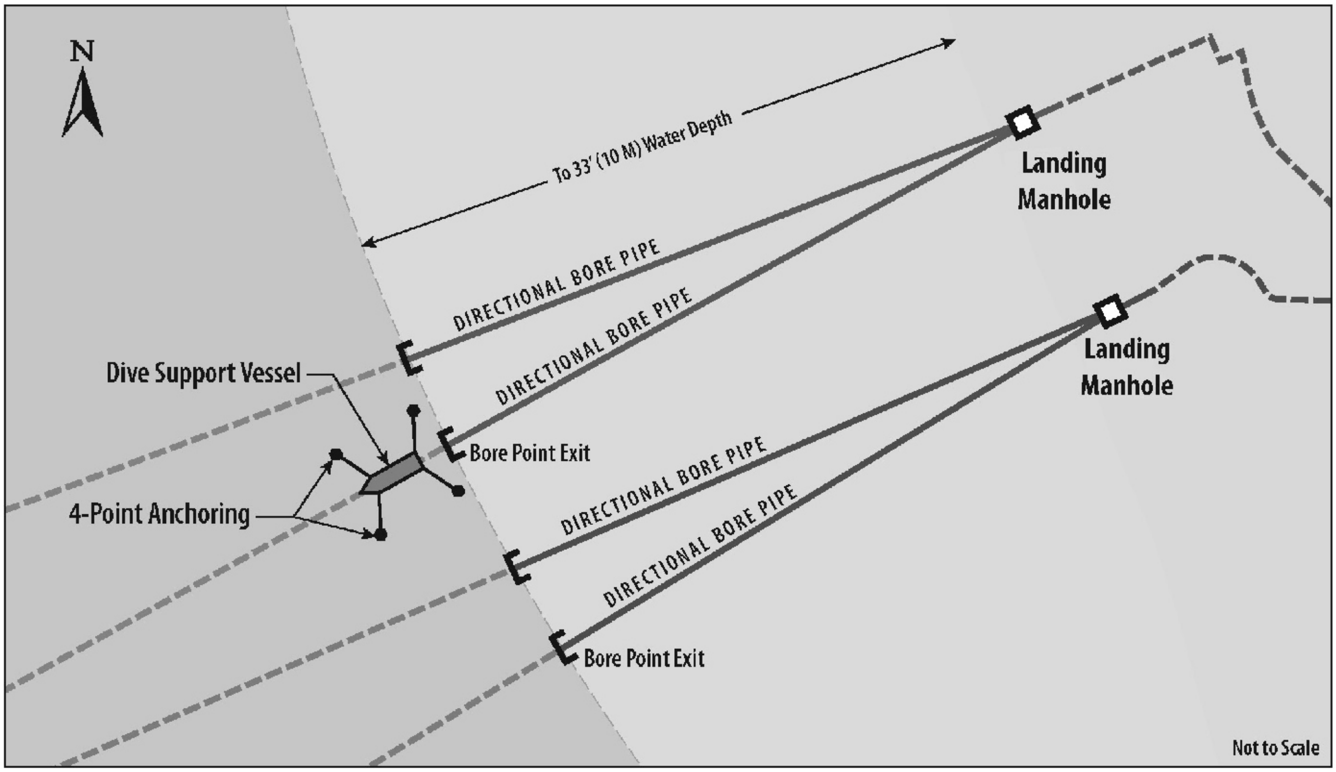
As the drill stem approaches the exit point on the ocean floor, the boring conditions would be monitored to determine the exact location of the bore head in relation to the exit point. In order to achieve a mud free exit and minimize the potential release of large quantities of bentonite on the ocean floor, the drilling mud would be circulated out of the system by flushing the drill string with fresh water. The exact distance and time from the exit point that freshwater would be introduced into the drill string would be based on boring conditions and not a predetermined distance. The actual bore exit would be identified by the drill crew when the bottom-hole assembly is no longer supported by the soil and the angle of the drill string changes dramatically. A marine support crew would be dispatched to dive on the exit to verify the exit point. Once the exit has been verified, an on-site inspector would be given the true offshore exit coordinate for approval.

Remove Bottom-hole Assembly

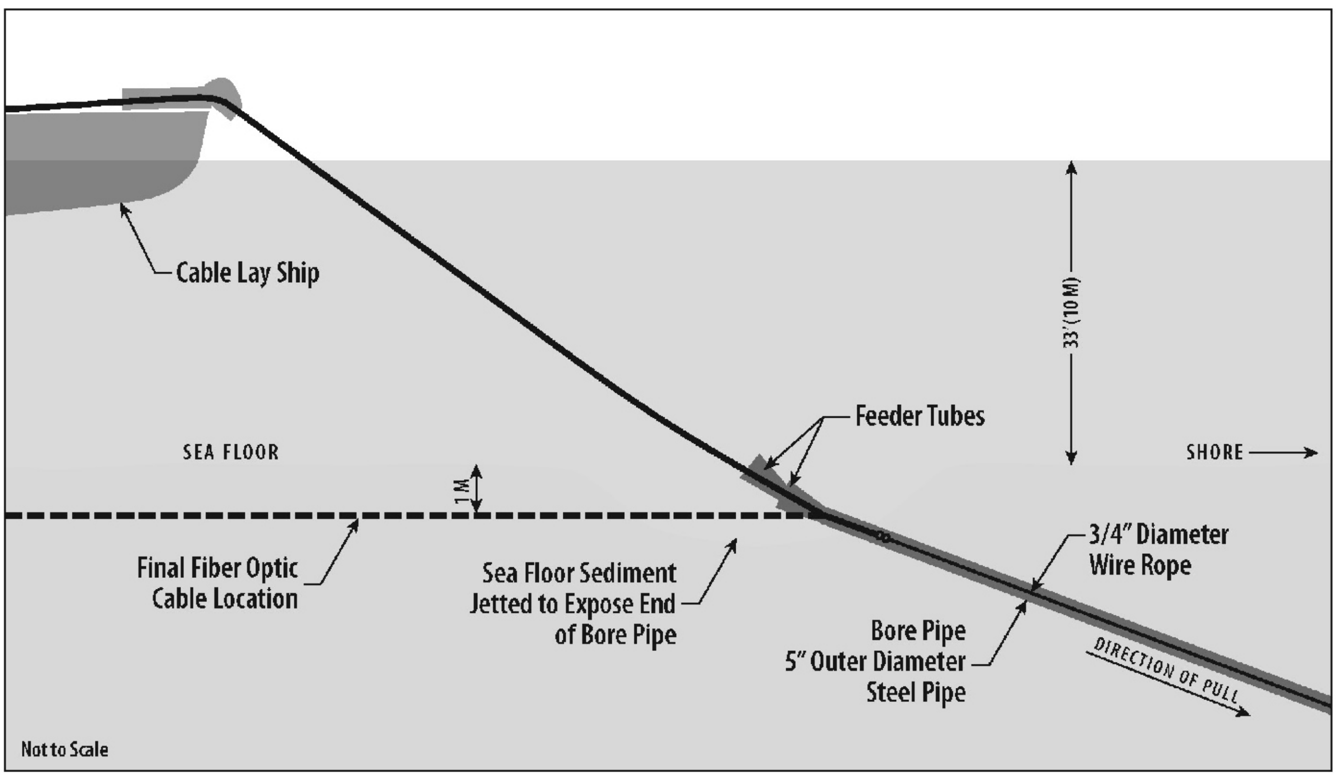
Once the exit location has been approved, divers would jet down through the sediment and excavate approximately 10 to 15 cubic yards (8 to 12 cubic meters) of seafloor sediment to expose the end of the pipe. The divers would then cut off the drill steel at a desired depth using underwater cutting equipment. Once the pipe is cut and the end of the pipe has been de-burred to remove any sharp edges, the guidance wire would be removed and a pipe pig attached to an aircraft cable would be installed at the onshore end of the drill pipe. The pipe pig would be hydraulically pushed through the drill pipe with fresh water with the cable trailing the pig. This removes any remaining drilling fluids, proofs the pipe, verifies the inside of the pipe is clean, and provides a cable for pulling the fiber-optic cable through the drill pipe. A check valve and a bell mouth would be installed on the offshore end of the drill and any extra cable would be pushed into the land portion of the drill pipe. The valve is intended to keep seawater from entering the bore pipe until the cable is installed. This process would be repeated for each of the four bore pipes. The cable would be tied off to a cap that would be placed on the land portion of the drill pipe. A locator ball would be placed above the cap and the pipe would be buried according to specification. The locating ball would be used to relocate the pipe casing prior to the installation of the fiber-optic cable.

2.5.2.2 Cable-Pulling Support

The marine cables would be pulled into the bore pipes from the LMH on shore. The cable ship would position itself approximately 328 feet (100 meters) seaward of the end of the bore pipe into which the cable is to be pulled. Divers would then install cable chutes (also known as feeder tubes) to the end of the pipe and floats to the cables in preparation of pulling. A workboat would assist with feeding a wire rope from the end of the marine conduit to the cable ship. The end of the cable would be attached to a 0.75-inch (1.9-centimeter) wire rope that would be placed during the final stage of the directional bore process and attached to a hydraulic winch. Each of the cables would be pulled into the LMH by the winch and anchored behind the LMH. Once the cable is secured in the LMH, the cable ship would move away on its course. Divers would manage and monitor the pulling process from the workboat.



Vessel Anchor Plan



Cable Pullback Operation

Source: ICF

Figure 2-14

Anchor Plan Pullback

The support for pulling the cable from the main cable lay vessel into the completed bore pipe would typically take two days per cable. The first day would be to arrive on station and prepare the end of the pipe for the operation. This would be a daytime operation. The second day would be to install the cable into the bore pipe. This day would be a 24-hour operation once the cable pulling begins. The vessel that will serve as the dive platform will be anchored on station and a support vessel will deliver the work crews along with the day's supplies. The dive platform would stay on station during the operation.

2.5.2.3 Pre-Lay Grapnel Run

The purpose of a pre-lay grapnel run is to clear debris, such as discarded fishing gear, from the seafloor along the corridors where the cables are to be buried. To accomplish this, a grapnel, typically of the flatfish type (Figure 2-15), would be dragged along the cable routes before cable installation. The grapnel would be attached to a length of chain to ensure contact with the bottom and towed by the main cable ship or a workboat similar to the *Dock Express 20* at a speed of approximately 1.2 miles per hour (approximately 1 knot or 1.9 kilometer per hour). The arms of the grapnel are designed to hook debris lying on the seafloor or shallowly buried to approximately 1.3 feet (0.4 meter). If debris is hooked and towing tension increases, then towing would cease and the grapnel would be retrieved by winch. Any debris recovered during the operation would be stowed on the vessel for subsequent disposal in port.

All four of the proposed cable alignments would cross at least one currently buried cable. Prior to the cable-laying activities, current cable positions would be obtained from the existing cable owners, and the locations would be verified when possible during the geophysical survey. The pre-lay grapnel run would not be performed in the vicinity of potential buried cables. The grapnel would be raised off the seafloor 656 feet (200 meters) before the potential buried cable location, and not lowered until at least 656 (200 meters) past the potential buried cable location.

2.5.2.4 Cable Laying and Plowing

Beginning at the end of the bore pipe, the cable would be temporarily laid directly on the seafloor to a water depth of approximately 328 feet (100 meters) until it can be post-lay buried by divers or ROV as described below. For the remainder of the buried section of cable, burial would be achieved by cable plowing or by ROV-assisted post-lay burial.

Software provides operators with substantial control over the variables in cable laying, the most important of which are cable position and tension. The software calculates the forces on the cable and automatically adjusts cable payout speed and vessel navigation to keep tension within acceptable limits. Key parameters in controlling cable position and tension are the ship's speed over the seafloor, the speed of the cable being payed out from the ship, and water depth. These parameters are continuously monitored during cable-laying operations. The ship's position and speed over the seafloor are measured by a global positioning system, and water depth is measured by echo-sounders and seabed mapping systems. Cable pay-out speed and length are also monitored. Computerized tracking of the entire laying operation includes corrections for external factors such as winds and ocean currents.

Cable plowing can be used on the marine cable between the water depths of 328 feet (100 meters) and 3,037 feet (1,200 meters). A cable plow is a burial tool in the form of a large sled that is deployed by the main cable ship after the shore-end landing operations are complete. Once deployed to the bottom, divers assist with loading the cable into the plow's articulated feed chute and burial shank. These mechanical movements are controlled through an umbilical cord connecting the plow to the cable ship by an operator watching the divers through a video camera mounted on the plow. When the ready signal is given, the ship moves away with the plow in tow. As it is towed, the plow mechanically buries the cable to its desired depth. The plow accomplishes this by slicing through the ocean floor sediments, while at the same time the cable is fed through the plow shank and into the bottom of the furrow in one operation, as illustrated in Figure 2-16. The plow furrow would be a narrow area of approximately 3.3 feet (1 meter) wide. The plow would be supported by two sled outriggers to a total width of approximately 20 feet (6.1 meters). The furrow created by the shank of the cable plow tool naturally closes under the weight of the sediments and the plow sleds that transmit the weight of the plow to each side of the furrow, effectively adding compacting force to the sediment. The combination of the two forces—the weight of the soil and the weight of the sled—is sufficient to fully close and compact the furrow. No further compacting would be required.

2.5.2.5 Post-Lay Marine Cable Burial

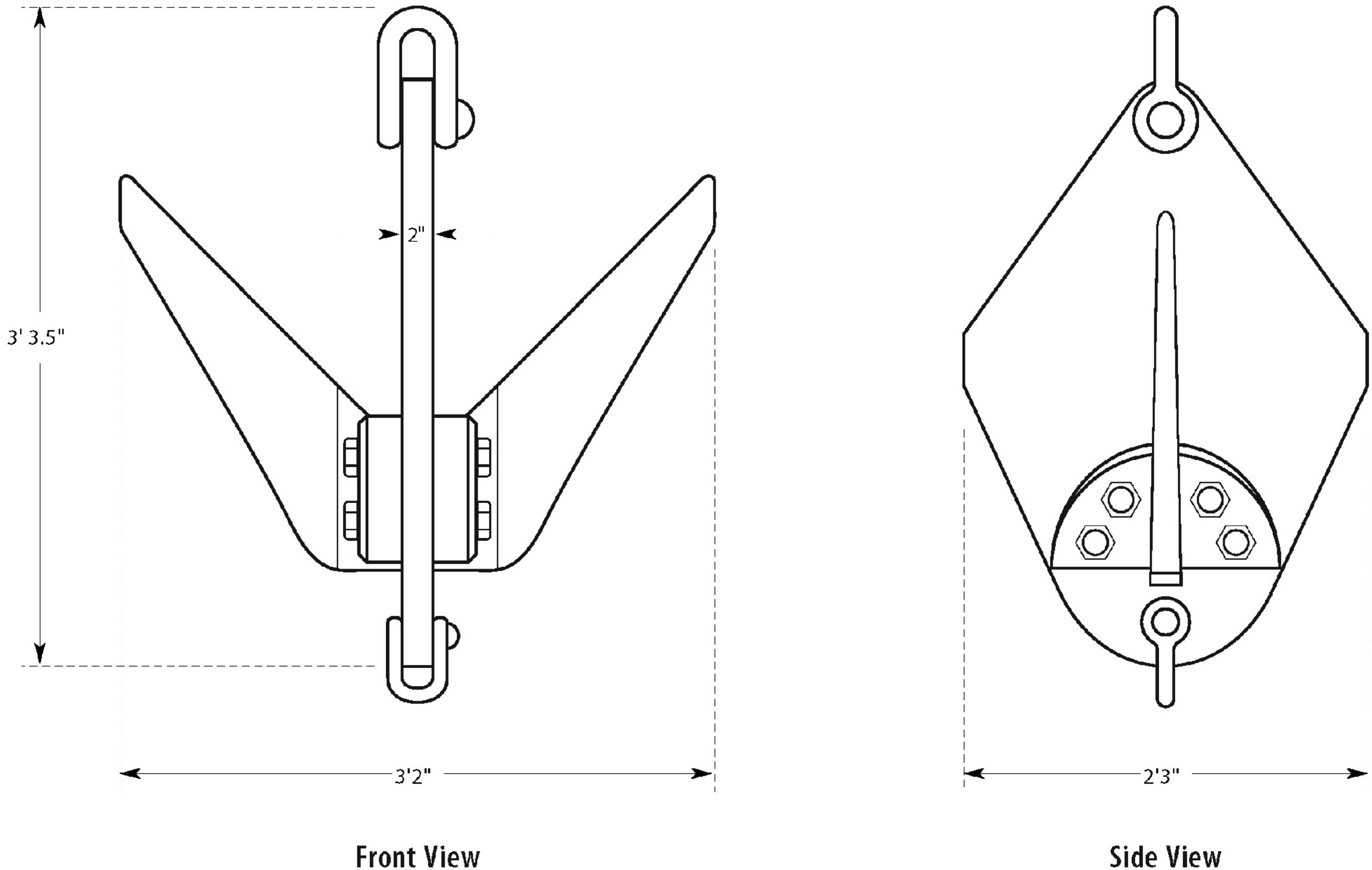
In some locations where plow burial is not possible, such as where the cable would be laid on the seafloor due to the presence of other cables in the area, the cable would be buried using post-lay burial methods. These methods would include diver-assisted jet burial and ROV burial.

Diver-Assisted Post-Lay Burial

Diver-assisted burial can be used in shallow water depths typically between 33 and 98 feet (10 and 30 meters). Once the cable has been securely anchored at the LMH, the main cable ship is given the order to begin moving out along the predetermined course, paying out the marine cable as it goes. The ship would move away at a rate of approximately 2.3 miles per hour (0.2 knots or 3.7 kilometers per hour).

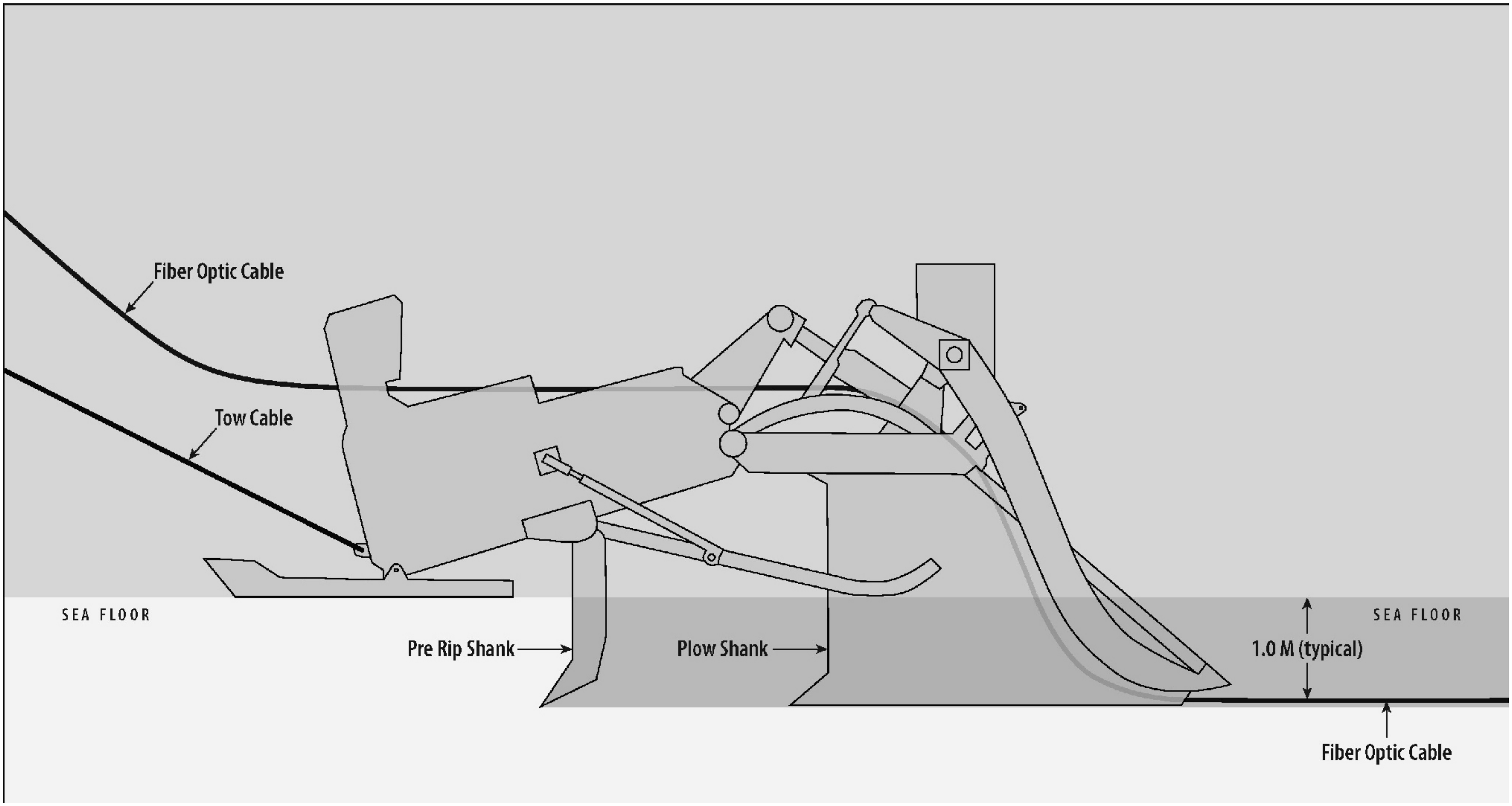
Diver-assisted burial would be used from the end of the bore pipes to a water depth of approximately 98 feet (30 meters), and cables would be installed using diver-assisted jetting equipment. For diver-assisted burial, divers would use hand jets to open a narrow furrow beneath the cable. This action would allow the heavy cable to drop into the furrow as it is opened, and the disturbed sediments would then settle back over the cable. This would fill the furrow and restore the surface to original grade. Depending on bottom conditions, the cable would be buried to a 3.3-foot (1.0-meter) water depth, where feasible based on localized conditions.

This operation would be conducted during the daytime and will utilize both a dive platform and a support vessel. The dive platform vessel will be on station and will move along the cable alignment as the burial progresses. The support vessel would deliver the work crews and daily supplies to the vessel each morning and return at the end of the work day to retrieve the workers. The operation is expected to take approximately one week to complete.



Source: ICF

Figure 2-15
Grapnel



Source: ICF

Figure 2-16

Sea Plow

Remotely Operated Vehicle (ROV) Post-lay Burial

Between water depths of approximately 98 feet (30 meters) and 328 feet (100 meters), or where the cable plow cannot achieve the targeted burial depth because of bottom conditions, an ROV would be used to attempt to bury the cable. These sections of cable would be laid temporarily on the ocean floor by the cable ship awaiting post-lay burial attempt at a later date by the ROV (E&E 2001).

An ROV is a robotic device operated from the vessel. The ROV would be deployed and operated from the main cable ship or a similar vessel. The ROV moves under its own power and is tethered to and guided from the cable ship. In a manner similar to the hand jets used in diver-assisted burial, ROV jets would loosen the seafloor sediments beneath the cable, allowing it to settle to the desired depth. The disturbed sediments would then settle back over the area to their original grade, leaving the cable buried. The cable is typically left at a depth of 3 to 4 feet (1 to 1.2 meters). The ROV has a nominal speed of 0.35 mile per hour (0.3 knot or 0.56 kilometer per hour) when jetting. However, the overall rate of forward progress depends on the number of passes needed to attain target burial depths, which in turn is a function of sediment stiffness. Up to three passes may be required; therefore, the overall rate of burial using an ROV is estimated to be 0.1 mile per hour (0.09 knot or 0.2 kilometer/hour). Post-lay burial of the cable by ROV would take place between 1 day and 3 weeks from when the cable is first laid on the ocean floor.

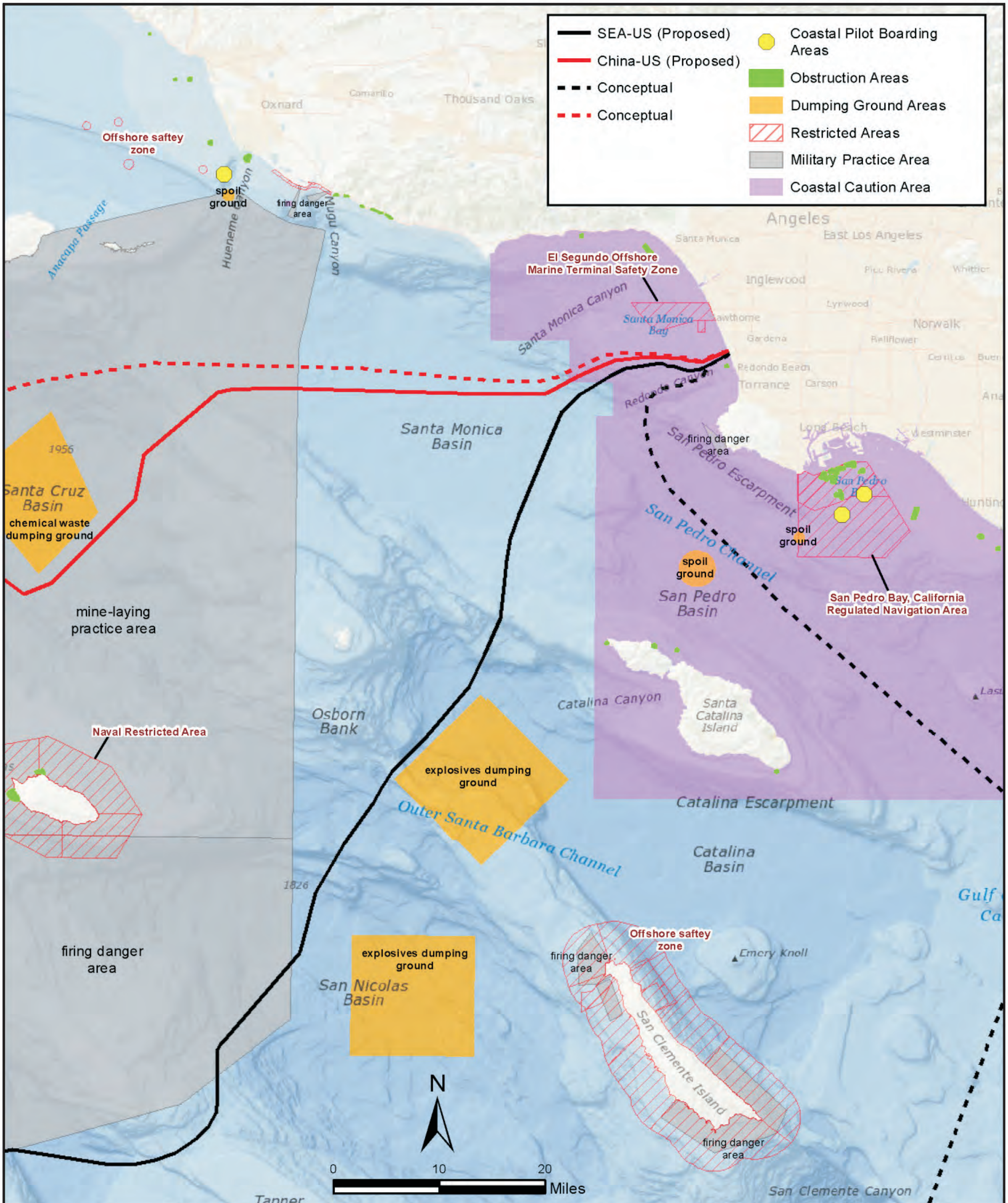
The post-lay burial of cable by ROV would disturb the seafloor. The typical width of disturbance associated with this activity is 15 feet (4.6 meters). This disturbance addresses the seafloor only, not disturbance to the water column.

2.5.3 Marine Alignments

The proposed marine routes cross coastal submerged lands under the City's jurisdiction (MWH to 3 nautical miles [3.5 statute miles or 4.8 kilometers] offshore, and offshore waters above the continental shelf from 3 nautical miles [4.8 kilometers] offshore to a distance where the seawater depth is approximately 5,904 feet [1,800 meters]). The proposed routes cross Santa Monica Bay and several offshore basins, ridges, and escarpments located on the California Borderland before reaching the edge of the outer continental shelf (E&E, 2001). All four of the proposed cable alignments would cross at least one existing cable.

The proposed marine routes were selected to avoid the following known marine features shown on Figure 2-17 and 2-18.

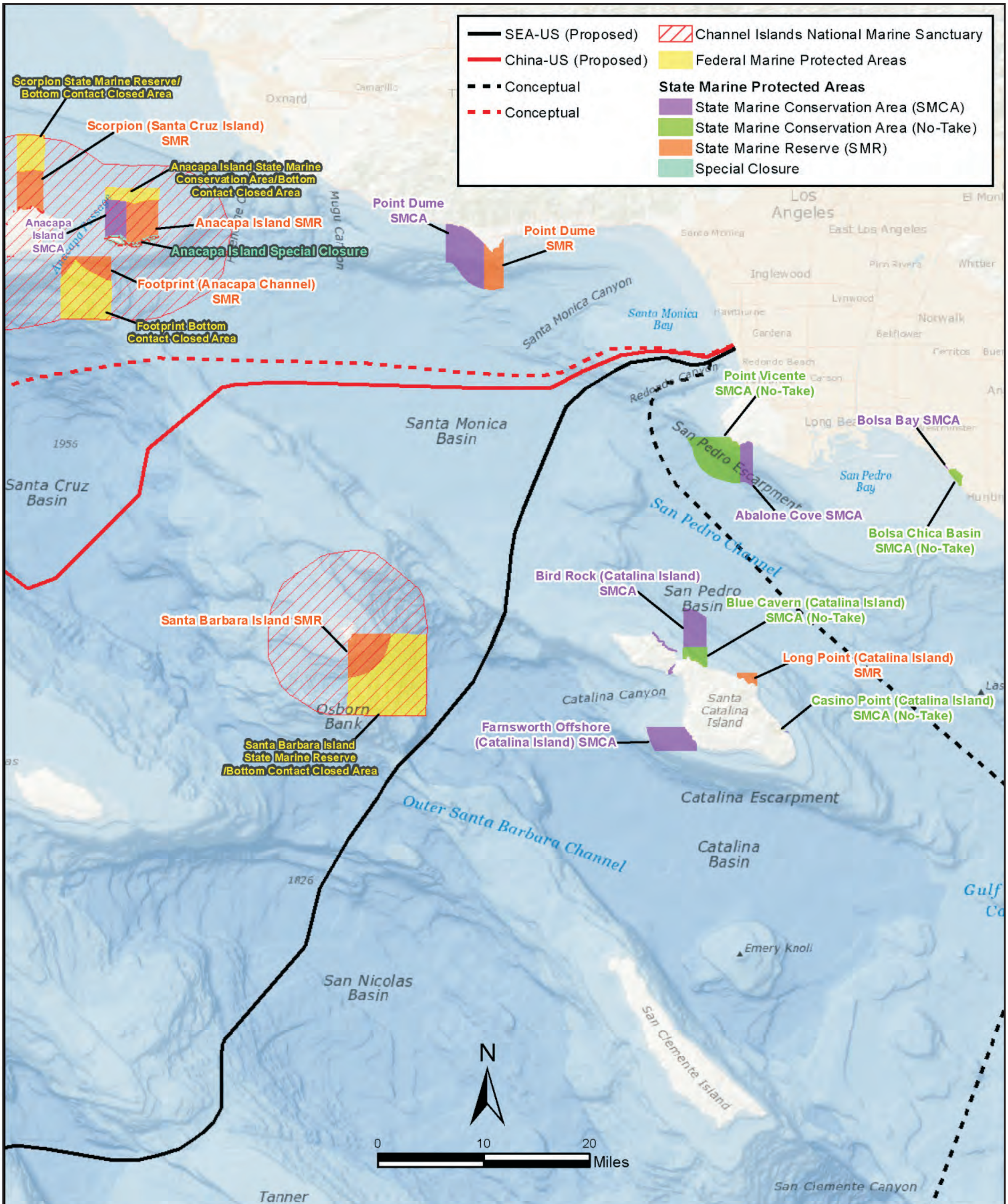
- Santa Monica Canyon and Redondo Canyon.
- Areas under consideration as part of the Channel Islands National Marine Sanctuary.
- Explosives dumping areas.
- Fisheries associated with Tanner Bank and Cortes Bank.
- Contaminated sediments in Santa Monica Bay associated with the Palos Verdes shelf and the Hyperion sewage outfall.
- Commercial vessel anchoring and pilot boarding areas.



Source: ICF International, NOAA, ESRI

Figure 2-17

Hazards



Source: ICF International, NOAA, ESRI

Figure 2-18

Marine Protected Areas

2.6 Operations, Maintenance, and Repair

2.6.1 Cable Identification

Differential geographic positioning system navigation would be used during installation of the cable systems. Extensive records would be maintained to track the exact location of the cable-lay ship, cable plows, or ROVs during the installation process. After installation, the data would be compiled into a standard-format cable record. The record would be distributed to all cable maintenance zone ships, government charting agencies, and other data users. Records can then be used to locate the cables on the seabed when a cable repair is needed. These records would be maintained throughout the system's life and after the system is retired.

2.6.2 Cable Operations and Maintenance

Other than ensuring that the power feed and transmission equipment in the terminal station are in proper working order, no routine maintenance is planned for the terrestrial segments of the cable network. These cables typically operate for 25 years. Routine maintenance for the marine segments of the network is unnecessary due to the stability of the ocean-bottom environment.

2.6.3 Emergency Cable Repair (Marine)

The cable could be damaged by saltwater intrusion into the conduit or by anchors or fishing gear that could snag the cable and cause a fault. For a typical shallow-water repair, the location of the fault (the point at which transmission is interrupted) can usually be pinpointed through the use of low-frequency electroding, and little if any extra cable must be added during the repair because of the shallow depth.

2.6.3.1 Buried Repair

If the cable is buried in the vicinity of the fault, the grapnel used by the repair vessel should be sized to match the burial depth attained during installation. Typically, a standard flatfish grapnel (Figure 2-15) can be rigged to penetrate and recover cable from burial depths up to 20 inches (50 centimeters). If deeper burial is involved, then a de-trenching grapnel, divers, or an ROV can be used to remove the cable from the burial trench and bring it to the surface. There, the cable can be repaired and then reburied in its original position to the extent practicable.

2.6.3.2 Unburied Repair

If the cable is not buried in the vicinity of the fault, it might be possible to engage it and bring it to the surface without cutting, provided there is sufficient bottom slack to allow this. The cable can be torch-cut at the bow of the ship. Otherwise, a cutting blade can be fitted to a flatfish grapnel, and the cable cut close to the fault location before recovery. Gifford grapnels can then be used for holding runs to recover each cut end. A Gifford grapnel is a type of grapnel comprised of four wide seated hooks at right angles to each other. It is typically used on hard or rough bottoms. Generally, the "good" end is the first one recovered (i.e., it is presumed that the fault would be in the cable still on the bottom).

After the cable is recovered, the end is prepared and the fibers tested using a conventional optical time-domain reflectometer (OTDR). Additionally, the power conductor path is checked to verify the absence of a shunt fault (fault to the power conductor). If there is any reason to suspect that the fault is in or beyond the repeater, Coherent OTDR also can be used. In any particular case, testing methods and the sequence of tests depend on the fault characteristic previously observed from the PFE facility and/or from results of testing with probes that detect an electroding signal on the cable power conductor.

The recovered end is then sealed and buoyed off for easy recovery later. Next, the other end is recovered and similarly tested to locate the fault more precisely. The repair vessel then recovers the cable until the fault is aboard. After the fault site (either cable or repeater) is removed from the system, the repaired cable is joined to the fault-free cable end and paid out as the vessel returns to the buoyed end. If the fault is in a repeater, it is replaced with a spare repeater. When the buoy is recovered, the two cable ends are joined. Before the joint is "overboarded," or returned overboard to the ocean floor, the system is powered and tested from the terminal stations to verify proper DC and transmission performance. The overboarded cable then is buried by an ROV if it came from a buried section or is laid on the bottom if it came from an unburied section.

2.7 Retirement, Abandonment, or Removal of the Cable Systems

The Project would have a life of approximately 25 years. Within 90 days of either taking the cable out of service or the expiration of the City lease, the applicant would advise the City, the California Coastal Commission, and any other agencies with jurisdiction over the cable of the status and proposed disposition of the inactive cable. The cable owner would also work with the City to determine if removal of facilities would be necessary. All terrestrial facilities, including the conduit and manhole system would be left in place and available for use by other cables. The directional bores installed to facilitate the cable landings would also be left in place.

The applicant has stated that the buried portions of the marine cable are expected to be left in place. However, in the past, the Coastal Commission has included a condition in Coastal Development Permits requiring the cable owner to apply for an amendment to the original permit after the cable is taken out of service. Through that permit amendment process, the Coastal Commission will determine whether it will require removal of the cable from the waters of the State of California. If is the Coastal Commission determines that removal is required, the cable owner would conduct the removal.

If the terrestrial cable is removed after Project retirement, it is anticipated that the cables would be accessed from the existing manholes and pulled out from the conduit using a truck with a reel puller, leaving the conduit in place and available for new cable to be installed. The other buried components of the terrestrial system are expected to be abandoned in place. As a result, no excavation or ground disturbance would be required. The equipment in the PFE facilities would be removed and the space the facilities occupied would be available for a new use.

If the marine cable is removed from State waters, the buried cable would be exposed using a ROV and hauled to the surface by a ship, which would bring the cable on board and then transport it away for disposal. The method of disposal is not known at this time.

Whether the removal impacts would be significant would depend on the existing setting and significance criteria at the time. At the end of the cable's life, a subsequent environmental analysis would be conducted and measures imposed, as needed, to reduce or avoid significant impacts.

2.8 Intended Uses of the EIR

Permits and approvals presumed necessary for construction of the proposed Project that are known at this time are listed in Table 2-5 below. This EIR is intended to provide the environmental clearance required by the California Environmental Quality Act for discretionary permits and approvals required by local and State agencies to implement the proposed Project. Separate environmental review under the National Environmental Policy Act (NEPA) may be required for federal actions required for Project approval. The primary federal action required for implementation of the Project is a permit for compliance with Section 404 of the Clean Water Act. At this time, it is anticipated that the Project would qualify a Nationwide 12 Authorization under the Clean Water Act, which does not typically necessitate NEPA review. The U.S. Army Corps of Engineers, which issues Section 404 permits, would be responsible for determining if the Project qualifies for a Nationwide 12 Authorization.

Table 2-5. Required Permits and Approvals

Agency	Permit/ Approval
Local	
City of Hermosa Beach	Building Permits, Encroachment Permits related to placement of conduit and construction activities
City of Hermosa Beach	Planned Development Permit for development in Open Space Zone
City of Hermosa Beach	Precise Development Permit
City of Hermosa Beach	Easement or lease for development of landings and for power feed equipment facility at the City maintenance yard
Air Resources Board or Air Pollution Control District	Air Quality Authorization
Regional Water Quality Control Board	Section 401 Clean Water Act Certification
Los Angeles Regional Water Quality Control Board	Dewatering Permit (if necessary)
State	
State Water Resources Control Board	National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activities
California Department of Fish and Wildlife	Letter of Concurrence Section 2090 Interagency Consultation Possible Section 2081 Incidental Take under the California Endangered Species Act
California Coastal Commission	Coastal Zone Management Act Consistency Determination
California Coastal Commission	Coastal Development Permit
Federal	
U.S. Army Corps of Engineers	Section 404 Clean Water Act, Nationwide 12 Authorization
NOAA Fisheries	Letter of Concurrence pursuant to Section 7, Endangered Species Act (If needed)
US Fish and Wildlife Service	Letter of Concurrence pursuant to Section 7, Endangered Species Act (If needed)

(RTI, 2015)