CHAPTER 4: TEMPORARY EFFECTS DURING CONSTRUCTION

4.1 CONSTRUCTION STAGING AND METHODS

Construction activities for the Electrification Program Alternative would consist of the installation of OCS poles and wires; the construction of traction power substations, switching stations and paralleling stations; the installation of pantograph inspection platforms; and the erection of overbridge protection barriers on roadway bridges that cross the Caltrain alignment. Installation of wiring and storage tracks within the Central Equipment Maintenance Operations Facility at the Lenzen Yard are also included.

The following paragraphs describe construction activities and staging for these facilities.

4.1.1 CONSTRUCTION OPERATIONS

4.1.1.1 Overhead Contact System Installation

Construction of the electrification infrastructure from San Francisco to Gilroy would take approximately three years and would occur at different locations during different periods.

Pole foundations would be excavated by means of three-foot-diameter augers, and the soil would be removed to a depth of approximately 15 feet. Alternately, a steel casing would be vibrated into place by ultrasonic vibrators. The casing would be sunk to the full 15-foot depth and soil would be excavated to a depth of only five to seven feet to place the pole foundation. This latter procedure would be used in areas that are close to drainages paralleling the rail corridor to reduce impacts to the drainage banks and vegetation, or in areas where there is potential for encountering contaminated soils or groundwater.

Spoils resulting from the excavations for OCS pole foundations would be relatively small in quantity. These spoils would be disposed of by spreading them along the railroad right-of-way in the vicinity of the excavation. Any spoils found to be contaminated with hazardous waste would not be spread within the right-of-way; the disposal of such material is addressed in Section 3.7 (Hazardous Waste).

Construction would typically occur along one- to two-mile sections of the route and would involve several “passes” per track. One pass would install the foundations, a second would place the poles, and another would install the feeder wires and support arms; these would then be followed by additional passes for installation of the messenger and contact wires. The final pass would involve a system check to ensure proper installation. This sequence is consecutive, however, construction could occur in several segments simultaneously, with different activities occurring at any or all of those locations.

The construction equipment required for these operations may include hi-rail tandem axle trucks or flatcars, on which would be mounted various items of construction equipment. These may include auger/drill rigs, concrete batch plants, ultrasonic vibratory pile drivers, 15-ton cranes, and telescoping boom bucket trucks. There would be other support vehicles, many of which would be fitted with hi-rail equipment, since the primary access to the construction sites for the catenary system would be from the tracks.

The track windows required for the installation of the OCS poles and foundations would be different from those required for other tasks, depending upon whether there is off-track access for the contractor to perform the construction, or whether there are natural resources or the potential for archaeological resources in the immediate vicinity. Off-track work is best for minimizing impacts to train operations, but on-track work may be preferable where feasible to avoid impacts to sensitive resources. Based upon the current and planned track alignment, about 20 to 30 percent of the poles and foundations (1,600 to 2,400 total poles/foundations) could be installed with off-track equipment and with minimal impact to train operations. The remaining 70 to 80 percent (some 5,600 to 6,400 poles/foundations) would be installed with on-track equipment requiring single-track access work windows. This work would need to be performed during off-peak operations such as:

9:00 a.m. to 2:30 p.m., Monday through Friday
5:00 a.m. to 5:00 p.m., Saturday and Sunday

These construction windows would take advantage of the improved single-tracking capabilities afforded by the new Centralized Train Control (CTC) signaling system and remotely controlled crossovers, and would enable this work to be carried out during daylight hours. The CTC system will be installed under the Caltrain Express (CTX) capital improvement project.

The windows for the installation of the OCS conductors, such as static wires, parallel feeders, and messenger and contact wires, would use on-track equipment and require night-time and weekend track occupancies, including weekend outages that would require total suspension of passenger revenue service. These track windows would also take advantage of the improved single tracking capabilities with the new CTC signaling system and remotely controlled cross-overs, but would require some multiple track shutdowns to install the OCS conductors at the complex interlockings. The majority of such OCS wirework would need to be accomplished during the night-time using single-track windows, but some portions of the work could be installed only by using complete weekend outages, requiring suspension of passenger service to increase working efficiency and reduce public safety risks. Typical work windows for on-track equipment could be:

10:00 p.m. to 5:00 a.m., Sunday through Thursday
10:00 p.m. to 7:00 a.m., Friday and Saturday
5:00 a.m. to 5:00 p.m., Saturday and Sunday

4.1.1.2 Overbridge Protection Barriers

Bridge barrier installation would consist generally of installing pre-fabricated components onto the existing parapets of the overhead bridges that traverse the Caltrain Corridor. Work crews would install anchor bolts into the existing bridge structure and then mount the bridge barrier. Equipment used would typically be pickups, dump trucks, and flatbed trucks.

The installation of overbridge protection barriers would occur almost entirely with the use of off-track equipment. Any work requiring the use of on-track equipment would be minimal and would be coordinated with the on-track window requirements for OCS wire installation.

4.1.1.3 Substation, Switching, and Paralleling Stations and Lay-Down Area

The sites proposed for the location of Caltrain electrification substations, switching stations and paralleling stations are presently in industrial or agricultural areas, transportation use, or proximate to existing high voltage facilities; see Section 3.9, Land Use and Planning, for evaluation of the use of these sites. Site preparation would include clearing, grubbing and grading with bulldozers and dump trucks. Access roads would be prepared concurrently with the site operations. Schedule duration for this activity would vary from site to site, but would generally take less than three months.

A ground grid composed of copper wire and driven ground rods, which is necessary for the protection of personnel and equipment during operation of the electrical systems, would be placed below each traction power facility at a depth of about three feet and then covered by fill.

Interconnections between electrical equipment would be accomplished in part by raceways contained in concrete encased conduits (duct banks). These duct banks would be installed as follows:

- dig a four-foot-deep trench with backhoe,
- construct forms as necessary (plywood and 2x4s),
- arrange conduits per design plans,
- pour encasement concrete, and
- remove forms and backfill with soil.

Concrete foundations would be required for the mounting of freestanding electrical transformers, circuit breakers and disconnect switches, as well as for the prefabricated control and medium voltage switchgear building. Foundations would generally be constructed as follows:

- with bulldozer and backhoe, dig to bottom grade per design plan,
- construct forms as necessary (plywood and 2x4s),
- arrange reinforcing steel, anchor bolts, grounding connections, and conduits (extensions of duct banks) as required per design plans,
- pour concrete, and
- strip forms and backfill.

Electrical equipment to be installed would include outdoor high voltage switches, transformers, and cables, as well as the prefabricated control and switchgear room. Some of the equipment would be mounted on small steel structures. Equipment weights range from several hundred pounds to 100,000 pounds, therefore the installation rigs would range from small truck-mounted cranes to larger track-mounted units. The equipment would be electrically connected together by cable or by buss (open air copper or aluminum tubes). Small truck-mounted cranes would be used to move and arrange the reels of cable and to support buss work during installation.

The primary service from the local utility network would be via either underground or overhead transmission lines. The installation would be either through duct banks or via direct connections to the transmission lines. Station sites would typically be finished with fencing along the entire periphery. Ground surfaces would be covered with clean crushed rock.

The electrical system would be tested prior to initiation of electrified train operations. Testing would be in two main phases, the first being with no power to verify that the installation complies with the design, the second being with the system energized to verify performance and to adjust system protective devices.

The installation of the substation, switching and paralleling stations would be done with off-track equipment. The work window requirements for constructing the interface facilities to the OCS conductors would be coordinated with the installation of the OCS wires.

4.1.2 Construction Schedule

The activities described above are not sequential; construction could occur simultaneously at several locations.

Figure 4.1-1 shows an estimated schedule for construction of the Electrification Program Alternative.

Activity	Est. Duration (Mos.)	YEAR							
		1		2		3		4	
		Mos. 1-6 *	Mos. 7-12	Mos. 13-18	Mos. 19-24	Mos. 25-30	Mos. 31-36	Mos. 37-42	Mos. 43-48
Traction Power Stations									
Clearing and Grading	3-6								
Construct Power Station Access Roads, if needed	3-6								
Install Ground Grid	3-6								
Construct Foundations	3-6								
Install Electrical Equipment	6-15								
Provide Electrical Equipment Interconnections	3-6								
Perform Testing	3-6								
OCS Poles and Wires									
Construct Foundations	6-18								
Place Poles	6-15								
Install Feeder Wires Support and Arms	6-15								
Install Messenger and Contact Wires	6-15								
Perform System Check	3-6								
Overbridge Barriers									
Anchor Bolt and Mount Pre-fabricated Barrier	12								
Locomotives and Commissioning									
Commissioning	6-9								
Manufacture Locomotives	30-36								
Pre-Revenue Testing	6-9								

* Preparing contract documents, procurement and award.

Figure 4.1-1: Estimated Construction Phasing for Caltrain Electrification Program Alternative

4.2 CONSTRUCTION–PHASE IMPACTS

The following sections describe anticipated construction-phase impacts of the Electrification Program Alternative and propose avoidance, compensatory, and mitigation measures wherever practical. Under the No-Electrification Alternative, Caltrain would continue diesel train operations in the existing, active commuter and freight rail corridor, and there would be no need to construct electrification facilities within or along the right-of-way. Therefore, the No-Electrification Alternative would not have construction-phase impacts. The No-Electrification Alternative is the No-Project Alternative for NEPA and CEQA. The rest of this section focuses on and discusses construction phase impacts and mitigation measures for the Electrification Program Alternative.

4.2.1 AESTHETICS

Project construction would be multi-phased and would occur in different locations at different times. All construction activities, whether for OCS poles and wires or traction power facilities, would involve the use of a variety of construction equipment, stockpiling of soils and materials, and other visual signs of construction. While evidence of construction activity would be noticeable to area residents and others in the vicinity, such visual disruptions would be short-term and are a common and accepted feature of the urban environment. Work would be conducted during off-peak periods and on weekends to minimize disruption to commuter train service. Some construction would be accomplished at night. The JPB would require the project contractor to ensure that construction crews working at night direct any artificial lighting onto the work site, to minimize "spill over" light or glare in adjacent residential areas.

4.2.2 AIR QUALITY

4.2.2.1 Impacts

Construction of the Electrification Program Alternative has limited potential to generate air quality impacts, as it would involve only erection of poles and wires within the Caltrain right-of-way, plus the construction of substations at 13 nearby locations. The majority of the construction activities would be within or adjacent to existing transportation corridors, industrial or agricultural areas. None of the substations would be constructed in residential areas.

During the construction phase of the Electrification Program Alternative, nitrogen dioxide, carbon monoxide, hydrocarbons, oxides of sulfur, and particulate matter would be emitted from construction equipment and exhausts of workers' vehicles. Additional dispersion of particulate matter would occur through grading and vehicular travel on the unpaved areas. These impacts would all be of temporary duration and would cease once construction was completed.

4.2.2.2 Mitigation

All traffic mitigation measures identified in Section 4.2.11, Transportation Effects during Construction, would be implemented to reduce congestion and resultant localized CO concentrations. Best management practices, including dust control measures such as watering and covering materials hauled in trucks, will be used during construction to minimize fugitive dust. Construction equipment will also be tuned and maintained in good working condition to minimize emissions of criteria pollutants and particulates.

4.2.3 BIOLOGICAL RESOURCES

4.2.3.1 Impacts

Temporary impacts to natural resources from construction activities typically include air pollution from dust and construction equipment, increased runoff and soil erosion, and construction noise. Construction activities and related impacts may disturb migratory patterns of California red-legged frog, San Francisco garter snake, and Monarch butterfly, and nesting behavior of several swallow species. Pre-construction surveys are recommended for these species to ensure that no incidental take of the species would occur. All sensitive habitat and wetland areas would be identified for avoidance during project design.

4.2.3.2 Preventive Measures

Short-term construction impacts to trees and other mature vegetation would be minimized or avoided by maintaining adequate clearance requirements within the right-of-way; i.e., trimming trees prior to conducting other construction activities.

Construction impacts on all other biological resources would be minimized through the use of Best Management Practices as identified in the Stormwater Pollution Prevention Plan (SWPPP) described in Section 4.2.6. The following preventive measures would adequately address construction-related impacts to wetland areas and special-status species. These measures will be reviewed by all agencies involved, including the USFWS, CDFG and ACOE.

- Precautions to prevent pollution of streams, waterways, and other bodies of water during construction;
- Dust control through watering of appropriate surfaces;
- Clearing and grubbing procedures that specify that only trees and plants designated for removal shall be removed;
- Excavation techniques to ensure the stability of subsurface materials as well as retention of excavated materials within the construction areas;
- Materials and fluids generated by construction activities would be placed at least 30 m (100 ft) from wetland areas or drainages until they could be disposed of at a permitted site; and

- All natural communities and wetland areas located outside the construction zone that could be affected by construction activities will be temporarily fenced off and designated Environmentally Sensitive Area(s) (ESAs) to prevent accidental intrusion by workers and equipment.

Construction-phase mitigation measures for specific special-status wildlife species are described in the following sections.

California Red-legged Frog and San Francisco Garter Snake

- All potential California red-legged frog and San Francisco garter snake habitat that can be avoided by construction activities shall be flagged by a USFWS-approved biologist prior to grading or other construction activities. All California red-legged frog and San Francisco garter snake habitat will be protected by a 3-meter (10-foot) buffer with exclusionary fencing to make it easily avoided by construction crews.

- A Worker Environmental Awareness Training Program for construction personnel shall be conducted by the JPB. The program will provide workers with information on their responsibilities with regard to the federally-listed, threatened California red-legged frog and federally- and state-listed endangered San Francisco garter snake.

- The construction site shall be monitored by a qualified and federally permitted biologist during all phases of construction to remove any California red-legged frogs and San Francisco garter snakes found in the construction area. Individual frogs and snakes shall be moved immediately to a site that is a minimum of 100 meters from the construction boundary. The relocation site shall be determined prior to commencement of construction activities.

- Construction activities near drainages identified as potential migration corridors shall take place between May 15 and October 31 when the California red-legged frog and San Francisco garter snake are least likely to be present in the project impact area.

- To discourage California red-legged frogs from entering the project impact areas via the freshwater ditches west of the impact areas, the ditches will be equipped with lightweight, one-way flow gates. These will be designed so that water can easily pass from the project site to the ditches, but small vertebrates such as the frog cannot move upstream from the ditches to the project site.

Monarch Butterfly

No formal mitigation is required, however, it is recommended that any trimming of *Eucalyptus* trees should be completed prior to the winter roosting season (September - February) to avoid take of individual Monarch butterflies. In accordance with CDFG recommendations, trees would be surveyed prior to trimming, and if Monarch butterflies are present, then trimming would be delayed until the trees were unoccupied.

Nesting Swallows

- Prior to construction activities, a USFWS-approved biologist would conduct a pre-construction survey of all potential nesting habitat for purple martins and other swallow species that use cavities in human-made structures (i.e., overpasses) as nest sites or construct nests that adhere to the aforementioned human-made structures to record the presence and location of nesting swallows.

- If construction during the breeding season cannot be avoided, then USFWS-approved exclusionary devices such as netting, panels, or metal projectors would be installed over the entrances to the identified cavities and/or nest sites prior to the birds' arrival in mid-March. No exclusionary devices shall be installed after the breeding season begins (i.e., March 15 through August 15) nor shall the cavities or external nests be blocked if birds are occupying them. All installation of exclusionary devices would be supervised by the USFWS-approved biologist.

- Alternatively, no pre-construction surveys would be conducted. However, all drainage holes or other cavities, or suitable nest substrates associated with human-made structures within the project corridor that may be used by nesting swallows would be fitted with the exclusionary devices described above prior to the birds' arrival in mid-March.

- All exclusionary devices would be monitored and maintained throughout the breeding season to ensure that they are successful in preventing the birds from accessing the cavities or nest sites. Upon the project's completion, the exclusionary devices would be removed from the site unless otherwise authorized by the USFWS.

4.2.4 CULTURAL AND HISTORICAL RESOURCES

4.2.4.1 Archaeological Resources

It is not anticipated that construction activities would disturb buried cultural materials. All construction within site boundaries and the sensitive zones would be conducted using the on-track equipment scenario for installation of OCS pole foundations. Pole foundations would be excavated using the ultrasonic vibrated steel casing method to minimize effects to subsurface materials. If buried cultural resources are inadvertently discovered during any ground-disturbing activities, all work would stop within 100 feet of the area until a qualified archaeologist can assess their significance.

4.2.4.2 Historic Architectural Resources

No construction-period adverse impacts to any of the historic resources identified within the project APE are anticipated. Construction workers would be informed in advance of the significance of historic resources within or along the Caltrain corridor. No excavations or vibration effects are anticipated that would threaten the structural integrity of historic properties. Temporary noise or visual impacts would not affect the attributes contributing to the historic eligibility of these properties. Since crown mining would be required within Tunnel 4 to accommodate pantograph movement, a feasibility study would be conducted in advance of any construction to identify techniques to protect the integrity of the brick lining of the tunnel.

4.2.5 HAZARDOUS WASTES

4.2.5.1 Impacts

Two principal types of hazardous wastes or materials may cause impacts during construction of the Electrification Program Alternative facilities: hazardous materials used during the construction process and hazardous wastes that may be encountered or generated during construction. Section 3.7, Hazards and Hazardous Materials, discusses the potential for encountering pre-existing hazardous wastes within the Caltrain right-of-way or proposed traction power sites and identifies appropriate mitigation measures.

Some hazardous materials, including fuels and motor oils, paints, cleaners, degreasers, and insulating materials, would be used during construction. Electrification facilities may contain hazardous materials, such as battery acids in the transformers or sulfa-hexaflouride gas insulation materials, that would be hazardous if there were a spill or rupture of the equipment chamber containing the material. While many of these materials are commonly used, they are considered hazardous materials (fuels, for example, are flammable) based on their physical properties, and improper handling could endanger workers and the public or result in contamination of soil and/or water.

Contact with contaminants from pre-existing hazardous wastes in the project area could have adverse effects on workers, the public, and environmental health and safety. Workers could be exposed to soil and/or groundwater containing hazardous substances via direct contact (ingestion or through the skin) or via airborne pathways (inhalation of vapors or minute particles). The public and environment could be exposed to contaminants transported offsite during construction. The degree of hazard associated with these impacts on human or environmental receptors would depend upon the chemical properties, concentrations, or volumes of contaminants, the nature and duration of construction activities, and contaminant migration pathways. The largest potential exposure risk is to the construction worker.

Construction of facilities for the Electrification Program Alternative would not require deep excavations or large earth movements. Foundations for the 13 traction power facilities would not be deep, although they may cover a relatively large area, up to 115 by 200 feet for a large primary substation. OCS pole foundations will be sunk up to 15 feet, but the hole to be excavated is only three feet in diameter. Groundwater is shallow in many places along the Caltrain corridor, however, and site dewatering within existing contaminated areas could increase the migration of contaminants to surface water and other groundwater zones along the alignment. Disposal of contaminated soil or water would transport contaminants out of the project area.

4.2.5.2 Mitigation

Handling and storage of fuels and other flammable materials during construction would follow California OSHA and local standards for fire protection and prevention. These measures include appropriate storage of flammable liquids and prohibition of open flames within 50 feet of flammable storage areas.

Prior to construction, the potential presence of contaminants in soil and groundwater would be investigated using conventional drilling, sampling, and chemical testing methods (see Section 3.7.4, Hazards and Hazardous Materials, Recommendations/Mitigation Measures). Based on the chemical test results, a mitigation plan would be developed to establish guidelines for the disposal of contaminated soil and discharge of contaminated dewatering effluent, and to generate data to address human health and safety issues that may arise as a result of contact with contaminated soil or groundwater during construction.

There are typically two different management strategies that can be employed to address contaminated soil handling and disposal issues. Contaminated soil can be excavated and stockpiled at a centralized location and subsequently sampled and analyzed for disposal profiling purposes in accordance with the requirements of the candidate disposal landfill. Alternatively, soil profiling for disposal purposes can be done in-situ so when soil is excavated it is loaded directly on to trucks and hauled to the appropriate landfill facility for disposal based on the in-situ profiling results. The project could also combine both strategies.

Transformers will be placed within spill containment structures to prevent contamination of soil or groundwater in the unlikely event of a rupture.

Soils removed during excavation and grading activities that remain at a centralized location for an extended period of time would be covered with plastic sheeting to prevent the generation of fugitive dust emissions. Additionally, dust control measures would be implemented during construction grading and excavation as necessary to minimize offsite migration of contaminants. Soil for disposal at a landfill or recycling facility would be transported by a licensed waste hauler, under appropriate manifests or bill of lading procedures, as required.

Chemical test results for groundwater samples along the right-of-way would be used to obtain necessary permits (Regional Water Quality Control Board, State Department of Toxic Substances Control, local jurisdictions). If required, treatment may include:

- Settling to allow particulate matter (total suspended solids) to settle out of the effluent in order to reduce the sediment load as well as reduce elevated metal and other contaminant concentrations that may be associated with suspended sediments; and/or

- Construction of a small-scale batch waste water treatment system to remove dissolved contaminants [mainly organic constituents such as petroleum hydrocarbons (gas, diesel, and oils), BTEX, and VOCs] from the dewatering effluent prior to discharge to the sanitary sewer. A treatment system would also likely employ the use of filtration to remove suspended solids.

A detailed mitigation plan for the handling of potentially contaminated soil and groundwater will be developed for soil and groundwater handling prior to starting project construction.

Workers performing activities on site that may involve contact with contaminated soil or groundwater would be required to have appropriate health and safety training in accordance with 29 CFR 1910.120. A Worker Health and Safety Plan (HSP) would be developed for the project and monitored for the implementation of the plan on a day-to-day basis by a Certified Industrial Hygienist (CIH). The HSP would include provisions for:

- Conducting preliminary site investigations and analysis of potential job hazards;
- Personnel protective equipment;
- Safe work practices;
- Site control;
- Exposure monitoring;
- Decontamination procedures; and
- Emergency response actions.

The HSP would specify mitigation of potential worker and public exposure to airborne contaminant migration by incorporating dust suppression techniques in construction procedures. The plan would also specify mitigation of worker and environmental exposure to contaminant migration via surface water runoff pathways by implementation of comprehensive measures to control drainage from excavations and saturated materials excavated during construction.

4.2.6 Water Quality

4.2.6.1 Impacts

Construction grading and utility excavations at substation sites would increase the sediment load in stormwater during rainfall events. Installation of electric poles would also result in some increase in sediment loads. Sediment sources created during construction include soil stockpiles and soil tracked across construction areas, debris resulting from the installation of electric pole foundations using the standard augering technique (described in Section 4.1), and soil transported by wind.

The project would disturb more than one acre of land, and therefore, a Stormwater Pollution Prevention Plan (SWPPP) will be required, in accordance with Section 402 of the federal Clean Water Act, as amended. The purpose of a SWPPP is to reduce the amount of construction-related pollutants that are transported by stormwater runoff to surface waters.

Impacts to groundwater will be avoided by using a vibration technique to install electric pole foundations in areas where groundwater is known to be high. There remains the potential to encounter groundwater during electric pole excavations in areas where depth to groundwater is unknown. Due to the 77-mile length of the project corridor, it is not practicable to conduct site-specific studies for the entire corridor.

4.2.6.2 Mitigation

A SWPPP will be prepared and will identify construction-period Best Management Practices to reduce water quality impacts. The SWPPP will emphasize standard temporary erosion control measures to reduce sedimentation and turbidity of surface runoff from disturbed areas, and will be submitted to the Regional Water Quality Control Board.

Where the project alignment is adjacent to water resources and riparian habitat, and in areas where the groundwater table is known to be high, impacts will be minimized by installing electric pole foundations using the vibration technique described in Section 4.1.1.1.

In the event groundwater is encountered during construction, dewatering would be conducted locally. Dewatering effluent would be tested for contamination. Contaminated effluent would be disposed of in accordance with applicable federal, state and local regulations.

4.2.7 NEIGHBORHOODS AND BUSINESSES

4.2.7.1 Impacts

Construction of OCS poles and wires within the Caltrain right-of-way would have short-term, temporary noise and vibration impacts that would be heard and felt by individual residents and neighborhoods as the construction proceeded up or down the corridor. There may be short-term, temporary traffic detours or occasional street closures to facilitate construction of electrification facilities on or off the right-of-way. These detours and closures would not affect the ability of businesses to operate nor disrupt neighborhood and community cohesion. It is anticipated that construction activities would be carried out on weekends, during the off-peak midday periods, and at night to avoid disruption of normal rail operations.

It is not anticipated that construction of the traction power facilities and connections would affect the functioning of neighborhoods or businesses. These facilities have been proposed to be located in areas where there are no close-by sensitive receptors. Construction of access roads to these facilities may require short-term, temporary detours or street closures.

4.2.7.2 Mitigation

Construction effects would be minimized by limiting street closures and consequent detours of transit and vehicular traffic to one location at a time, with a construction time frame of 24 to 48 hours for each closure. For local roadways where lane closures and restricted travel speeds would be required for longer periods, traffic control measures would be implemented to minimize traffic conflicts and delays to the traveling public.

Residential and business property line noise and vibration restrictions established prior to construction would minimize temporary and intermittent construction noise intrusion on residences and sensitive businesses. Construction activities would take place primarily during daytime hours.

JPB would coordinate with the traffic departments of the local jurisdictions and with homeowner associations as practicable in developing traffic management measures affecting local streets.

Neighborhood residents and business owners in the project vicinity would be notified in advance of the construction schedule and of any impending street closures or reroutings and their duration.

4.2.8 CONSTRUCTION EMPLOYMENT

Given the size of the Bay Area economy, the Electrification Program Alternative would not result in changes to regional socioeconomics beyond current regional planned and forecasted growth.

4.2.8.1 Methodology and Impacts

Table 4.2-1 provides an estimate of the number of positions and level of economic activity created by the expenditure of construction funds for the No-Electrification and Electrification Program Alternatives. Estimates are based in part on an input/output study of construction activity in Texas by the Federal Highway Administration (Politano and Roadifer, 1989). Funds created in economic output include the multiplier effect of direct construction being re-spent in service or other sectors of the economy. Economic activity generated by the proposed project is anticipated to benefit the San Francisco Bay Area region and would also follow the labor and material markets for transportation-related construction.

Table 4.2-1: Impacts from Construction Investment in the Caltrain Electrification Program* (Millions of 2003 dollars)

Alternative	Construction Value**	Regional Economic Output	Total Earnings	Job Creation (Person Years of Employment)	
				On-Site	Total
Electrification Program Alternative	$456.7	$803.77	$210.08	1,300	2,800
No-Electrification Alternative	N/A	N/A	N/A	N/A	N/A

* Construction impacts are based on preliminary estimates for construction value and exclude purchase of rolling stock (2003 dollars).
** Construction value includes administration costs.
N/A = Not Applicable
Sources:
A.L Politano and Carol J. Roadifer, REIMHS: A Prototype Model for Regional Economic Analysis of Highway Projects and Systems, Federal Highway Administration, presented at TRB 68th Annual Meting, Washington D.C., January 1989. (Model adjusted to reflect inflation.)
Parsons, December 2003.

With respect to job creation, FHWA found nationally in the early 1980s that a one million dollar investment in transportation construction would directly generate 10 on-site, full-time construction jobs (person years of employment [PYE]). This number has been adjusted to 5.6 PYE positions to reflect inflation through 2003. When off-site, construction-related and service-industry-related jobs and related increases in consumer demand (direct, indirect, and induced effects) are considered, the total number of full time PYE positions created rises to about 12.1, adjusting for inflation, for each one million dollars investment. On-site and total PYE positions have been adjusted by half to reflect jobs generated specifically by rail construction.

Compared with the No-Electrification Alternative, capital costs for construction of the Electrification Program Alternative would be $456.7 million, exclusive of rolling stock. Although there are three rolling stock options, rolling stock costs are excluded from the regional effects of construction expenditures because the rolling stock would not be manufactured in the region. Construction expenditures would generate approximately 1,300 on-site full-time construction positions (PYE) and 2,800 total positions (PYE), including direct, indirect, and induced, as compared to the No-Electrification Alternative.

The impact of this direct and indirect employment added to the regional economy would be positive.

4.2.8.2 Mitigation

As the impacts are beneficial, no mitigation is proposed.

4.2.9 CONSTRUCTION NOISE AND VIBRATION

4.2.9.1 Construction Noise

Construction noise varies greatly depending on the construction process, type and condition of equipment used, and layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, which makes it difficult to accurately estimate levels of construction noise.

Three construction stages have been identified for the Electrification Program Alternative for the purpose of determining construction noise exposure. These stages include: 1) Overhead Contact System, 2) Overbridge Protection Barriers, and 3) Substation, Switching, and Paralleling Stations. Each stage has several activities that could create high noise levels.

Noise Sources. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment. For most construction equipment, the engine, which is usually diesel, is the dominant noise source. Table 4.2-2 identifies the major pieces of construction equipment associated with the various stages of construction. Typical maximum noise emission levels (L_{max}) are summarized, based on construction equipment operating at full power at a reference distance of 50 feet, and an estimated equipment usage factor based on experience with other similar construction projects. The usage factor is a fraction that accounts for the total time during an eight-hour day in which a piece of construction equipment is producing noise under full power. Although the noise levels in Table 4.2-2 represent typical values, there can be wide fluctuations in the noise emissions of similar equipment based on two important factors: (1) the operating condition of the equipment (e.g., age, presence of mufflers and engine cowlings); and (2) the technique used by the equipment operator (aggressive vs. conservative).

Table 4.2-2: Typical Construction Equipment Noise Emission Levels

Equipment	Maximum Noise Level, dBA, 50 feet from Source	Equipment Usage Factor	Total 8-Hour Leq Exposure, dBA at Various Distances [1]	
			50 feet	100 feet
Overhead Contact System Installation				
Foundation Installation Without Casing			**85**	**79**
Auger/drill rigs	85	0.50	82	76
Concrete truck	82	0.50	79	73
Telescoping boom bucket trucks	81	0.10	71	65
Front Loader	80	0.30	75	69
Dump Truck	71	0.15	63	57
Generator to vibrate the concrete	82	0.15	74	68
Foundation Installation With Casing			**86**	**80**
Auger/drill rigs	85	0.25	79	73
Concrete truck	82	0.25	76	70
Telescoping boom bucket trucks	81	0.20	74	68
Front Loader	80	0.30	75	69
Vibratory hammer	85	0.50	82	76
Dump Truck	71	0.15	63	57
Generator to vibrate the concrete	82	0.15	74	68
OCS Pole Installation			**73**	**67**
Diesel construction train (stationary)	70	0.06	58	52
Diesel construction train (in transit)	77	0.0007	45	39
Telescoping boom bucket trucks	81	0.06	69	63
Generator (nighttime lighting)	82	0.06	70	64
OCS Wiring			**75**	**69**
Diesel construction train (stationary)	70	0.09	60	54
Diesel construction train (in transit)	77	0.008	56	50
Telescoping boom bucket trucks	81	0.09	71	65
Generator (nighttime lighting)	82	0.09	72	66
Overbridge Protection Barriers				
Installation of Barriers to Roadway Bridges			**81**	**75**
Pneumatic drill (in concrete)	85	0.30	80	74
Utility truck (with crane)	81	0.30	76	70
Flat bed truck	78	0.10	68	62

Table 4.2-2: Typical Construction Equipment Noise Emission Levels

Equipment	Maximum Noise Level, dBA, 50 feet from Source	Equipment Usage Factor	Total 8-Hour L_{eq} Exposure, dBA at Various Distances [1]	
			50 feet	100 feet
Substation, Switching, and Paralleling Stations				
Ground Clearing Stage – one site only			**83**	**77**
Dozer	85	0.50	82	76
Front Loader	80	0.30	75	69
Dump Truck	71	0.25	65	59
Compactor	81	0.25	75	69
Ground Grade			**81**	**75**
Backhoe	80	0.30	75	69
Hammer to drive rods (small vibrator)	86	0.25	80	74
Concrete Foundations			**84**	**78**
Flat bed truck	78	0.10	68	62
Wood saw to construct forms	88	0.25	82	76
Concrete Truck	82	0.25	76	70
Utility truck (with crane)	81	0.30	76	70
Generator to vibrate the concrete	82	0.15	74	68
Electrical Equipment Installation			**83**	**77**
Flat bed truck	78	0.15	70	64
Forklift	80	0.27	74	69
Large crane	85	0.50	82	76

Source: Parsons.
Note: 1. Distances are measured from the center of the noise producing activities associated with the construction phase.

Construction Noise Impact Criteria. There are various jurisdictions along the proposed project alignment, each with different construction noise and vibration limits. These criteria, summarized in Table 4.2-3, typically specify limits for construction noise and vibration levels and/or permit construction activities only during certain hours.

Table 4.2-3: Summary of Local Ordinances Governing Construction Noise

Jurisdiction	Noise/Vibration Source	Maximum Allowable Levels or Exemption
San Francisco	Construction	Daytime: 80 dBA measured at 100 ft from construction equipment. Nighttime: not more than 5 dBA above background noise at the nearest property line.
Brisbane	Construction	83 dBA at 25 feet for individual equipment; 86 dBA at project property line. Construction permitted weekdays 7 a.m. to 7 p.m.; and weekends from 9 a.m. to 7 p.m.
South San Francisco	Construction	90 dBA at 25 feet for equipment or at property plane of the project. Construction permitted weekdays from 8 a.m. to 8 p.m.; Sundays or holidays from 9:00 a.m. to 8 p.m.; Saturdays from 10 a.m. to 6 p.m.
San Bruno	Construction	85 dBA at 100 feet, 7 a.m. to 10 p.m.; 60 dBA at 100 feet, 10 p.m.to 7 a.m.
Millbrae	Construction	Permitted weekdays from 7 a.m. to 6 p.m., and Saturdays and Sundays from 9 a.m. to 5 p.m.
Burlingame	Construction	Permitted weekdays from 7 a.m. to 7 p.m., Saturdays from 8 a.m. to 6 p.m.; and Sundays from 10 a.m. to 6 p.m.
San Mateo (County)	Construction	Permitted Monday thru Friday from 7 a.m. to 7 p.m., Saturdays from 10 a.m. to 6 p.m. and Sundays from 12 p.m. to 4 p.m. Deliveries to construction site are prohibited between 7:30 a.m. and 8:30 a.m., and from 4 p.m. to 5 p.m.
Belmont	Construction	Permitted Monday thru Friday from 8 a.m. to 5 p.m. and Saturdays from 10 a.m. to 5 p.m.; prohibited on Sundays.
San Carlos	Construction	Permitted weekdays from 7 a.m. to 6 p.m., and weekends and holidays from 9 a.m. to 5 p.m.
Redwood City	Construction	110 dBA measured at the property line. Permitted Monday thru Friday from 7 a.m. to 8 p.m.; and Saturday, Sunday and holidays from 9 a.m. to 8 p.m.
Atherton	Construction	Exempt from general noise regulations from 8 a.m. to 5 p.m., Monday thru Friday only.
Menlo Park	Construction	85 dBA: measured 50 feet from equipment. Permitted Monday thru Friday from 8 a.m. to 6 p.m.; and Saturday, Sunday, or holidays from 9 a.m. to 5 p.m.
Palo Alto	Construction	110 dBA at 25 ft. for individual equipment or at property plane of project. Permitted weekdays from 8 a.m. to 8 p.m.; 9 a.m. to 8 p.m. Saturday; 10 a.m. to 6 p.m. Sundays & holidays.
Santa Clara County	Construction (Mobile Equipment)	75 dBA, Mon.-Sat., 50 dBA Sundays, 7 a.m. to 7 p.m., single-family zone. 80 dBA, Mon.-Sat., 55 dBA Sundays, 7 a.m. to 7 p.m., multi-family zone. 85 dBA, Mon.-Sat., 60 dBA Sundays, 7 a.m. to 7 p.m., commercial zone.

Table 4.2-3: Summary of Local Ordinances Governing Construction Noise

Jurisdiction	Noise/Vibration Source	Maximum Allowable Levels or Exemption
Santa Clara County	Construction (Stationary Equipment)	60 dBA, Mon.-Sat., 50 dBA Sundays, 7 a.m. to 7 p.m., single-family zone. 65 dBA, Mon.-Sat., 55 dBA Sundays, 7 a.m. to 7 p.m., multi-family zone. 70 dBA, Mon.-Sat., 60 dBA Sundays, 7 a.m. to 7 p.m., commercial zone.
San Jose	Construction	Permitted only from 7 a.m. to 7 p.m. M-F, when within 500 ft. of a residential unit.
Morgan Hill	Construction	Permitted 7 a.m. to 8 p.m. M-F, 9 a.m. to 6 p.m., Saturday

Source: *Noise and Vibration Study*, Parsons, November 2003.

It would not be practical for a contractor to comply with all of the individual limits shown in Table 4.2-3; therefore, FTA daytime and nighttime construction noise levels will be used for the entire project. Table 4.2-4 presents the recommended noise limits for the proposed project. These limits are for 8-hour average noise levels (L_{eq}) at the property line of the nearest location to the construction site.

Table 4.2-4: Allowable Construction Noise Levels

Land Use	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
	L_{eq} [1]	L_{eq} [1]
Residential	80	70
Commercial	85	85
Industrial	90	90

[1] L_{eq} for 8 hours.
Source: FTA, 1995

Construction Noise Impacts. Total construction noise impact was determined by first calculating the noise exposure for each piece of equipment, and then combining the noise exposures for all equipment to be used during a construction stage. The results of these calculations are shown in Table 4.2-2. The equipment noise levels within a particular stage were combined together to obtain a total noise exposure for each stage (listed as bolded entries in Table 4.2.2. Noise levels of different stages were not combined because the different stages would not occur at the same time in a given area.

To assess impacts sensitive to receptors a calculation was performed to determine the distance from the construction activities where an 80-dBA exposure would occur over an 8-hour period. This exposure level represents the limit for daytime construction noise at residential land uses. Table 4.2-5 shows the results of those calculations.

Based on the distances calculated in Table 4.2-5 and the daytime noise impact criteria of 80 dBA for residential properties, construction noise impacts would occur along the rail corridor when construction activities come within 60 to 125 feet of residences and remain within that distance for at least an 8-hour period. When those conditions occur, noise mitigation would be required. Because some construction activities are expected to be performed during nighttime hours, moreover, the number of affected residences would be greater since the nighttime criterion is 10 dBA lower, or 70 dBA.

Table 4.2-5: Distance to Noise Impact During Construction Stages 1

Construction Stage	Distance to Leq of 80 dBA Based on 8-Hours/ Day of Exposure to Construction Noise [1] (Feet)
Overhead Contact System Installation	
Foundation installation without casing	30
Foundation installation with casing	35
OCS pole installation	25
OCS wiring	30
Overbridge Protection Barriers	
Installation of barriers to roadway bridges	60
Substation, Switching, and Paralleling Stations	
Ground Clearing Stage – one site only	75
Ground grade	55
Concrete foundations	80
Electrical equipment installation	70

Note: 1. Based on the construction noise limit criteria of 80 dBA for daytime hours at residential land uses. Distances are measured from the center of the noise producing activities associated with the construction phase.

Source: Noise and Vibration Study, Parsons, November 2003.

4.2.9.2 Construction Vibration

Two types of construction vibration impact were analyzed: (1) Human annoyance; and (2) building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Ordinary buildings that are not particularly fragile would not experience any cosmetic damage (e.g., plaster cracks) at distances beyond 30 feet. This distance can vary substantially depending on the soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment. The potential for vibration annoyance and building damage was analyzed for major vibration-producing construction equipment that would be used for the Electrification Program Alternative.

Construction Vibration Sources. The vibration produced by construction equipment, shown in Table 4.2-6, was obtained from FTA procedures (FTA, 1995) and from field measurements.

Table 4.2-6: Vibration Source Levels for Construction Equipment

Equipment	PPV(1) at 25 ft (in/sec)	Approximate Velocity Level(2) at 25 ft (VdB)
Large bulldozer	0.089	87
Loaded trucks	0.076	86
Small bulldozer	0.003	58
Auger/drill rigs	0.089	87
Vibratory hammer	0.07[3]	85[3]
Vibratory compactor/roller	0.55[4]	103[4]

1 - Peak particle ground velocity measured at 25 feet unless noted otherwise.
2 - Route mean square amplitude ground velocity in decibels (VdB) referenced to 1 micro-inch/second.
3 - Measured at 88 feet by Parsons.
4 – Measured at 15 feet by Parsons.
Source: FTA, 1995

Construction Vibration Impacts. Table 4.2-7 presents FTA's vibration impact criteria. The distances at which vibration impacts would occur were calculated according to these criteria and the FTA procedures, which are described in Section 3.11.2.

Table 4.2-7: Ground-Borne Vibration Impact Criteria for Human Annoyance

Land Use Category	Ground-Borne Vibration Impact Levels (dB ref. 1 micro-inch/sec)	
	Frequent[1] Events	Infrequent[2] Events
Category 1: Buildings where low ambient vibration is essential for interior operations.	65 VdB[3]	65 VdB[3]
Category 2: Residences and buildings where people normally sleep.	72 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use.	75 VdB	83 VdB

(1) "Frequent Events" is defined as more than 70 vibration events per day.
(2) "Infrequent Events" is defined as fewer than 70 vibration events per day.
(3) This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Ensuring lower vibration levels in a building often requires special design of the HVAC systems and stiffened floors.

Source: FTA, 1995

Table 4.2-8 shows the minimum distances at which short-term construction vibration impacts would occur, resulting from various types of equipment. Mitigation would be required if construction equipment were to operate within the distances shown in Table 4.2-8 from light-frame buildings located along the Caltrain right-of-way. Vibration with potential to damage adjacent buildings is not anticipated, based on the distances shown.

Table 4.2-8: Construction Equipment Vibration Impact Distances

Equipment	Distance to Vibration Annoyance[1] in feet	Distance to Vibration Building Damage[2] in feet
Large bulldozer	45	<10
Loaded trucks	40	<10
Small bulldozer	--	<10
Auger/drill rigs	45	<10
Vibratory hammer	130	25
Vibratory compactor/roller	85	15

[1] This is the distance at which the route mean square amplitude velocity level is 80 VdB or less at the inside of the building structure (see Section 3.11.2). When propagating from the ground surface to the building structure foundation, there is a vibratory coupling loss of approximately 5 dB; however this loss is offset by the building amplification in light-frame construction. Thus, no additional adjustments are applied.
[2] This is the distance at which the peak particle velocity is 0.50 inch/sec or less (see Section 3.11.2).

Source: *Noise and Vibration Study*, Parsons, November 2003.

Construction vibration impacts sufficient to cause some annoyance are anticipated at residential locations that are within 40 to 130 feet from the construction activity, based on the impact assessment presented in Table 4.2-8. These kinds of construction impacts are of a temporary nature, and construction is a necessary part of any project, however, mitigation measures are proposed to reduce the impacts.

4.2.9.3 Mitigation

To minimize noise and vibration impacts at nearby sensitive sites, construction activities should be conducted during daytime hours to the extent feasible. Nighttime construction would be unobtrusive and therefore could be preferable in some locations (e.g., in commercial districts where most businesses do not operate at night). Nighttime construction may also be necessary to avoid unacceptable rail service or traffic disruptions during daytime hours. Three scenarios for the installation of OCS poles and wires are under consideration: (A) nighttime construction with no impact to Caltrain service, (B) complete shutdown of service, and (C) a combination of A and B. Once details of the construction activities become available, JPB would work with local authorities to develop an approach to reduce interference with the business and residential communities, and minimize traffic disruptions and the total duration of the construction.

There are a number of measures that can be taken to reduce intrusion without placing unreasonable constraints on the construction process or substantially increasing costs. These include noise and vibration monitoring to ensure that contractors take all reasonable steps to minimize impacts when near sensitive areas; noise testing and inspections of equipment to ensure that all equipment on the site is in good condition and effectively muffled; and an active community liaison program. The community liaison program should keep residents informed about construction plans so they can plan around noise or vibration impacts; it should also provide a conduit for residents to express any concerns or complaints.

The following measures would minimize noise and vibration disturbances at sensitive areas during construction:

1. Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding).
2. Perform all construction in a manner to minimize noise and vibration. Use construction methods or equipment that will provide the lowest level of noise and ground vibration impact near residences and consider alternative methods that are also suitable for the soil condition. The contractor should be required to select construction processes and techniques that create the lowest noise levels.
3. Perform noise and vibration monitoring to demonstrate compliance with the noise limits. Independent monitoring should be performed to check compliance in particularly sensitive areas. Require contractors to modify and/or reschedule their construction activities if monitoring determines that maximum limits are exceeded at residential land uses.
4. Conduct truck loading, unloading and hauling operations so that noise and vibration are kept to a minimum by carefully selecting routes to avoid going through residential neighborhoods to the greatest possible extent.
5. Ingress and egress to and from the staging area should be on collector streets or higher street designations (preferred).
6. Turn off idling equipment.
7. Temporary noise barriers shall be used and relocated, as practicable, to protect sensitive receptors against excessive noise from construction activities. Consider mitigation measures such as partial enclosures around continuously operating equipment or temporary barriers along construction boundaries.

8. Minimize construction activities during evening, nighttime, weekend, and holiday periods to the extent feasible, given rail operational requirements and the need for on-track work to avoid sensitive resources. Permits may be required in some cities before construction can be performed in noise-sensitive areas between 10 p.m. and 7 a.m.
9. The construction contractor should be required by contract specification to comply with all local noise and vibration ordinances and obtain all necessary permits and variances.

It is expected that ground-borne vibration from construction activities would cause only intermittent localized intrusion along the rail corridor. Although processes such as earth moving with bulldozers or the use of vibratory compaction rollers can create annoying vibration, there should be only isolated cases where it is necessary to use this type of equipment in close proximity to residential buildings. Following are some procedures that can be used to minimize the potential for annoyance or damage from construction vibration:

1. When possible, limit the use of construction equipment that creates high vibration levels, such as vibratory rollers operating within 110 feet of residential structures.
2. Require vibration monitoring during vibration-intensive activities.
3. Restrict the hours of vibration-intensive equipment or activities such as vibratory rollers so that impacts to residents are minimal (e.g., weekdays during daytime hours only when as many residents as possible are away from home).

A combination of the mitigation techniques for equipment noise and vibration control as well as administrative measures, when properly implemented, would provide the most effective means to minimize the impacts of construction activities. Application of these mitigation measures will reduce the construction impacts; however, temporary increases in noise and vibration would likely occur at some locations.

4.2.10 Public Services and Facilities

4.2.10.1 Impacts

Construction of OCS poles and wires within the Caltrain right-of-way could involve short-term, temporary detours or street closures. These are not expected to have substantial adverse effects on public or emergency service delivery or the ability of people to access public facilities. The traction power stations are proposed to be located away from residential developments to avoid impacts on local public services and community facilities. Construction of access roads or connections from the traction power facilities to the Caltrain right-of-way could involve short-term street closures but is not expected to disrupt or delay public or emergency services delivery or affect accessibility to public and community facilities.

4.2.10.2 Mitigation

Construction effects would be minimized by limiting street closures and consequent detours of transit and vehicular traffic to one location at a time, with a construction time frame of 24 to 48 hours for each closure. For local roadways where lane closures and restricted travel speeds would be required for longer periods, traffic control measures would be implemented to minimize traffic conflicts and delays to the traveling public.

JPB would coordinate with the traffic departments of the local jurisdictions and with all corridor emergency service providers in developing detour routes and other traffic handling plans.

JPB would provide advance notice of all Electrification Program construction-related street closures and detours to local jurisdictions, emergency service providers and motorists.

4.2.11 TRANSPORTATION EFFECTS DURING CONSTRUCTION

4.2.11.1 Impacts

During the construction phase of the Electrification Program Alternative, traffic in the vicinity of the proposed traction power stations or along the route of power conduits to the rail right-of-way could be disrupted by construction equipment and traffic. Although much of the installation of poles and wires on the rail right-of-way will take place from on-track vehicles, public roadways would be used to access the rail right-of-way. Use of rail vehicles and the rail right-of-way for construction could involve disruption of normal rail operations.

Construction activities for the Electrification Program Alternative are not expected to have any substantial impact on the availability of parking. Construction workers would be expected to park on-site or on the rail right-of-way. No impacts to non-motorized traffic other than those affecting general traffic are anticipated, as bicycles and pedestrians are prohibited within the Caltrain right-of-way, and construction activities for the Electrification Program Alternative will not affect bicycle or pedestrian trails off the right-of-way.

4.2.11.2 Mitigation

Construction staging plans will be developed to minimize impacts to Caltrain service and to existing roadways. Contractors will be required to coordinate with rail dispatch to minimize disruption of rail service in the corridor. Closure of one or more tracks for construction activities will be limited to off-peak periods and weekends, when service is less frequent, or late night, when no passenger service is scheduled. A traffic management plan will be developed and will include measures to address rail service and other transportation issues. The JPB will coordinate with Caltrans and the local jurisdictions to provide the public with advance notice of any proposed traffic detours and their duration. Construction crews will follow established safety practices to protect work crews while working within an active rail right-of-way, including flaggers, and – if track conditions are affected – speed restrictions (slow orders). Provisions will be incorporated into the construction contracts to designate areas for construction worker parking and to avoid substantial parking impacts to residential or business areas.

4.2.12 UTILITIES

4.2.12.1 Impacts

JPB would coordinate with all utility providers during the design phase of the project to identify all subsurface and overhead utilities so that effective design treatments and construction procedures can be developed to avoid adverse impacts to existing utilities and prevent disruptions in service. JPB is conducting a survey of existing overhead utilities to give each owner advance warning of the Electrification Program and to provide time to plan for relocation to minimize disruptions. Design treatments and construction procedures are described in Section 3.16, Utilities. The potential exists, nonetheless, for construction activities to encounter unexpected utilities within the Caltrain right-of-way. Relocations of affected utilities that cross the Caltrain right-of-way will be the responsibility of the utility owner and may require short-term, limited interruptions of service. No interference with existing utility service is anticipated during installations of connections to existing high-voltage power transmission facilities because the utility will put customer loads on alternate feeders during the connection activity.

4.2.12.2 Mitigation

If unanticipated underground utilities are discovered, OCS pole foundations can be adjusted up to three feet either side of the design location to avoid them.

Any short-term, limited service interruptions would be scheduled well in advance and appropriate notification provided to users.