CHAPTER 1

PROJECT DESCRIPTION

1.1 INTRODUCTION

In its California Public Utilities Commission (CPUC) application (A.03-12-039) for a permit to construct the Potrero to Hunters Point 115 kilo-volt (kV) Cable Project pursuant to GO 131-D, Pacific Gas and Electric Company (PG&E) is proposing a project that includes the installation of approximately 2.5 miles of underground 115 kV single circuit cable to serve as a transmission line between PG&E's Potrero and Hunters Point switchyards ("Potrero to Hunters Point 115 kV Cable Project" or "project") (see **Figure 1-1**). The project would also include certain modifications to each of the switchyards. Additionally, construction staging areas would be needed to store equipment and excavated materials. The project is intended to provide upgrades to the electrical transmission system serving the City and County of San Francisco (City) to support continued system reliability. This Initial Study considers the potential environmental impacts from PG&E's proposed project route and investigates a reasonable range of project alternatives (see **Figure 1-2**).

1.2 PROJECT OBJECTIVES

PG&E's most recent electric demand forecast for the City, which was used to develop the base case loads for PG&E's 2003 Electric Transmission Grid Expansion Plan, anticipates a growth rate of about 15 megawatts (MW) per year. Substantial additions to PG&E's electric transmission systems would be required in order to meet this growth demand and to maintain the reliability of the transmission system while complying with the transmission planning options for the San Francisco Bay area as identified by the California Independent System Operator (CAISO).[1] In addition to transmission upgrades, generation additions to PG&E's systems are included as a long-term initiative to meet growing power needs and to increase reliability (SFPUC 2002), which are discussed in greater detail in Section 2.12.

The Potrero to Hunters Point 115 kV Cable Project would provide necessary upgrades to the electrical transmission system serving the City in order to improve reliability, increase capacity,

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1 Included as part of the CAISO California Grid Planning Criteria are the Planning Standards and Guidelines of the North American Electric Reliability Council (NERC). As a part of the CAISO long-term plan (five to ten years) PG&E has agreed on transmission planning options for the San Francisco Bay area. This final stakeholder report is posted on the California ISO website at (http://www2.caiso.com/docs/2004/02/25/2004022516265416166.html). To address the deficiencies identified in the report, PG&E has implemented or is in the process of implementing the Jefferson-Martin 230 kV and San Mateo-Martin #4 60 kV to 115 kV conversion projects as well as the proposed Potrero to Hunters Point 115 kV Cable Project. .

SOURCE: Environmental Science Associates (2004)

Figure 1-1
Project Overview Map

SOURCE: Environmental Science Associates (2004)

Figure 1-2
Alternatives Route Map

and provide a component needed to meet the goal of closing PG&E's Hunters Point Power Plant, an aging plant that has operated beyond it's potential lifetime, pursuant to PG&E's agreement with the City.[2] Additionally, the Potrero to Hunters Point 115 kV Cable Project would provide a component needed to facilitate the goal of closing PG&E's Hunters Point Power Plant, an aging plant that is operating beyond its planned lifetime. In accordance with PG&E's agreement with the City and County of San Francisco, PG&E will close Hunters Point Power Plant as soon as 1) it is no longer needed to sustain electric reliability in San Francisco and surrounding areas, and 2) the CAISO authorizes closure of the plant.

The objectives of the project as stated in the Proponent's Environmental Assessment (PEA) (Essex Environmental, 2003) are:

- Meet Electric Demand. Ensure that the electric system has adequate capacity to safely and reliably serve the City.

- Comply with Planning Criteria. Ensure that the transmission system would continue to meet planning standards and criteria established by the CAISO to ensure the safety and reliability of the transmission system. Pursuant to these criteria, PG&E uses both normal and emergency ratings for transmission infrastructure equipment.[3] Normal ratings are equipment operating limits for continuous use. Emergency ratings are slightly higher equipment operating limits allowed for short durations. Projects that propose to increase transmission capacity to meet load growth must satisfy the grid-planning criteria.

- Facilitate the Closure of Hunters Point Power Plant. In 2003, the CAISO considered the potential retirement of power generation at Hunters Point within a study to determine the load serving capability for the San Francisco Peninsula under a variety of transmission and generation scenarios (San Francisco Peninsula Load Serving Capability Study). The CAISO determined that a combination of transmission system reinforcement within the San Francisco Peninsula and Greater Bay Area along with the proposed City operated Combustion Turbines are required to provide sufficient load serving capability with the Hunters Point Power Plant retired.

Using the CAISO California Grid Planning Criteria, PG&E transmission planners have evaluated various transmission alternatives capable of accomplishing the project objectives. According to this planning effort, constructing a new 115 kV underground cable from Potrero to Hunters Point is the most feasible and cost-effective means of adding the needed capacity to PG&E's electrical system. The San Francisco Stakeholders Study Group, a broad-based, multidisciplinary study group led by the CAISO, has also studied these issues and has independently confirmed the need for the Potrero to Hunters Point 115 kV Cable Project. In December 2000, the CAISO formally approved the PG&E Potrero to Hunters Point Cable Project.

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2 In 1998, the City and County of San Francisco and PG&E entered into an agreement to close Hunters Point Power Plant as soon as 1) it was no longer needed to sustain electric reliability in San Francisco and surrounding areas, and 2) the California Independent System Operator authorizes closure of the plant.

3 Overhead transmission line ratings are based on the conductor tensile strength, distance above the ground, conductor temperature, and ambient weather conditions. Underground cable ratings are based on the loading cycle on the cable, thermal resistivity of the soil surrounding the cable, and ambient temperature conditions. Transformer ratings are based on maximum temperature rise, hot-spot temperature, and ambient weather conditions.

The CAISO California Grid Planning Criteria, which focus on system reliability, are as follows:

- Category A. Normal ratings of equipment will not be exceeded with all generators, lines, and transformers in service. The voltage must be maintained within normal limits under these conditions.[4] No loss of load is allowed.
- Category B. Emergency ratings of equipment will not be exceeded with the loss of a single circuit, generator, or transformer, or of a single circuit and a single generator. The voltage must be maintained within emergency limits under these conditions. No loss of load, except as noted in the footnote below, is allowed.[5]
- Category C. Emergency ratings of equipment will not be exceeded with the loss of a single circuit, generator, or transformer, or of a single circuit and a single generator; followed by manual system adjustments, and then followed by loss of another single circuit, generator, or transformer. The voltage must be maintained within emergency limits under these conditions. Loss of load, except as noted in the footnote below, is not allowed.[6]

1.3 PROJECT COMPONENTS

The components of the proposed project are as follows:

- Underground Power Line. Underground power line (115 kV dielectric cable) within duct banks (approximately 2 feet wide and 6 feet deep) containing four 6-inch-diameter conduits. The duct bank would also carry two 4-inch-diameter communication conduits for fiber optic cables. These communication cables would be used for substation communications. **Figure 1-3** depicts a typical schematic of a duct bank. For the proposed project route, approximately eight underground concrete power and eight concrete communication vaults would be installed in line with the duct bank. Each power vault would measure approximately 20 feet long, 10 feet wide and 8 feet high. While each communication vault would measure approximately 6 feet long by 4 feet wide by 6 ½ feet deep. The communication vaults would be located near every other power vault which would be spaced at approximately 1,600 to 2,000 feet apart.
- Switchyards. New equipment would be required within the Potrero and Hunters Point switchyards. Specifically, the project would require constructing termination structures,

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4 Normal voltage and emergency limits are based on average customer equipment voltage requirements and California Public Utilities Commission Electric Rule 2.

5 "Planned or controlled interruption of generators or electric supply to radial customers or some local network customers, connected to or supplied by the faulted component or by the affected area, may occur in certain areas without impacting the overall security of the interconnected transmission systems. To prepare for the next contingency, system adjustments are permitted, including curtailments of contracted firm (non-recallable reserved) electric power transfers." (NERC Planning Standards, Table 1, footnote b)

6 "Depending on system design and expected system impacts, the controlled interruption of electric supply to customers (load shedding), the planned removal from service of certain generators, or the curtailment of contracted firm (non-recallable reserved) electric power transfers may be necessary to maintain the overall security of the interconnected transmission systems" (NERC Planning Standards, Table 1, footnote d). CAISO Planning Standards specify that: "Involuntary load interruptions are an acceptable consequence in planning for CAISO Planning Standard Category C and D disturbances (multiple contingencies with the exception of the combined outage of a single generator and a single transmission line), unless the CAISO Board decides that the capital project is clearly cost effective (after considering all the costs and benefits)." In cases where this application would result in the elimination of a project or relaxation of standards that would have been built under past planning practices, these cases will be presented to the CAISO Board for a determination on whether the projects should be constructed. (CAISO Planning Standards; February 7, 2002, page 3)

transition structures, breakers, coupling capacitive voltage transformer structures, and bus connections at both the Potrero and Hunters Point switchyards. Lighting would be installed on the breaker and bus structures at each substation and on the control building at the Hunters Point Switchyard. **Figures 1-4** through **1-8** depict the types of structures to be installed at the switchyards. In addition, a prefabricated metal control building measuring 16 feet wide by 48 feet long would be installed at the Hunters Point Switchyard. Photographs of a representative control building are included as **Figure 1-9**. Neither switchyard would be expanded beyond the existing fence line for these modifications.

- Excavated Materials Storage and Staging Areas. PG&E's General Construction yard on the northeast corner of 22nd Street and Illinois Street, across the street from the Potrero Switchyard would serve as a staging area and a storage site for materials removed, as well as those used (i.e. concrete, plastic conduit, and asphalt) during the construction phase. Another site on the Hunters Point Power Plant property, or, if an agreement can be reached, on the Port of San Francisco's property north of Cargo Way between Third Street and Jennings Street, may be used to store PG&E's construction equipment and vehicles currently located on the Cargo Way/Jennings Street site, as well as project equipment and construction materials. Materials excavated from the trench and other work areas may be used as backfill, if suitable, with any excess materials being tested and disposed of in accordance with applicable requirements. Additionally, a project construction office trailer would be located at one of these sites.

1.4 EXISTING SYSTEM

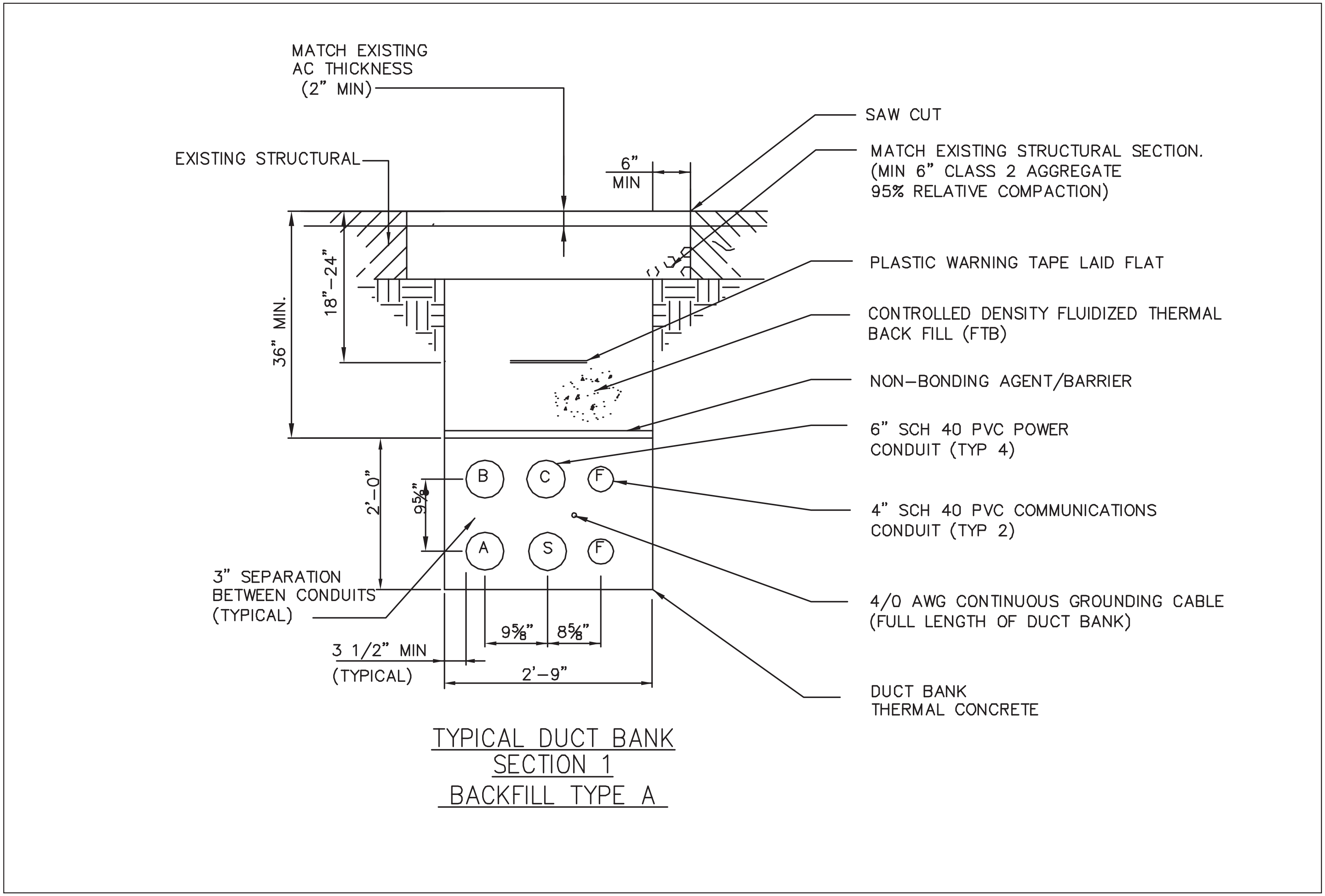
Within the City, PG&E supplies customer load with electricity imported on thirteen 115 kV underground cables, which are supplemented by local generation, and two 230 kV underground cables. Local generation consists of two power plants PG&E's Hunters Point[7] (213 MW) and Mirant Corporation's Potrero (357 MW) power plants. The 115 kV cable ratings range from 130 mega-volt-ampere (MVA) to 160 MVA; the 230 kV cables each have a 420 MVA rating. The cable system is configured to maximize electric supply to the seven substations in San Francisco,[8] which supply the distribution system serving PG&E's customers in the City. The cable system also provides generation outlets for the Hunters Point Power Plant.

1.5 PROJECT LOCATION

The proposed project is located in the eastern Potrero Hill and northern Bayview neighborhoods of San Francisco (see **Figure 1-1**). The route traverses city street right of way predominately within commercial and industrial areas with the exception of passing a residential unit located on Minnesota between 25th and 26th Street. Three alternative underground cable alignments and the no project alternative have been selected for detailed analysis in this document (see Figure 1-2). Alternatives considered but not evaluated are highlighted in Section 1.17.

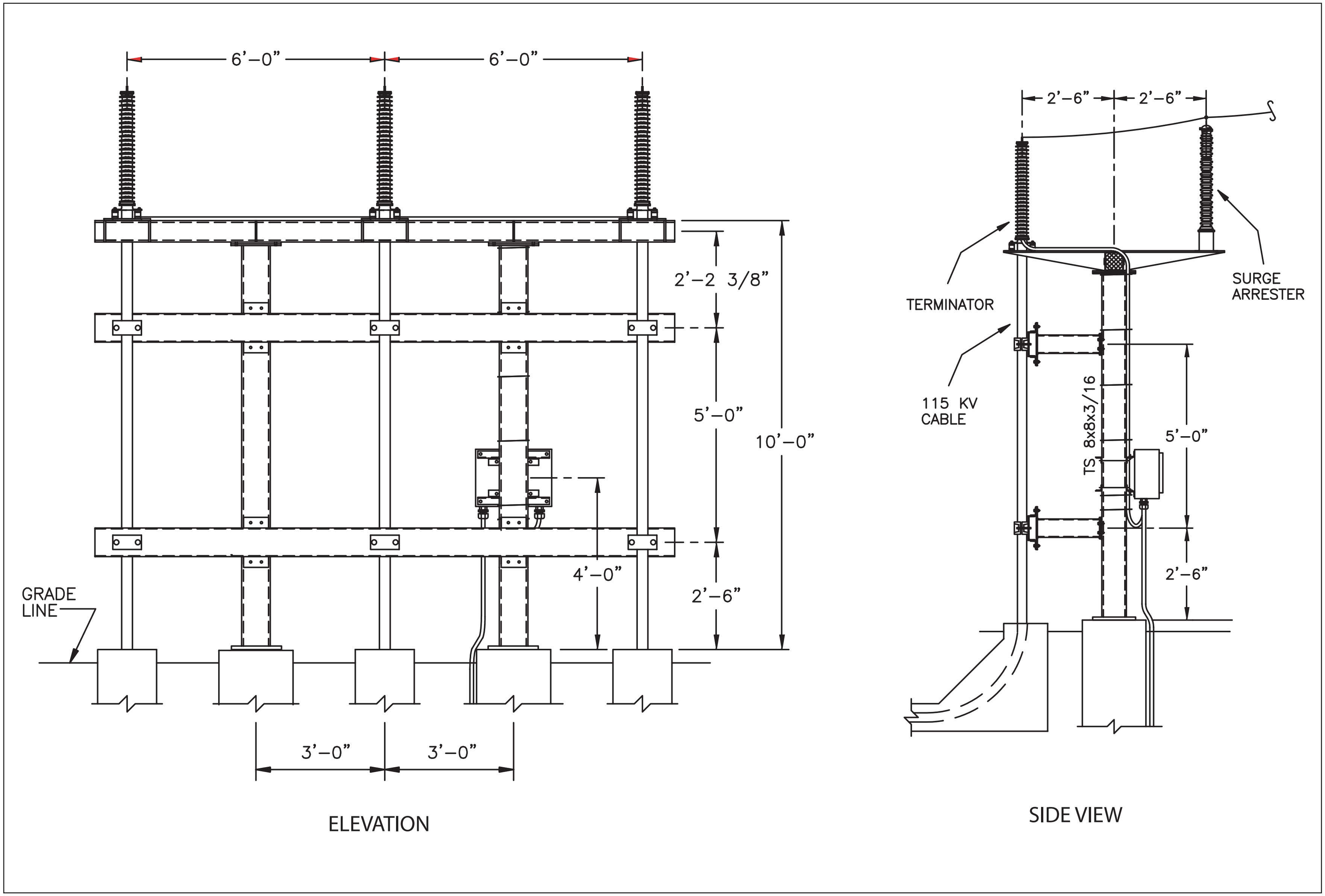
7 Hunters Point Units 2 and 3 operate as synchronous condensers to produce voltage support and are not in electric energy production mode.

8 The substations include Bayshore, Embarcadero, Larkin, Martin, Mission, Hunters Point Switchyard, and Potrero Switchyard.



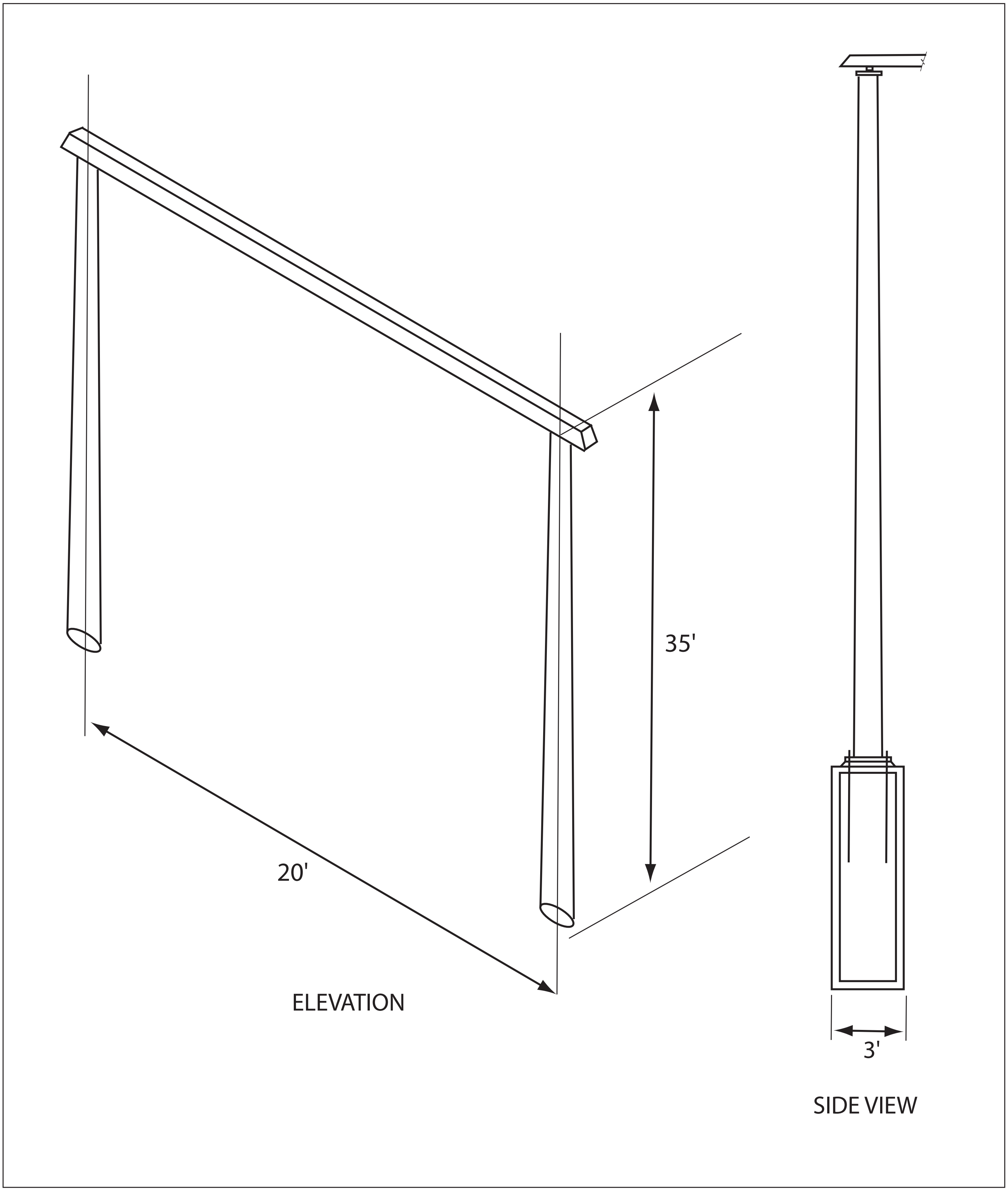
SOURCE: Black & Veatch, 2003; Environmental Science Associates (2004)

Figure 1-3
Typical Duct Bank Schematic



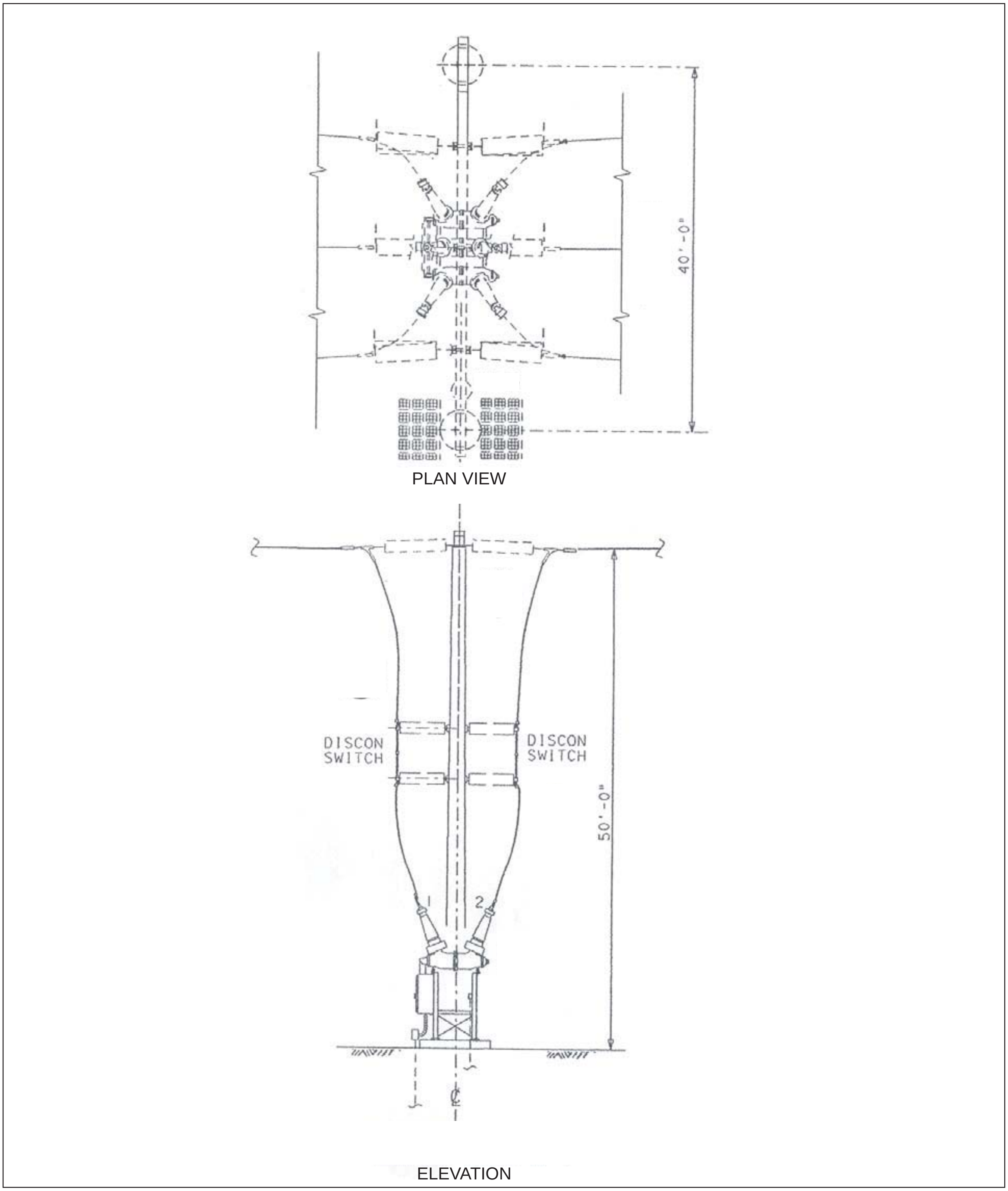
SOURCE: PG&E Department of Engineering (2003);
Environmental Science Associates (2004)

Figure 1-4
Typical Cable Termination Structure



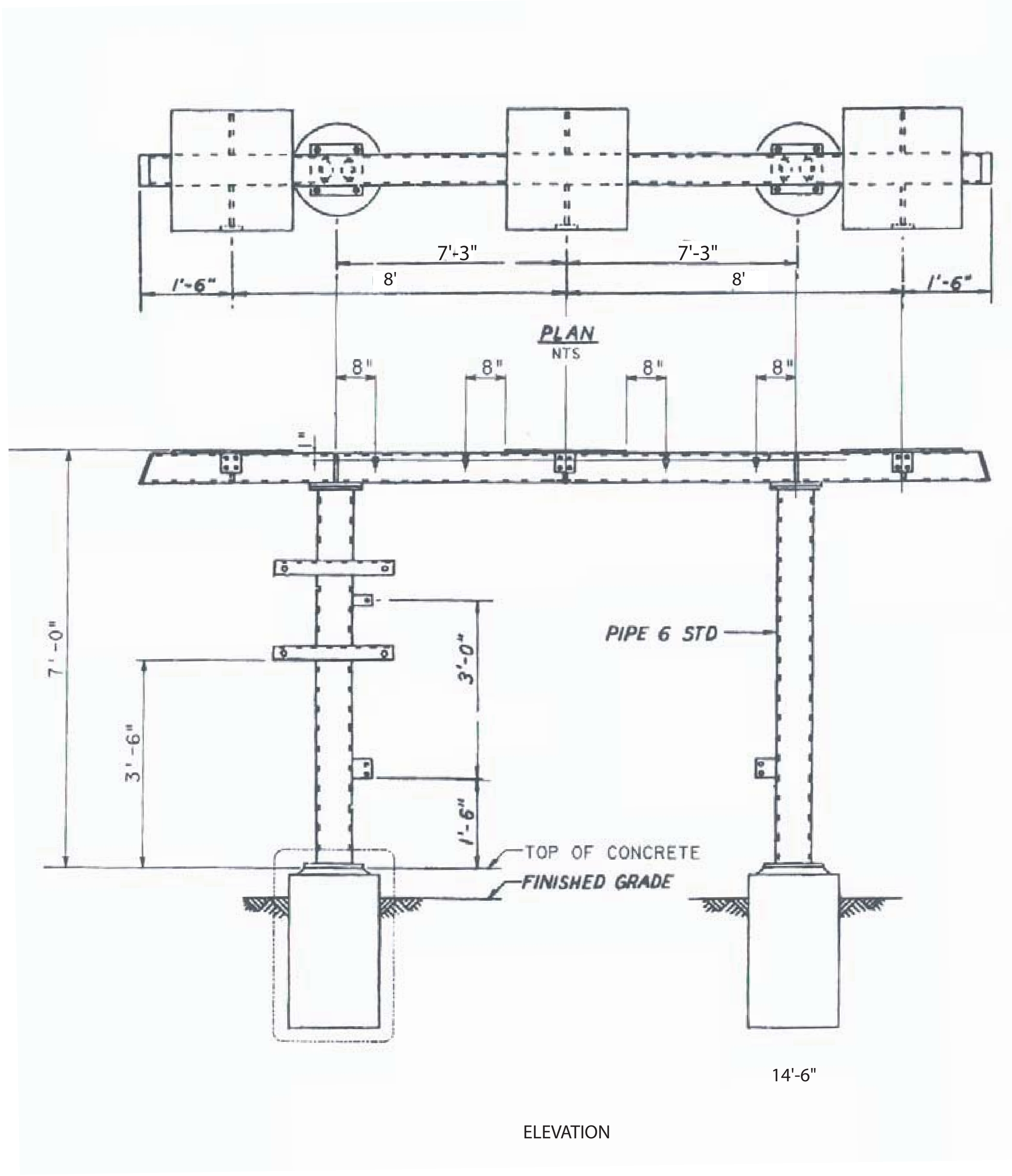
SOURCE: PG&E Department of Engineering (1994);
Environmental Science Associates (2004)

Figure 1-5
Typical Transition Structure



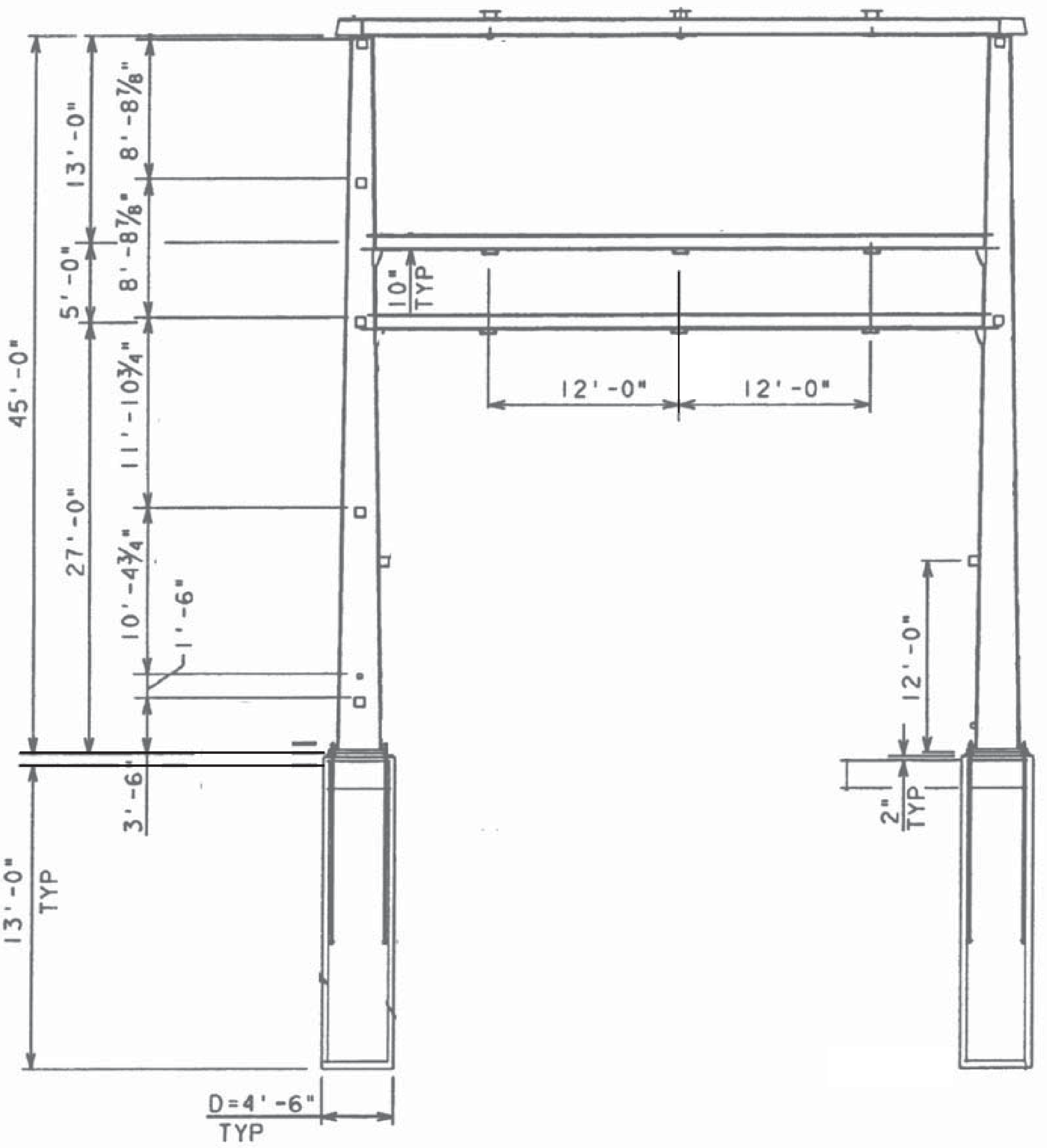
SOURCE: PG&E Department of Engineering (2003); Environmental Science Associates (2004)

Figure 1-6
Typical Breaker Structure – Plan and Elevation



SOURCE: PG&E Department of Engineering (2003);
Environmental Science Associates (2004)

Figure 1-7
Typical Coupling Capacitive Voltage Transformer (CCVT) Structure



ELEVATION

SOURCE: PG&E Department of Engineering (1998);
Environmental Science Associates (2004)

Figure 1-8
Typical Breaker Connection Structure – Elevation

SOURCE: PG&E Department of Engineering (2003);
Environmental Science Associates (2004)

Figure 1-9
Representative Control Building Photographs

1.6 PG&E'S PROPOSED PROJECT

PG&E's proposed project route (as shown on **Figure 1-1**) begins at the northwest corner of the Potrero Switchyard between 22nd Street and 23rd Street, and runs south on Illinois Street until turning west on 23rd Street between milepost (MP) 0.1 and MP 0.2. From 23rd Street, the route turns south on Tennessee Street and continues for two blocks, until turning west on 25th Street. The route continues along 25th Street for a short distance, turns south on Minnesota Street, and continues for two blocks before turning west on Cesar Chavez Street between MP 0.6 and MP 0.7. It follows Cesar Chavez Street for approximately 0.2 miles, crossing under Interstate 280 and the Caltrain railroad tracks and then turning south between MP 0.8 and MP 0.9 where it crosses 0.1 miles of property owned by the City and the San Francisco Chronicle. The route then turns west onto Marin Street before turning south-southeast onto Evans Avenue. The route follows Evans Avenue and crosses under Interstate-280 and the Caltrain railway between MP 1.2 and MP 1.4 and proceeds down Evans Avenue for approximately 1 mile before entering the Hunters Point Power Plant property at MP 2.4. The route terminates at the Hunters Point Switchyard at MP 2.5.

1.7 ALTERNATIVE EVALUATION CRITERIA

PG&E's PEA (Essex Environmental, 2003) evaluated three alternatives for their ability to meet the project objectives and for potential environmental impacts, compatibility with local planning and existing land uses, engineering, and other factors. One additional alternative is also analyzed in this Initial Study using the same factors as those included in PG&E's PEA. Factors that were considered when evaluating the routes included:

- <u>Project Objectives</u>
  - *Meet electric demand*: Ensure that the electric system has adequate capacity to safely and reliably serve San Francisco.
  - *Comply with planning criteria*: Ensure that the transmission system would continue to meet planning standards and criteria established by the CAISO to ensure the safety and reliability of the transmission system.
  - *Facilitate the closure of the Hunters Point Power Plant:* Provide an element of transmission system reinforcement deemed necessary by CAISO.
- <u>Engineering</u>
  - Length of cable
  - Compatibility with existing infrastructure
- <u>Land Use</u>
  - Consistency with local plans and policies
  - Compatibility with existing uses and approved developments

- Environmental
  - Impacts to streams or wetlands
  - Exposure to geologic hazards
  - Exposure to hazardous materials

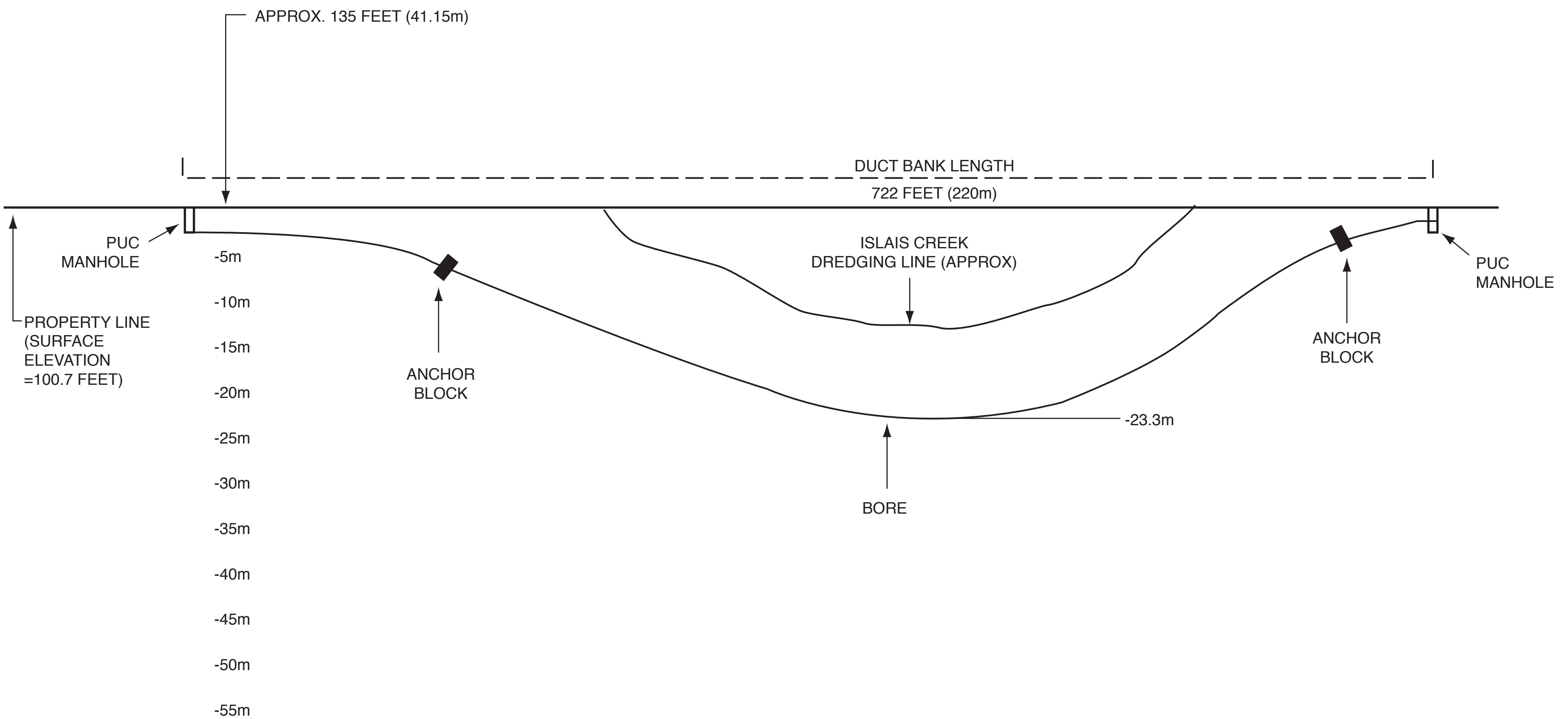
The four alternatives evaluated in this document are:

- Alternative Route 1 – Islais Creek Alternative
- Alternative Route 2 – Cargo Way Alternative
- Alternative Route 3 – Islais Creek overhead Cable Alternative
- Alternative 4 – No Project Alternative

1.8 ALTERNATIVE ROUTE 1 – ISLAIS CREEK ALTERNATIVE

The route for Alternative 1 begins at the northwest corner of the Potrero Switchyard, between 22nd Street and 23rd Street, and runs south approximately 0.6 mile within Illinois Street, crossing Cesar Chavez Street and Marin Street before reaching Islais Creek just before MP 0.7. Between 25th Street and Marin Street, 1,400-feet of the cable would be placed within a duct bank installed by the City. The route traverses property owned by the Port of San Francisco on both sides of the creek, then crosses under a 0.2 mile section of Islais Creek in the City's existing double-circuit duct bank, which was installed in 2003 as part of the Third Street Light Rail Project. This duct bank is situated at a depth of 75 feet (23.3 meters) below the ground surface of Islais Creek. Once the route emerges from the duct bank, it then crosses Amador Street at MP 0.8, turns southeasterly and follows Cargo Way to Jennings Street. It then turns southwest between MP 1.4 and 1.5. The route continues along the Hunters Point Power Plant boundary in the Jennings Street right-of-way until reaching Evans Avenue between MP 1.6 and 1.7. The route terminates at the Hunters Point Switchyard at MP 1.8. The majority (1.6 miles) of the 1.8-mile route is within City streets.

Although Alternative 1 meets the project objectives and is the shortest, most direct route, it was not selected by PG&E as the proposed project route because of construction challenges and viability issues. It was originally considered because the City's Municipal Railway had already constructed approximately 1,400 feet of double-circuit duct bank along Illinois Street from Marin Street to 25th Street and a duct bank under Islais Creek installed utilizing a horizontal directional drilling method. This duct bank is approximately 722 feet long and includes eight 6-inch diameter conduits and two 2-inch diameter conduits within a 36-inch diameter casing pipe. However, as detailed below, construction challenges and long-term viability issues make it potentially infeasible and, based upon current information, less desirable than the proposed project route. A diagram of the underground bore for Alternative 1 is provided in **Figure 1-10.**



SOURCE: Environmental Science Associates (2004)

Figure 1-10
Islais Creek Ductbank Profile

***Adequacy of Casing*:** There is concern that water and sediment have entered the casing, and that differential soil and water pressure may have excessively deformed the casing since the 36-inch diameter casing was not filled with thermal grout following installation, which is required to sustain the integrity of an underground casing. Based on the Feasibility Study conducted by Black and Veatch (2003), the existing duct bank installed under Islais Creek may not be viable for transmission line use due to its condition. The duct bank casing and conduits have become inundated with bay water, which is likely to have deposited sediment into the casing. According to engineering calculations conducted by Black and Veatch, the 36-inch casing is expected to have deformed (from round to oval in shape) due to soil pressure because it was not grouted after installation. A further study to assess the condition of the duct bank would be required and could show that the duct bank may need to be completely reconstructed under this alternative. If the duct bank did require repair or replacement, implementation of this alternative would be costly and could result in adverse water quality impacts to Islais Creek. Due to the potential time required to further access the viability of the alternative, delays could result in the inability to implement this project prior to December 2005. Construction activities in the vicinity of both ends of the casing could also potentially conflict with the Port of San Francisco's plans to construct the adjacent Illinois Street Intermodal Bridge, which is scheduled to start construction in late 2004.

***Conduit Replacement*:** In order to remediate the issue of improper grouting within the duct bank, inspection and cleaning of the casing must be done, which includes removal of the existing conduits. However, engineering concerns have been raised regarding the ability of these existing conduits to withstand the pressure of installing new thermal grout; therefore these conduits should be replaced.

***Liquefaction*:** In addition to the construction challenges, the alternative route has long-term engineering issues and land use conflicts. The soils at the Islais Creek crossing are highly unstable and susceptible to liquefaction. An earthquake could cause significant damage to the cable at this location. In addition, the existing vaults, which were installed by the San Francisco Public Utilities Commission, have the potential to settle over time, separating from the duct bank. The Port of San Francisco has plans to construct a railroad line over the existing ducts installed by the City of San Francisco. In order to withstand this additional loading, the duct banks may need costly foundation rework, including pile driving. The railroad may also limit duct maintenance access during railroad operations.

Railroad Loading: Currently, the Port of San Francisco plans to construct a railroad over the existing duct bank. PG&E indicates that some foundation rework may be necessary to withstand the additional load unless the railroad is constructed in a manner that would not adversely affect the duct bank.

Because of all of these constraints and uncertainties, it has been determined that this alternative route is less desirable than the proposed project route and that the current configuration and condition of the cable duct under Islais Creek may be infeasible for PG&E's use.

1.9 ALTERNATIVE ROUTE 2 – CARGO WAY ALTERNATIVE

Alternative 2 follows the same alignment as the proposed project route along Illinois Street to 23rd Street. The route then turns west on 23rd Street, crossing Third Street to Tennessee Street. From the intersection of 23rd Street / Tennessee Street, the route turns south on Tennessee Street, continues for two blocks, until turning west on 25th Street. The route, then follows 25th Street for a short distance, turns south on Minnesota Street and continues for two blocks, before turning west on Cesar Chavez Street. It follows Cesar Chavez Street approximately 0.2 mile and then turns south, crossing City-owned and private property for about 0.1 mile. The route then turns west onto Marin Street before turning south-southeast onto Evans Avenue. The route follows Evans Avenue to Quint Street where it turns northeast and continues to Cargo Way. The route travels down Cargo Way in the southeast direction until reaching Jennings Street, where it turns southwest. Upon reaching Evans Avenue, the route turns southeast where it enters the Hunters Point Switchyard. This alternative alignment is approximately 2.9 miles long.

Although Alternative 2 would meet the project objectives, it was not selected by PG&E as the proposed project route due to potential conflicts with existing utilities and the railroad. Quint Street is relatively narrow and contains an existing 72-inch underground sewer line, from which the cable would need a minimum separation of 5 feet. In addition, there is an operating railway track along Quint Street. This railway would likely need to be placed out of operation and removed for a period of three weeks in order to construct the cable, which would likely be installed under the tracks. Even if construction could occur without removing the tracks, which does not appear likely, operation may still have to be restricted for safety reasons and for the final crossing at Arthur Street, which would need to be an open cut due to space constraints. Locating the cable under or adjacent to this operating railway may also restrict maintenance activities during operations.

Additionally, under Alternative 2, if construction were scheduled to take place on 23rd Street, between Third Street and Tennessee Street prior to June 2, 2005, special permission to excavate would need to be granted due to the current moratorium status on these streets. Section 2.4.4(n) of the San Francisco Department of Public Works Code defines a "moratorium street" as any block that has been reconstructed, repaved, or resurfaced by the Department [of Public Works] or any other owner or person in the preceding five-year period. Although the Department provides that any permit to excavate shall not be issued in any moratorium street; a waiver for good cause may be granted under the Directors' discretion.

Moreover, this alternative has a similar potential to encounter hazardous materials as the proposed project route and a similar potential for exposure to strong ground motion from earthquakes. Due to potential impacts to existing utilities and railway operations, this alternative was not selected as the proposed project route. It is also less desirable than the proposed project route because it is longer in length and therefore potentially more costly and time-consuming to construct.

1.10 ALTERNATIVE ROUTE 3 – ISLAIS CREEK OVERHEAD CABLE ALTERNATIVE

Alternative 3 follows essentially at the same route as Alternative 1; beginning at the overhead bus/circuit-breaker structure in the northwest corner of the Potrero Switchyard, between 22nd Street and 23rd Street and going underground, running south approximately 0.6 mile within Illinois Street, crossing Cesar Chavez Street and Marin Street before reaching Islais Creek, just before MP 0.7. The transmission line would leave the underground configuration and rise to an overhead transmission line configuration at the north duct bank of Islais Creek and remain overhead until reaching the south duct bank of the Creek, where it would again transition underground. Two transition stations would be constructed, one on each side of Islais Creek. A photo example of an overhead to underground transition tower is provided in **Figure 1-11.**

The three phases of the transmission line would approach this type of "dead-end" structure in the same vertical plane. A ground grid and conduit system would be installed at the base of the transition station. The 115 kV cable overhead line section would begin at the proposed transition station at the north side of Islais Creek and would end at the transition station at the south end of Islais Creek. The line then follows the same underground route as Alternative 1, crossing Amador Street at MP 0.8, turning southeasterly and finally rising to terminate above ground on the overhead bus/circuit-breaker structure in Hunters Point Switchyard at MP 1.8.

Although Alternative 3 meets the project objective and is a shorter, more direct route, it has a considerable number of construction challenges, operating constraints, and system reliability issues. Reliability concerns arise whenever there are multiple transitions between overhead and underground configurations. Each time a cable, or a circuit containing cable sections, is deenergized, a manufacturer-specified timeframe must lapse before it can be reenergized. This is due to the likelihood of substantial trapped charge remaining in the cable portion. Immediate circuit testing or restoration of power is permitted only after faults on overhead lines are corrected by rapidly dissipating the charge into the air. No testing or re-energization is allowed after faults occur on underground portions, until the faulted underground section can be electrically isolated and evaluated to be in good order. For this reason, fault location for multiple overhead/underground circuits is a substantial system operating challenge, and rapid restoration is not allowed.

Underground-to-overhead transition towers, which have the appearance of a tubular steel pole, would be required on each side of Islais Creek. See example of a transition tower in Figure 1-11. The transition towers would be specially designed for strength in the short span and to accommodate a vertical clearance requirement of 135 feet above mean high water (Title 33 Code of Federal Regulations, Part 322.5). This clearance is based upon the largest existing or prospective future vessels operating upon Islais Creek and would assure avoidance of impacts to navigation. Other visual considerations for the towers may include marking/lighting for aviation compliance/regulations and, while this is an urban landscape, it would impose another intrusive element into the visual context. Although transition towers are often tubular steel poles, it is likely that in this case a steel lattice structure would be necessary due to the height requirements.

SOURCE: Pacific Gas & Electric (2004)

Figure 1-11
Representative Overhead to
Underground Transition Structure

Permission from the Port of San Francisco would be necessary for use of land on each side of the creek, which would be needed for construction and installation of the transition towers. Prior to installing the conductors, temporary protective devices would be installed across Islais Creek to prevent the conductor from falling into the creek. This crossing guard could consist of a net or other device spanning across the creek and secured to each tower. A helicopter may be used to facilitate this installation. Temporary closure of the waterway to shipping traffic may be necessary during use of a helicopter. To install the conductor, a small cable would be pulled from tower to tower using a helicopter or other means to place the cable into the sheaves. The conductors would then be attached to the cable, and pulled through each tower using a controlled tension to maintain a certain clearance above the crossing guard nets and other facilities. Once the conductors were pulled into place, the conductor sag would be adjusted to a calculated elevation, attached to the insulators, and then the sheaves and crossing guard would be removed. Cable risers, with insulating potheads, would be needed up the sides of the towers, at each side, to make connection with the overhead conductors, completing the circuit back to the underground construction.

1.11 NO PROJECT ALTERNATIVE

Under the No Project Alternative, no cable line would be constructed between the Potrero and Hunters Point switchyards. The No Project Alternative does not support necessary upgrades to the electrical transmission system serving the City required to meet necessary system reliability requirements, and meeting the goal of closing PG&E’s Hunters Point Power Plant pursuant to PG&E’s agreement with the City, as discussed in Section 1.2. PG&E’s PEA states that their studies indicate that the electric transmission system may not be able to reliably serve customers in the San Francisco area as early as 2004. Any additional local generation requirements or other reductions would cause further overloading. According to PG&E, widespread overloading of the existing electrical transmission system could occur, leading initially to equipment overheating and eventually to electrical and/or mechanical failures. Such failures may result in uncontrollable service interruptions. To prevent such an event, it may be necessary to institute a program of controlled, rotating outages in which a portion of the system load would be subject to service interruptions to avoid equipment overload or system failures. As customer demand grows in San Francisco, service interruptions could become more widespread as a result of increased system overload.

Therefore, the project is considered necessary to ensure the reliability of service to San Francisco, to meet the local demand for electricity, and comply with CAISO planning standards and criteria. If the project were not implemented, direct impacts to the environment would not occur because no new construction would take place. However, if the project is not developed, PG&E indicates that indirect impacts to human health and safety could potentially occur as a result of insufficient capacity and prolonged power outages. There are no direct, immediate financial costs associated with the No Project Alternative. Power outages that may occur without the project would likely have direct equipment repair, replacement, and other costs. And as noted, without the proposed project, a component deemed necessary to allow the decommissioning of the Hunters Point Power Plant would not be in place.

A summary of the impacts and significance levels is provided in Section 3.

1.12 ALTERNATIVES CONSIDERED BUT ELIMINATED

Three additional alternatives were also considered. Two alternatives involved underground routes that traveled south on Illinois Street from the Potrero Switchyard and turned west on Cesar Chavez Street. Once on Cesar Chavez Street, they followed the route picked for Alternative 2 (see Figure 1-2). These two routes were eliminated from further consideration because the intersection of Illinois Street and Cesar Chavez Street is highly congested with underground facilities. At that location, there are three sanitary lines, as well as a gas line in close proximity. Additionally, the San Francisco Municipal Railway is constructing the Metro East Rail Maintenance Facility with feeder rails along 25th Street. At the Third Street crossing on Cesar Chavez Street, there are also a number of sanitary lines and storm drains, one of which is 54 inches wide and 36 inches deep. Boring in this area is not feasible. As a result, it would not be feasible for the power line to turn at this intersection from Illinois Street to Cesar Chavez Street. A third option, a complete overhead transmission route, was considered but ultimately rejected due to the high density of urban development in the project area and concerns raised by the City as to the feasibility and health and safety. The potential of increased concern from local residents regarding exposure to Electromagnetic Fields (EMF) from overhead cable lines also made this route less viable for PG&E.

1.13 RIGHT-OF-WAY REQUIREMENTS

The majority of construction would be restricted to the width of the franchised areas (public right-of-way [ROW]). A minimum construction access width of 65 feet would be required to allow for trench excavation and construction of the duct bank. PG&E's contractors would park construction equipment on the opposite side of the street. Additional space, which is further discussed in the Special Construction Methods section below, would be required at the vault and boring locations. The permanent underground electric transmission cable ROW where the cable line crosses City-owned and private property would be 45 feet in width.

1.14 CONSTRUCTION

1.14.1 ROW REQUIREMENTS

1.14.2 UNDERGROUND CONSTRUCTION METHODS

The installation of the underground cable, duct banks, and splice vaults would be completed using a cut-and-cover method (open trenching) along the majority of the route. Crossings of railroads may require a duct bank crossing that allows continuous use of the railroad. The following steps represent the major construction activities.

STEP 1 – TRENCHING/DUCT BANK INSTALLATION

Prior to trenching, PG&E would notify other utility companies (via the Underground Service Alert) to locate and mark existing underground structures along the proposed cable lines, and also would conduct exploratory excavations (potholing) to prove the locations for proposed facilities. PG&E would apply for an Excavation Permit from the City for trenching in City streets. No roads would be completely closed, although one-way traffic controls would be implemented. PG&E would also coordinate with the Port of San Francisco for the section of Illinois Street that falls within their jurisdiction between 22nd Street and 23rd Street.

After the route is marked, the pavement within the trench line would be removed. The typical trench dimensions for installation of a single circuit would measure approximately 2 feet wide by 6 feet deep, although typical trench depths may vary depending on soil stability and the presence of existing substructures. The trench would be widened and shored where needed to meet California Occupational Safety and Health Administration safety requirements. Dewatering would be conducted using a pump or well points to remove water from the trench. The water would be pumped into containment tanks and tested for turbidity and pH values. The water would be discharged into the storm sewer system if the water meets acceptable discharge standards. Otherwise, it would be disposed of in accordance with state and federal standards.

Typically, a maximum open trench length of 150 to 300 feet on each street would occur at any one time, depending on City permitting requirements. Steel plating would be placed over the trench to maintain vehicular and pedestrian traffic across areas that are not under active construction. Traffic controls would also be implemented to direct local traffic safely around the work areas. PG&E would apply for a Special Traffic Permit from the City of San Francisco and also coordinate provisions for emergency vehicle and local access with City personnel.

As the trench for the underground 115 kV cable is completed, PG&E would install the cable conduit, ground wire, and concrete conduit encasement duct bank. At about every 1,600 to 2,000 feet along the trench, the installation of splice vaults would require a larger excavation (as described in Step 2, below). The duct bank cover would measure at least 36 inches.

Most of the duct bank would be in a two-by-two duct configuration (see **Figure 1-3**), with occasional transitions to a flat configuration to clear substructures in highly congested areas or to fan out to termination structures at the switchyards. The duct bank typically would consist of four 6-inch-diameter polyvinyl chloride (PVC) conduits. The dimensions of the duct bank would be approximately 24 inches wide by 34 inches in height. The three electrical cables would be contained within the 6-inch-diameter PVC conduits and one conduit would be left open as a spare for future use should a single cable fail. Fiber optic lines for system protection and communication would be housed in two 4-inch-diameter conduits that would be installed above the top level of the 6-inch-diameter conduits and within the thermal backfill. The three electrical cables that make up one circuit would be capable of carrying 200 MVA at the normal conductor temperature rating of 90 degrees centigrade. The 200-MVA load on this circuit would be met using copper conductor extruded dielectric cable.

Where the electrical transmission duct bank crosses or runs parallel to other substructures (which have operating temperatures at earth temperature), a minimum radial clearance of 12 inches would be required. These substructures include gas lines, telephone lines, water mains, storm lines, and sewer lines. In addition, a 5-foot minimum radial clearance would be required where the new duct bank crosses another heat-radiating substructure at right angles. A 15-foot minimum radial clearance would be required between the duct bank and any parallel substructure whose operating temperature significantly exceeds the normal earth temperature. Such heat-radiating facilities may include other underground transmission circuits, primary distribution cables (especially multiple-circuit duct banks), steam lines, or heated oil lines.

Once the PVC conduits are installed, thermal-select or controlled backfill would be transported, placed, and compacted. A road base backfill or slurry concrete cap would be installed, and the road surface would be restored in compliance with the locally issued permits. While the completed trench sections are being restored, additional trench line would be opened farther down the street. This process would continue until the entire conduit system is in place.

Throughout construction of the trench, duct bank, and vaults, the asphalt, concrete, and other excavated material would be hauled off to a temporary excavation material storage site that would be located at the PG&E yard at the northeast corner of 22nd Street and Illinois Street near the Potrero Switchyard. The excavated material would be used as backfill if it is suitable. When necessary, clean backfill would be imported to the project area. Any excess materials would be tested and disposed of in accordance with applicable requirements. The total volume of materials to be excavated is estimated at approximately 10,000 cubic yards.

Truck traffic generation would depend upon the rate of the trenching and the size of vault excavation, but would be approximately 33 trips per day. Jackhammers would be used sparingly to break up sections of concrete that the saw-cutting and pavement-breaking machines cannot reach. Other miscellaneous equipment would include a concrete saw, various paving equipment, and pickup trucks. **Table 1-1** lists vehicles and equipment that are typically used to construct an underground transmission line project. In general, no equipment would be left at the trench site overnight, with the exception of an excavator.

STEP 2 – VAULT INSTALLATION

As previously discussed, PG&E would excavate and place approximately eight preformed concrete power vaults at approximately 1,600 to 2,000 foot intervals and two communication vaults near every other installed power vault during trenching. The power vaults would be initially used to pull the cables through the conduits and to splice cables together. During operation, power vaults provide access to the underground cables for maintenance inspections and repairs. The vaults would be constructed of prefabricated, steel-reinforced concrete with inner dimensions of the power vaults being approximately 20 feet long by 10 feet wide by 8 feet high and the communication vaults being approximately 6 feet long by 4 feet wide by 6 ½ feet deep. The vaults would be designed to withstand the maximum likely earthquake in the area, as well as heavy truck traffic.

TABLE 1-1
EQUIPMENT TYPICALLY USED DURING CONSTRUCTION

Equipment	Use
Pickup trucks	Transport construction personnel
2-ton flatbed truck	Haul materials
Flatbed boom truck	Haul and unload materials
Rigging truck	Haul tools and equipment
Mechanic truck	Service and repair equipment
Winch truck	Install and pull rope into position in conduits
Cable puller truck	Pull transmission cables through conduits
Cement trucks	Transport and pour backfill slurry
Shop vans	Store tools
Crawler backhoe	Excavate trenches (excavate around obstructions)
Large backhoe	Excavate trenches (main trencher)
Dump trucks	Haul trench and excavation materials/import backfill
Large mobile crane	Lift/load/set 20-ton cable reels and prefabricated 40-ton splice vaults and lift cable ends on terminating structures
Small mobile cranes (< 12 tons)	Load and unload materials
Cable reel trailers	Transport cable reels and feed cables into conduits
Splice trailer (40-foot)	Splicing supplies/air condition manholes
Air compressors	Operate air tools
Air tampers	Compact soil
Rollers	Repave streets over trench and manhole locations
Portable generators	Construction power
Horizontal dry boring equipment	For horizontal bores
Baker (water) storage tanks	Store water pumped from trenches, if needed
Pumps	Remove water from trench, if needed
Shoring boxes	Maintain trench walls, prevent collapse of loose soils or sand
Tank trucks	Transport water from Baker tanks, to process/disposal facility

The total excavation footprint for a power vault would be approximately 22 feet long by 12 feet wide by 10 feet deep. Installation of each vault would occur over a one-week period with excavation and shoring of the vault pit followed by delivery and installation of the vault, filling and compacting the backfill, and repaving the excavation area.

STEP 3 – CABLE PULLING, SPLICING, AND TERMINATION

After installation of the conduit, PG&E would install cables in the duct banks. Each cable segment would be pulled into the duct bank, spliced at each of the vaults along the route, and terminated at the switchyards. The three electric cables and one communication cable would be pulled through individual ducts at the rate of two of the three segments between vaults per day. To pull the cable through the duct bank, a cable reel is placed at the end of a section and a pulling rig is placed at the other end of the section. With a fish line, a larger rope is pulled into the duct. The rope is attached to cable pulling eyes for pulling. To ease pulling tensions, a lubricant is applied to the cable as it enters the duct.

Cables would be spliced at all vaults after they are completely pulled through the ducts. During construction, the vaults must be kept dry at all times to prevent contamination of the unfinished splices with water or impurities. Splicing would usually take 8 to 10 hours per day. A splice trailer would be positioned adjacent to the vault manhole openings. A mobile power generator would be located directly behind the trailer.

At each end of the route, cables would rise out of the ground on a transition structure and terminate at the switchyards.

STEP 4 – SPECIAL CONSTRUCTION METHODS

The project may require three bores: two to cross the Third Street Light Rail ROW at the intersections of 23rd Street & Third Street and Evans Avenue & Third Street and one to cross a railroad spur on Evans Avenue between Rankin Street and Quint Street. There are two types of borings: horizontal boring and directional drilling. Horizontal boring (jack and bore) is an auguring operation that simultaneously pushes a casing beneath the obstruction, which is usually used for shorter crossings (less than 400 feet long). Directional drilling is performed by using a steerable jet bit to cut the earth and create a small pilot hole. Once the jet bit has reached the opposite side, a reamer is attached to widen the hole and pulled back, along with the casing, through the pilot hole. Directional drilling is usually used for longer bores. The ultimate boring method to be used at each location will be determined during the final design and engineering process.

It is anticipated that water would be used for dust suppression along the cable segment. The amount of water would vary depending on the length of access roads being used each day, the road surface conditions, the weather conditions, including temperature and wind speed, as well as other site-specific conditions. PG&E does not expect to require significant amounts of jobsite water for foundation construction or other activities. However, this could change if unexpected conditions arise. For example, actual soil properties or groundwater elevations may require alternative construction practices that could require additional water.

Boring would begin by digging a bore pit at the sending end and a trench at the receiving end of the bore. The bore pit would be approximately 50 feet long by 20 feet wide and by 20 feet deep. The receiving area for the bore casing would be approximately 10 feet by 20 feet. The elevation at the bottom of the bore pit and the receiving trench would be approximately equal. The bore equipment would then be installed in the bore pit. The steel casing would be welded in 10 to 15 foot sections and jacked into the bore as the boring operation proceeds. At each bore crossing, a minimum rectangular construction access area approximately 100 feet long by 80 feet wide for equipment staging would be required to perform the bore operation.

STEP 5 – JOB SITE CLEANUP

As part of the final construction activities, PG&E would restore all removed curbs, gutters, and sidewalks, repave all removed or damaged paved surfaces, restore landscaping or vegetation as necessary, and clean up the job site to preconstruction conditions.

1.14.3 CONSTRUCTION AT SWITCHYARDS

At each switchyard, the following equipment would be installed within the existing fence line:

- one termination structure,
- one transition structure,
- one breaker (switch),
- one coupling capacitive voltage transformer (CCVT) structure, and
- bus connections from the new cable to the existing structures within each switchyard.

The termination structures, shown in **Figure 1-4**, would consist of both underground and aboveground components. The aboveground portion would consist of three 16-foot-tall poles. The transition structures, shown in **Figure 1-5**, would be low-profile tubular steel pole frame structures measuring 40 feet wide and 45 feet high. The breaker (switch) structures, shown in **Figures 1-6** and **1-8**, would be approximately 40 feet wide, 50 feet high, and 40 feet long. The CCVT structure, shown in **Figure 1-7**, would be 7 feet tall and approximately 15 feet wide. Neither switchyard would be expanded beyond the existing fence line for these modifications.

At the Potrero Switchyard, the bus connection would be attached to an existing bay (Bay 18). The transition structure and breaker would be installed within the switchyard toward the southeastern side of the station behind Bay 18.

At the Hunters Point Switchyard, the transition structure would be installed near the eastern end of the switchyard on the upper bench of the station. A new prefabricated metal control building, measuring 16 feet wide by 48 feet long would be installed at the Hunters Point Switchyard to house relays. The control building would be located north of Evans Avenue and immediately south of an existing 40-foot-tall water tank, some smaller tanks, and aboveground piping. Photographs of a representative control building are included in **Figures 1–8**. The breaker and CCVT structure would be installed near the middle of the station on the lower bench.

Halophane light fixtures would be installed on the breaker and bus structure at each switchyard, and on the control building at the Hunters Point Switchyard at a height of approximately 9 feet pointing downward.

1.14.4 PERSONNEL

The project expects to utilize approximately 25 construction personnel for excavation and conduit installation, and approximately 6 truck drivers during conduit installation using two excavation crews. Approximately 15 construction personnel would be employed during cable installation. The number of employees would peak at approximately 60 and would include switchyard workers, supervisors, and inspectors. About 20 percent of the construction crew would be composed of local PG&E employees.

1.14.5 CONSTRUCTION SCHEDULE

In the PEA, PG&E states that in order to enable project operation by December 2005, construction must begin on or before April 1, 2005. The entire project should be completed in approximately nine months, barring unexpected complications. Conduit installation would take approximately eight months and cable installation would take approximately two months, overlapping conduit installation by one month.

Construction would occur between 7 a.m. and 8 p.m., or during times set by the City in the Excavation Permit. If trenching work would cause traffic congestion, the City may require nighttime work to avoid traffic disruption. Mitigation measures have been proposed by PG&E in its PEA to avoid adverse impacts to traffic as are provided in Section 2.15. Mitigation measures for noise are provided in Section 2.11. PG&E would identify any applicable city, county, state, federal, and railroad regulations, ordinances, and restrictions to be complied with prior to and during construction.

1.15 OPERATION AND MAINTENANCE

1.15.1 GENERAL SYSTEM MONITORING AND CONTROL

Switchyard monitoring and control equipment would electronically monitor PG&E’s existing computer system.

1.15.2 FACILITY INSPECTION

Regular inspection of power lines, instrumentation and control, and support systems is critical for safe, efficient, and economical operation. Early identification of items needing maintenance, repair, or replacement would insure continued safe operation of the project. Aboveground components would be inspected at least annually for corrosion, equipment misalignment, loose fittings, and other common mechanical problems. The underground portion of the line would be monitored regularly from inside the vaults; therefore, inspections would not significantly disturb traffic using city streets.

1.16 REQUIRED APPROVALS

The following permits and approvals would be required for construction of the project, including:

- Permit to Construct (PTC) in compliance with General Order No. 131-D of the California Public Utilities Commission (CPUC)
- Compliance with the CEQA
- National Pollutant Discharge Elimination System Stormwater Construction Permit for discharges of stormwater associated with Small Linear Underground/Overhead Construction Projects (General Permit)-Regional Water Quality Control Board
- Excavation Permit – City and County of San Francisco to construct within roadways and railroads
- Special Traffic Permit – City and County of San Francisco for lane and sidewalk closures
- Night Noise Permit – City and County of San Francisco
- Encroachment permits from Caltrans District 4 for crossings of Interstate-280, and from the Peninsula Corridor Joint Powers Board for crossings of the Caltrain tracks
- Land Rights Permit from San Francisco Public Utilities Commission as the underlying fee owner of streets crossed by this route for the railroad tracks that cross Arthur Avenue and Quint Street

1.17 AREAS OF CONTROVERSY

The only known area of controversy associated with the proposed project is the protest filed by the City due to PG&E's selection of the proposed project route instead of Alternative 1. The City requested that PG&E use the existing conduit underneath Islais Creek as described in Alternative 1 to enable project operation by December 2005. PG&E has provided information to the City regarding the feasibility of the proposed project and their ability to implement the proposed project by December 2005. Despite concerns that the implementation of the proposed project could result in delays, the City officially withdrew their protest on July 22, 2004, relying on PG&E's statements to adequately implement the proposed project by the December 2005 deadline (CPUC 2004).

1.18 POTENTIAL ENVIRONMENTAL IMPACTS

The potentially significant impacts associated with the proposed project and its alternatives include:

- Aesthetics (Alternative 3 only)
- Air Quality
- Noise
- Cultural Resources
- Hazards and Hazardous Materials

- Hydrology and Water Quality
- Transportation and Traffic

Each of these potentially significant impacts is considered in this Expanded Initial Study.

1.19 APPLICANT-PROPOSED MITIGATION MEASURES

In its PEA, the applicant has proposed the following mitigation measures to reduce potentially significant impacts to a level of insignificance. The following mitigation measures identified under Air Quality (6), Cultural Resources (3), Hazards and Hazardous Materials (9), Hydrology and Water Quality (1), Noise (4) and Transportation and Traffic (9) will be implemented by PG&E as part of this project.

AIR QUALITY

- All construction personnel working on the project shall be trained prior to starting construction on methods for minimizing air quality impacts during construction.

- All active construction areas, access roads, and staging areas shall be watered down as necessary to control dust.

- All trucks hauling soil and other loose material shall be covered, or at least two feet of freeboard shall be maintained around the sides of the truck bed.

- Streets, paved access roads, and parking lots shall be swept daily with water sweepers if visible soil material is carried onto adjacent public streets.

- Exposed stockpiles of soil and other excavated materials shall be enclosed or covered as necessary to control dust.

- Vegetation removed during construction shall be restored to preconstruction conditions.

CULTURAL RESOURCES

- Prior to the initiation of construction or ground-disturbance, all construction personnel shall be trained on the potential for exposing subsurface cultural resources. The training shall provide information on the procedures to be followed upon the discovery or suspected discovery of archaeological materials, including Native American remains.

- A monitor shall be on-site during all underground trenching activities to watch for potential discoveries.

- Upon discovery of possible buried cultural materials (including potential Native American skeletal remains), work in the immediate area of the find shall be halted and the monitor shall be notified. Once the find has been identified and evaluated, a qualified archaeologist shall make the necessary plans for treatment of the find and mitigation of impacts if the find is determined to be significant as defined by the California Environmental Quality Act. PG&E will comply with all State laws in the event of the exposure of Native American skeletal remains.

HAZARDS AND HAZARDOUS MATERIALS

- A Hazardous Substance Control and Emergency Response Plan shall be prepared for the project and implemented during construction. It shall prescribe hazardous material handling procedures to reduce the potential for a spill during construction, or exposure of the workers or public to hazardous materials. The plan shall provide a discussion of appropriate response actions in the event that hazardous materials are released or encountered during excavation activities.

- The plan shall include proposed methodologies for managing excavation materials, including asphalt, concrete, debris, and soil. Details on dust control, runoff control, tarping, and air monitoring (of the trench and temporary excavated materials storage areas) shall be included in the plan. The plan shall be submitted to the Hazardous Material Unified Program Agency, or another appropriate oversight agency, for approval prior to initiating excavation activities.

- A Health and Safety Plan shall be written and implemented to ensure the health and safety of construction workers and the public during project construction. The plan shall include information on the appropriate personal protective equipment to be used during excavation activities, sample collection, and material loading, testing, and disposal.

- A Stormwater Pollution Prevention Plan (SWPPP) shall be prepared for the project and implemented during construction. The SWPPP shall contain information on engineering controls to minimize turbid stormwater runoff or the acceleration of sedimentation rates.

- An environmental training program shall be established and delivered to communicate environmental concerns and appropriate work practices to all construction field personnel. The training program shall emphasize site-specific physical conditions to improve hazard prevention, and shall include a review of the Health and Safety Plan, Hazardous Substance Control and Emergency Response Plan, and the SWPPP.

- Oil-absorbent material, tarps, and storage drums shall be used to contain and control any minor releases of oil. Emergency-spill supplies and equipment shall be kept adjacent to all areas of work and in staging areas, and shall be clearly marked. Detailed information for responding to accidental spills and for handling any resulting hazardous materials shall be provided in the project's Hazardous Substance Control and Emergency Response Plan, which shall be implemented during construction.

- A trained environmental monitor shall be present during all project excavation activities. The monitor shall be equipped with the appropriate equipment to monitor air quality in excavation trenches, and to observe excavation spoils for the presence of potentially hazardous materials. The monitor shall have the experience and authority to select the appropriate personal protective equipment, determine appropriate soil and groundwater handling and disposal requirements, modify work activities, or stop work at any time to ensure worker and public health and safety.

- Excavated materials shall be separated into asphalt, concrete, debris, and soil, and hauled to one of the excavated materials storage areas located near the switchyards. Each material shall be placed on plastic sheeting, moistened to control dust, and covered in a manner to prevent runoff of turbid or contaminated stormwater. Analyses to determine the presence of hazardous materials in material to be disposed of shall be performed to determine the proper handling, transport, and disposal methods. The specific hazardous material disposal site(s) have not been identified at this time as PG&E shall use the analytical results to determine which landfill in the area is classified to receive the excavated materials.

- If groundwater is encountered in the excavation trenches, it shall be contained in Baker tanks and tested for turbidity and potential contaminants prior to being disposed of in accordance with local regulations. Non-contaminated groundwater shall be released to the stormwater conveyance system (with prior approval).

HYDROLOGY AND WATER QUALITY

- Once the duct bank is installed, it shall be surrounded with concrete. Above the duct bank, the trench shall be filled with fluidized thermal backfill (a blend of sand, gravel, fly ash, and cement). Because permeability of these materials is low, a section of drainpipe shall be laid across the trench directly above the concrete at approximately 100-foot intervals to allow groundwater to pass through the low permeability backfill material. Alternatively, gravel drains or other drainage measures may be installed across the pipeline.

NOISE

- Intake and exhaust mufflers recommended by the manufacturers shall be installed on impact tools and equipment.

- Pavement breakers and jackhammers shall be equipped with acoustically attenuated shields or shrouds recommended by the manufacturers.

- Standard practices shall be implemented when feasible, including directing exhausts away from buildings and shielding other equipment,.

- No construction shall take place within 100 feet of residences at night (8 p.m. to 7 a.m.).

TRANSPORTATION AND TRAFFIC

PG&E shall prepare and implement a Traffic Management Plan that is subject to approval by the City and County of San Francisco prior to construction. The plan shall:

- Include a discussion of work hours, haul routes, limits on the lengths of open trench, work area delineation, traffic control, and flagging.
- Identify all access and parking restrictions and signage requirements.
- Layout a plan for notifications and a process for communicating with affected residents and businesses prior to the start of construction. Advance public notification shall include postings of notices and appropriate signage of construction activity. The written notification shall include the construction schedule, the exact location and duration of activities within each street (i.e., which lanes and access points/driveways shall be blocked on which days and for how long), and a toll-free telephone number for receiving questions or complaints.
- Include a plan to coordinate all construction activities with emergency service providers in the area at least one month in advance. Emergency service providers shall be notified of the timing, location, and duration of construction activities. All roads shall remain passable to emergency service vehicles at all times.
- Include the requirement that all open trenches be covered with metal plates at the end of each workday to accommodate traffic and access.
- Specify the street restoration requirements pursuant to PG&E's franchise agreements with the City and County of San Francisco.
- Discuss temporary pedestrian, wheelchair, and bicycle access through detours or safe areas along the construction zone, where construction shall result in the temporary closure of sidewalks or bike lanes. These areas shall be delineated and signed.
- PG&E shall consult with San Francisco Muni at least one month prior to construction to coordinate bus stop relocations (as necessary) and to reduce potential interruption of transit service.
- If excavation is scheduled to occur while the moratorium is in effect on 23rd Street, PG&E shall repave and restripe the entire street from curb to curb (not just the area that was trenched). Section 2.4.4(n) of the San Francisco Department of Public Works Code defines a "moratorium street" as any block that has been reconstructed, repaved, or resurfaced by the Department [of Public Works] or any other owner or person in the preceding five-year period.

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