

4 CONSTRUCTION

This chapter revises Section 3.18 from the 2008 Final Program EIR. This chapter is in addition to the treatment of construction impacts contained in various resource area sections in Chapter 3 of the 2008 Final Program EIR. Readers are referred to those chapters for more information about construction impacts by resource area. Changes to text from the Partially Revised Draft Program EIR are shown with a bar in the margin; added text is noted with underlining and deleted text is noted with strikeout.

3.18 Construction Methods and Impacts

This section describes the construction methods and related types of impacts considered for the No Project and HST Alignment Alternatives[†]. Construction methods are the basis for assessing and qualifying the potential environmental impact from construction activities. These construction methods would be used to prepare, construct, and implement the typical highway, airport, and HST alignment improvements that make up the alternatives, including adjustments to Monterey Highway and other rail and transportation facilities that may be affected.

3.18.1 Construction Method Approach

This section identifies the types of construction (highway and rail alignment) associated with the alternatives, describes the typical sequence and methods for each type of construction, and discusses potential construction-related impacts. The construction of highway improvements is a common element of both the No Project and the HST Alignment Alternatives. Improvements that make up the alternatives are grouped by type of construction and their relationship to the system alternatives, as indicated in Table 3.18-1.

**Table 3.18-1
System Alternative Construction Types**

Improvement Type	System Alternative	
	No Project	HST Alignment
Expanded Highway	X	X
Monterey Highway Lane Reduction and Shift		X
HST Alignment		X
HST Station/Facility		X
X = Common construction type.		

3.18.2 Planned Highway Improvements and Monterey Highway and other Roadway Adjustments

Improvements to existing highways that are planned and programmed are included in the No Project and HST Alignment Alternatives. The improvements to existing highways include:

- Safety improvements.
- Straightening the alignment.
- Interchange improvements.

[†]See Section 3.0, Introduction, for an explanation of how this section fits together with the HST Network Alternatives presented in Chapter 7, as well as for an overview of the information presented in the other chapters.

- Access and terminal/station road improvements.
- Limiting access.
- Adding ramp meters.
- Adding a truck climbing lane.
- Adding new auxiliary lanes.
- Adding new HOV lanes.
- Adding new general use lanes.
- The construction along Monterey Highway to implement the high-speed train would involve both reducing the number of lanes from six to four generally within the existing highway right-of-way for approximately 3.3 miles, and shifting the highway to the east between 0 and 60 feet in some locations (see Figure 2-2).

3.18.3 Highway Improvement Process and Monterey Highway and other Roadway Adjustments

A. CONSTRUCTION WORKSITE CHARACTERISTICS

The worksite for a highway capacity improvement project is the existing highway right-of-way and additional right-of-way (including any temporary construction easements) that has been acquired for the project. The defining characteristic of this worksite is the need to maintain traffic on the existing highway during construction of the improvement.

During construction, traffic is first shifted to one side of the existing roadway while the opposite side is improved (e.g., new retaining walls and pavement installed to widen the roadway, barriers installed or replaced), then traffic is shifted back onto the newly improved portion while the other side is improved. Operational issues associated with construction are complicated and require significant coordination with the contractors and responsible agencies.

The worksite for Monterey Highway construction would be the existing highway right-of-way, the new right-of-way in areas where the highway would shift, and temporary construction easements to provide staging areas for equipment and materials. The defining characteristic of the Monterey Highway construction worksite is the need to maintain traffic flow during construction. To maintain traffic flow during construction, traffic would be first shifted to one side of the existing roadway while the opposite side is improved (e.g., new retaining walls, sidewalks, landscaping and pavement installed to widen the roadway, barriers installed or replaced), then shifted onto the newly improved portion while the other side is improved. During times of low traffic volumes, additional lanes would be coned off to provide temporary additional work space.

B. TYPICAL CONSTRUCTION SEQUENCE (CONSTRUCTION METHOD)

The typical construction sequence would be:

- Mobilization and site preparation—Clear any remaining buildings or other improvements from any new right-of-way.
- Initial traffic control phase—Implement a plan for the temporary protection and direction of traffic. The initial traffic control plan phase may include construction of new sound walls along the new edge of the right-of-way.
- Repeat for each traffic control phase—Remove the portions of existing structures; construct the portions of new structures and bridges, existing structure widening, and existing embankment

widening or excavations; and widen pavement and install temporary pavement markings. Repeat for the next phase of the traffic control plan.

- Final traffic control plan phase—Construct new wearing surface across entire width of each direction of roadway and install final pavement markings.
- Finishes—Construct elements such as signage and landscaping (this phase may start prior to the final traffic control phase).

Mobilization and Site Preparation

The key mobilization activity would be to develop a traffic control plan for the temporary protection and direction of traffic. If the capacity improvement project is expanding the highway right-of-way, site preparation would include clearing the new right-of-way of conflicting structures, obstructions, and utilities. This would also be the case for shifting Monterey Highway. If the highway project does not include new right-of-way, little site preparation work can be started until a plan for the traffic plan is implemented. This would be the case for narrowing Monterey Highway from six lanes to four lanes between Southside Drive and south of Blossom Hill Road.

Minor capacity improvement projects generally do not require sufficient excavation or embankment to justify developing new material sources or waste sites. Major highway widening may justify opening (or more likely re-opening) a quarry or other aggregate source and setting up a rock crusher. A project that includes replacing the existing structures or pavement may well include an aggregate (pavement) crushing plant to recycle used pavement into new aggregate. The crushing plant would not be mobilized until sufficient material has been removed to allow several months of continuous operation. (If the project does not require recycling, the contractor would dispose of the waste material, either as embankment material or at a disposal site.)

Initial Traffic Control Phase

Each traffic control phase would shift traffic away from that phase's work zone and would install temporary barriers to protect workers in the work zone from traffic. The shift can use some combination of closed lanes, narrowed lanes, and the pavement shoulder for through traffic.

Earthwork

The contractor would construct the required retaining walls, embankments, and excavations. The design would attempt to balance cut and fill requirements, but severe terrain or urban conditions may require imported fill or exported cut material. If the overall schedule permits, the embankments would be allowed to consolidate for a year or two before pavement is placed on them. The contractor would route any existing drainage that crosses the alignment through new and extended pipes or box culverts. The contractor would install inlets and pipes, detention basins, and outfalls for roadway drainage.

Structures

The contractor would construct grade separation, drainage, and other bridges or concrete boxes as required.

Pavement

The contractor would finish grading the new roadbed, install subbase, base rock, and bridge approach slabs, and may pave the new roadway. The new pavement would drain to the inlets previously constructed. The contractor would construct any transition sections required. The contractor would install pavement markings on the completed roadway.

Repeat For Each Traffic Control Phase

Subsequent traffic control phases would shift traffic onto the completed portion of the work to create a new work zone. The contractor would construct/reconstruct the portion of the pavement and structures in the new work zone, then shift the traffic to a new traffic control phase until all new pavement and structures are complete.

Final Traffic Control Plan Phase

For some roadway widening, when the temporary barrier is removed, the contractor would overlay a new pavement wearing surface across the entire roadway width. This paving could be done at night, when traffic volumes are reduced, and may take several nights. The contractor would install temporary pavement markings as the new top lift is installed. The contractor would install permanent markings after the new wearing course has aged for a week.

Finishes

Construction of the new pavement wearing course and markings may complete the project, or construction may continue with shoulder barriers, signage, and landscaping.

C. TYPICAL CONSTRUCTION IMPACTS

The general types of construction impacts associated with highway capacity improvement projects, Monterey Highway construction, or other locations where lane narrowing or adjustments are made include the following, which are considered significant under CEQA at the program level.

- **Construction Period Traffic Congestion:** Traffic control plan lane closures and lane narrowing to allow for demolition, construction, and paving would occur mainly at night, when traffic volumes are less, but could still potentially result in increased traffic congestion ~~both on~~ roadways, including Monterey Highway as well as on surrounding local streets during the construction period.
- **Construction Period Air Emissions:** Construction of highway capacity improvement projects, including Monterey Highway construction, would generate short-term air pollutant emissions (fugitive dust emissions, mobile source emissions, potentially asbestos) from demolition of existing structures and roadways, excavation, facilities construction, mobile source emissions from construction worker travel to and from the project site, mobile source emissions from delivery and hauling of construction supplies and debris to/from the work site, and emissions from heavy construction equipment.
- **Construction Period Noise and Vibration:** Construction of highway capacity improvement projects, including Monterey Highway construction, would generate noise and vibration impacts from heavy construction equipment, including jackhammers and pavement breakers, as discussed generally in Chapter 3.4 of the 2008 Final Program EIR.
- **Construction Period Energy:** Construction of highway capacity improvement projects, including Monterey Highway construction, would result in a one-time, non-recoverable energy cost which would occur during the construction period.
- **Construction Period Runoff and Erosion:** Construction of highway capacity improvement projects, including Monterey Highway construction, has the potential to disrupt the existing roadway drainage system, potentially leading to runoff and erosion unless mitigation measures and/or design practices are imposed as a control measure.
- **Construction Period Aesthetics and Land Use Effects:** Construction of highway capacity improvement projects, including Monterey Highway construction, would result in staging areas

with construction equipment, signage, barriers, and potential nighttime lighting that may be visible from adjacent properties. Construction may be disruptive to adjacent land uses.

- **Construction Period Hazards and Waste:** Hazardous materials/wastes may be present in the project area and could be encountered during project construction, and construction activities may result in the release of small quantities of fuel through accidental release or upset.
- **Construction Period Cultural Resources:** Construction of highway capacity improvement projects, including Monterey Highway construction, could result in the discovery of previously unknown archaeological, paleontological, or historic resources.
- **Construction Period Biological Resources:** Depending on construction techniques, construction of highway capacity improvement projects, including Monterey Highway construction, could result in impacts on sensitive vegetation communities, special-status plants and wildlife, and water resources/wetlands. Additionally, sediment disturbance from construction could affect some fish species.
- **Construction Period Section 4(f) and 6(f) Resources:** Construction of highway capacity improvement projects, including Monterey Highway construction, could affect the use of publically owned parks and recreational uses.

~~In addition~~ Highway capacity improvement projects, including Monterey Highway construction would generate waste pavement that would either be recycled, or if the material was unsuitable, placed in landfills. This impact is considered less than significant at the program level.

3.18.4 High-Speed Train Alignment Alternatives

This section applies to the HST Alignment Alternatives and the new construction associated with track alignment and system elements. The alignment would include at-grade, aerial, bridge, and tunnel components.

A. CONSTRUCTION WORKSITE CHARACTERISTICS

In most locations, particularly in urban areas, the worksite (new HST alignment) would be close to existing railroad tracks, within active rail corridors, or close to highway facilities. However, in some locations, the worksite would follow a new alignment independent of existing railroad or highway infrastructure through undeveloped areas. In areas where there is existing Caltrain and freight (UPRR) rail service, the worksite would need to maintain service during construction of the HST alignment and facilities. The construction worksite within active rail corridors may require temporary construction easements in some locations to create temporary “shoofly” tracks next to the existing tracks to provide continued service during HST construction. New grade crossings, temporary Caltrain station platforms, and associated signal system upgrades would be constructed as a requirement of the shoofly tracks. Additionally, access to freight rail sidings and leads would need to be maintained throughout the phased construction process. Caltrain and freight operations would shift onto the new shoofly tracks once they were complete. Close coordination between the Authority, Caltrain and the freight operator would be critical throughout the process.

The new trackway and worksite would have three primary characteristics in high-speed segments—long tangent sections connected by very large-radius horizontal curves, long sections of constant grade connected by long vertical curves, and underpasses or overpasses wherever the trackway crosses another surface transportation alignment (e.g., street, highway, railroad track). In urban areas, the curve radii are generally reduced because of development constraints, but the curves generally are still greater than the existing highway alignments.

In some locations, such as the Central Valley, the topography simplifies construction of an HST trackway. The major construction effort would be to clear obstructions from an appropriately straight

alignment and to construct grade separation structures to carry crossing roads and other railroads over or under that alignment.

In other locations, especially where the HST system crosses mountain ranges, the topography would challenge the construction of an HST trackway. In challenging terrain, the major construction effort would consist of reshaping the earth (earthwork or cut and fill) and constructing bridges and tunnels to cross over or under the existing ground surface where it is impractical to achieve the alignment geometry through reshaping.

There would be additional infrequent, but important, worksites along the alignment. These additional worksites include:

- Traction power substations and signal/communications bungalows.
- Tunnel ancillary structures (e.g., tunnel emergency egress/access points, tunnel ventilation buildings, tunnel drainage pumping plants).

In addition, there would be temporary (construction-related) sites, such as:

- Access roads and yards.
- Embankment material and aggregate source sites.
- Tunnel spoil and other excavation material disposal sites.
- Rail welding, aggregate crushing, Portland cement concrete, and asphaltic concrete plant sites.
- Shoofly tracks and station platforms, as necessary, to maintain existing rail operations.

B. TYPICAL CONSTRUCTION SEQUENCE (CONSTRUCTION METHOD)

The typical construction sequence would be:

- Mobilization and site preparation—Clear the alignment of conflicting improvements, including buildings and utilities not already removed, and mobilize for construction, including establishing construction yards, building site access roads if necessary, developing aggregate sources and embankment material borrow pits, and preparing excavation material and tunnel spoil waste sites. Mobilizing for construction within an active rail corridor would include building temporary shoofly tracks, grade crossings, Caltrain station platforms, signal system upgrades, and access to freight sidings and leads.
- Heavy civil construction—Construct the trackbed, including embankments, cuts, bridges, or tunnels; construct crossing highway or railroad grade separation structures if not already in place; and construct supporting facilities, including central control building, vehicle maintenance buildings and storage yards, and passenger stations. Within an active rail corridor, HST construction as noted above would continue on one side of the right-of-way while passenger and freight rail operations continue on the other. Once completed, Caltrain and freight service would be shifted from the shoofly tracks onto the new, permanent tracks. To complete a four-track system within an active rail corridor, additional tracks would be constructed along with the associated grade separations, permanent station platforms and signal system generally within the existing right-of-way. The last step would be to shift all HST, Caltrain and freight service to the new four-track alignment and to relinquish the temporary construction easement.
- Railroad systems construction—Construct trackwork and special trackwork, traction electrification, and railroad signaling and communications on the trackbed and at the supporting facilities.
- Finishes—Construct elements such as signage and landscaping (this phase would overlap with railroad systems installation and system testing).

- System testing—equipment and system testing would culminate with a period of simulated full revenue service.

Mobilization and Site Preparation

Construction of the HST system would require a large workforce, a large fleet of construction equipment, large quantities of aggregate and embankment materials, and a large number of manufactured products. This initial phase would develop the construction yards and other temporary infrastructure required to assemble and organize these construction resources. The Authority's right-of-way acquisition program may have cleared the right-of-way of existing improvements (primarily buildings and utilities). If those improvements have not already been removed, the contractor would remove them during this phase.

During the construction mobilization phase, the contractor would set up construction yards to receive equipment and products, prepare sources (i.e. quarries and borrow pits) for aggregate and embankment materials, and cut pioneer roads as necessary to reach remote work sites (e.g., tunnel portals and shafts, bridge piers). The contractor would also remove or relocate any conflicting improvements (buildings, utilities, roads, track) that remain on the right-of-way.

Heavy Civil Construction

Construction of the high speed rail system would reshape a strip of land 40 to 100 ft wide to create a trackbed meeting the system's horizontal and vertical alignment requirements. (The width of the strip of land would be greater at special locations such as passenger stations or vehicle maintenance facilities.) The trackbed would be grade separated—meaning that other facilities, such as existing or future roads, tracks, or cattle paths, would cross the alignment above or below the high speed rail tracks. Where the terrain is too severe, or the crossing roadways and other tracks too numerous, bridges or tunnels would carry the trackbed over or under the terrain.

Reshape the earth means that the contractor would remove the existing vegetation and topsoil, excavate farther down (below the topsoil), or bring in embankment material and construct engineered fill as necessary to reach the design subgrade elevation, and cap the subgrade with compacted crushed aggregate subballast. The contractor would construct drainage ditches or subdrains on either side of the alignment. The contractor would also construct discharges from the ditches and subdrains at appropriate points.

In any of these grade separation cases, the contractor would build grade separation structures and roadwork or trackwork on or through the structures during the heavy civil construction phase. If the structure carries the high speed rail alignment over the crossing road or track, the structure would be constructed prior to the trackbed. If the structure carries the crossing road or track over the high speed rail alignment, the structure could be constructed either before or after the trackbed. Grade separation construction would sometimes include the modification of existing or construction of new traffic signal systems.

To construct a grade separation bridge, the contractor would remove the existing vegetation and topsoil under the future structure, construct foundations under piers and bridge abutments, construct piers and abutments, construct the bridge superstructure (girders and deck), and install finish elements such as approach slabs, metal railings, or solid concrete parapets. The foundations and superstructure types for any bridge would be selected in the design phase based on site-specific conditions from menus of likely foundations and superstructures. The foundation menu includes:

- Spread footings.
- Driven or drilled piling covered with a pile cap.

- Cast-in-drilled-hole (CIDH) piers.

The superstructure menu includes:

- Steel or precast concrete girders supporting a deck slab.
- A cast-in-place or precast concrete box with a deck slab integrated into the main girder.

Precast concrete girders would also be prestressed; cast-in-place concrete boxes may be prestressed or reinforced without prestress.

To construct a grade separation cut-and-cover concrete box, the contractor would excavate to a depth below the future box, then construct the box bottom slab, walls, and roof; backfill the sides and over the top of the completed box; and install finish elements such as lighting.

Construction of any of these structures would require heavy equipment access to the site and maneuvering room for the equipment. In addition, the cast-in-place concrete box option would require falsework to support the formwork that shapes the structure.

Bridges over severe terrain could be similar to grade separation bridges; however, because of the difficulty in locating intermediate piers, severe terrain bridges could require more elaborate long span or precast segmental superstructures. While special superstructures could reduce the access requirements for intermediate piers, they would still require access to both abutments and possible larger abutment work areas to prepare girders to be launched across the ravine being bridged.

Tunnels through severe terrain must be excavated from headings. If the tunnel is short (up to 6 miles long), it might be reasonable to construct it from a single heading. The selected HST system has no tunnels longer than 6 miles.

At each tunnel heading access site, there must be sufficient work area to accommodate:

- Worker and equipment staging.
- Tunnel utility infrastructure (fresh air supply, compressed air, water, electric power, and tunnel drainage).
- Tunnel spoil surge piles.
- Storage of excavation support materials (e.g., steel ribs, rock bolts and shotcrete, precast liner panels).

There must be room to transfer materials going into the tunnel from trucks to tunnel railcars, and to transfer spoil coming out of the tunnel from tunnel railcars or conveyor belts to trucks. These heading access site requirements are generally independent of the excavation method (tunnel boring machine, drill and blast, or road-header) or number of tunnel bores (two single-track tunnels or one double-track tunnel).

After the tunnel is excavated, many of the tunnel construction access sites would become permanent tunnel support sites, such as ventilation plants, pump stations, traction power substations, and emergency access points.

To avoid or limit potential impacts along the surface above the tunnels, the selected HST system has limited surface access for ventilation and/or evacuation through tunnel design. The potential impacts associated with construction access roads would be greatly limited, and avoided altogether in some sensitive segments (as defined at the project level), by using in-line construction, i.e., by using the new rail infrastructure as it is built to transport equipment to and from the construction site and to

transport excavated materials away from the construction area and to appropriate re-use or disposal sites. To avoid the creation of access roads in sensitive areas (as defined at the project level), it may be necessary to conduct geologic exploration using helicopter transport for drilling equipment and restoring sites after use, which would result in minimal surface disruption. Small pilot tunnels would be used where more extensive subsurface geology information is needed.

The heavy civil construction phase may also include construction of alignment elements to support the subsequent railroad systems phase:

- Cable trough or duct banks.
- Foundations for poles supporting the overhead contact system.
- Site work for traction power substations.

Railroad Systems Construction

The railroad systems include trackwork, traction electrification, signaling, and communications. (The rail vehicles are another key system but are not discussed in this section.)

Trackwork includes both the typical track structure and special trackwork. Special trackwork is the track switches, frogs, crossing diamonds, etc., that make up turnouts and crossovers. Trackwork is the first rail system to be constructed, and it must be in place at least locally to start traction electrification and railroad signaling installation. Trackwork construction generally requires the welding of transportable lengths of steel running rail (traditionally 78 ft in length) onto longer lengths (approximately ¼ mile), which are placed in position on crossties or track slabs and field-welded into continuous lengths from special trackwork to special trackwork. Trackwork would also be required for reconstruction of passenger and freight rail operations within an active rail corridor.

Tie and ballast track construction typically requires that crossties and ballasts be distributed along the trackbed by truck or tractor. In sensitive areas, this operation can be accomplished by using the established right-of-way corridor with delivery of the material via the constructed rail line because in-line construction techniques are proposed. The top 4 inches or so of ballast can be delivered by railcar over the assembled track.

The traction electrification equipment to be installed includes traction power substations and the overhead contact system. The running rails, which serve as the power return current conductor, are also part of the electrical circuit. Traction power substations are typically fabricated and tested in a factory, then delivered by tractor-trailer to a prepared site adjacent to the alignment. Substation spacing depends on the power supply technology selected, but this document assumes one substation every 30 miles per the Engineering Criteria Report, January 2004.

The overhead contact system is assembled in place over each track from components (poles, brackets, insulators, conductors, and various hardware). The overhead contact system is connected by field-wiring to adjacent substations.

The signaling equipment to be installed includes wayside cabinets and bungalows (within established rights of way), wayside signals (at interlockings), switch machines, insulated joints, impedance bonds, and connecting cabling. The equipment supports several technologies—Automatic Train Protection, Automatic Train Control, and Positive Train Control—to control train separation, train routing at interlockings, and train speed.

The communications equipment to be installed includes System Control and Data Acquisition (SCADA), telephone, radio, closed-circuit television, and visual messaging. The equipment is located

in the system central control facility, wayside communications bungalows, passenger stations, tunnel equipment rooms, traction power substations, signal bungalows, and other locations. Communications data likely would be carried on a fiber optic backbone running the length of the alignment.

Finishes

Landscaping, signage, architectural finishes, and similar items involve construction trades different from those required for heavy civil or railroad systems. The distinction between finishes and earlier phases of work is important for labor and material scheduling but not for the identification of work sites or overall construction methods. Finishes would be installed at the same construction worksites as the earlier phases of construction and would probably overlap the completion of the heavy civil and railroad systems work.

Testing and Start-Up

All work would be inspected and tested as stand-alone items as part of its construction. During system testing and start up, the work would be checked again to confirm that it functions as an integrated system. For example, integrated testing would confirm that the SCADA tunnel ventilation system status display at central control truly reflects the status of the ventilation systems, and that the ventilation equipment correctly responds to commands initiated at central control.

C. TYPICAL CONSTRUCTION IMPACTS

Overall, the HST Alignment Alternative construction sites would have numerous site-specific impacts on adjacent land uses and within active rail corridors. However, some construction impacts would be more universal in nature. Typical impacts may include the following, which are considered significant under CEQA at the program level.

- The worksite would generate traffic on public roads leading to the site and on private haul routes running along the alignment or between the alignment and construction yards. The traffic would include construction worker commuting, delivering construction supplies (e.g., bulk cement, asphalt, steel, fuel, manufactured products), and moving construction materials (primarily dirt from excavations to embankments, and aggregate). In sensitive areas, these operations can be accomplished using the established right-of-way corridor with delivery of the material via the constructed rail line because in-line construction techniques are proposed.
- The worksite would be cleared of ground cover for construction. As a result, rainstorms would produce greater runoff and erosion than would otherwise be the case. The high speed rail construction contractor would use silt fences, hay bales, and other measures to control runoff and erosion.
- The construction project has the potential to generate large quantities of material—from pavement demolition, clearing and grubbing, and soil/rock—that is anticipated to be suitable for reuse in the construction of the proposed HST facilities. Potential uses include aggregate for concrete and fill material for other portions of the line. The project itself would generate a much smaller volume of waste—product packaging, broken equipment, and site litter. The project may experience minor hydraulic fluid, motor oil, and fuel spills that would result in the disposal of contaminated soil. The project may generate a comparatively tiny volume of hazardous waste from building demolition. The high speed rail construction contractor would collect and dispose of solid waste appropriately.
- Some heavy civil construction activities, notably pile driving and rock excavation with explosives, would be inherently noisy. Most construction activities would use large pieces of construction equipment, and the equipment would generate noise. Most of the construction worksite would be sufficiently remote so that construction noise would not cause adverse impacts on adjacent

land uses. However, the portions of the worksite in urban areas may experience sufficient construction noise to have an impact on adjacent properties.

- Tunnel excavation would likely take place 24 hours per day. As a result, tunnel heading access sites would also be occupied 24 hours per day and would be illuminated at night. The nighttime illumination may have an impact on adjacent land uses.
- Roadway grade separations would connect to active roads at both ends of the grade separation worksite. Particularly in urban areas where the surrounding areas are not sensitive to noise impacts, roadway traffic may be such that the connection work must be performed overnight, when traffic volumes are less. The night connection work, if required, would be illuminated, and the illumination may have an impact on adjacent land uses.
- The following construction activities would generate short-term pollutant noise increases and air emissions (fugitive dust emissions, mobile source emissions, and asbestos):
 - Demolition of existing structures.
 - Excavation related to preparation of track beds and installation of rail.
 - Welding related to CWR operations.
 - Mobile emissions related to construction worker travel to and from project sites.
 - Mobile emissions related to the delivery and hauling of construction supplies and debris to and from project sites.
 - Stationary emissions related to fuel consumption by onsite construction equipment.
- Temporary construction easements may be required to construct temporary shoofly tracks next to existing tracks, new grade crossings, or temporary station platforms. These temporary construction easements may result in a need for additional real property on a temporary basis, and may involve temporary traffic, noise and vibration, and aesthetic/land use impacts.

3.18.5 High-Speed Train Stations/Facilities

This section applies to the HST Alignment Alternatives and the new construction associated with stations and maintenance facilities. These facilities would include urban and rural locations, potentially joint-operated and joint-developed locations, and at-grade, aerial, and underground locations. Passenger stations include improvements to existing railroad stations and newly constructed stations. Substations and maintenance facilities would be newly constructed structures.

A. CONSTRUCTION WORKSITE CHARACTERISTICS

In urban areas, most worksites would include an expansion of or improvements to existing train stations. In rural areas, most worksites would include new construction along a new alignment independent of existing railroads.

A unique characteristic of construction on existing railroad stations is the need to maintain capacity and passenger levels of service during the construction activities. Unlike highways, where traffic can be diverted to other facilities during construction, railroad stations must be able to accommodate demand and operations because passengers cannot typically be diverted to other facilities. As a result, railroad station improvements require significant coordination and planning to accommodate safe and convenient access for passengers and no disruptions to operations.

The worksite for a new railroad station or maintenance facility most likely would be a constrained parcel of land. The footprint of the new structure and parking area would be available for the contractor's exclusive use. Because parking areas and tail track/storage track areas may be

available, the contractor could make use of these areas as a construction yard. If necessary, adjacent landowners may furnish temporary easements for the contractor to use as a construction yard during construction.

B. TYPICAL CONSTRUCTION SEQUENCE (CONSTRUCTION METHOD)

The typical construction sequence would be:

- Demolition and site preparation—Vacate identified areas within existing structures. Construct new entrances to existing stations if necessary. Close the portion of existing structures to be removed. Construct/install construction fence and barriers. Demolish existing structures scheduled for removal on the worksite. For new facilities, perform earthwork, drainage work, and utility relocation/construction as necessary. For platform improvements or additional platform construction, the necessary track realignment and construction would be required.
- Structural shell and electrical/mechanical rough-in—Construct foundations and structural frames. Construct walls or platforms. Rough-in electrical and mechanical systems.
- Finishes and tenant improvements—Install electrical/mechanical equipment. Install finishes and communications equipment. Construct tenant improvements. The actual construction sequence may have several additional steps if the railroad agency determines that it needs to stage construction, such as completing and occupying a portion of the new work before removing the last of the existing structure for replacement.

Demolition and Site Preparation

The contractor would construct detour roadways, new station entrances, and other elements required to take existing facilities in the worksite out of service. The other elements could be as significant as constructing a new utility company primary service and switchgear if the existing facility is in the way of the expansion.

The contractor would close the roadway, parking, or portion of the station to be removed, install construction fences or barriers, and demolish the existing improvements.

Structural Shell and Electrical/Mechanical Rough-In

The contractor would construct foundations and the structural frame of the new station. The contractor would enclose the new building or construct new platforms and connect the structure to site utilities. The contractor would rough-in electrical and mechanical systems and would install specialty items such as elevators, escalators, and ticketing equipment.

Finishes and Tenant Improvements

The contractor would install electrical and mechanical equipment. The contractor would install communications and security equipment, finishes, and signage. The contractor may install tenant improvements, or developers and other tenants may have their own contractors construct tenant improvements.

C. TYPICAL CONSTRUCTION IMPACTS

The largest impact would be the daily disruption of station activities. There would be little construction impact outside of the station site. Other impacts may include the following, which are considered significant at the program level.

- Construction traffic in the vicinity of the station.

- Operations and planning coordination for platform improvements or new platforms that require trackwork realignment.
- The contractor must take care to maintain or replace the existing utilities as called for in the construction documents, but with care, drainage should not be a problem.
- There may be a substantial volume of demolition debris from the site preparation phase.
- Construction noise generally would be lost in the ambient station noise.
- Night work in the urban station areas would need to be assessed for impacts on residential and commercial (hotel) areas.

The additional worksites along the alignment may include:

- A central control facility.
- Revenue service vehicle storage and maintenance facilities.
- Maintenance-of-way shops and non-revenue vehicle storage.
- Traction power substations and signal/communications bungalows.
- Tunnel ancillary structures (e.g., tunnel emergency egress/access points, tunnel ventilation buildings, tunnel drainage pumping plants).

3.18.6 Mitigation Strategies and CEQA Significance Conclusions

The following mitigation strategies for construction impacts would apply to highway improvements, Monterey Highway adjustments, HST project construction, and HST construction within active rail corridors. These mitigation strategies are either identical to or consistent with mitigation strategies contained in the 2008 Final Program EIR for construction impacts within each subject matter chapter. These strategies can be refined and applied as part of second-tier, project-level EIRs and are anticipated to be effective at reducing construction impacts to a less than significant level.

Construction Period Traffic Mitigation Strategies

- Off-street parking for construction-related vehicles. Identify adequate off-street parking for all construction-related vehicles throughout the construction period. If adequate parking cannot be provided on the construction sites, designate a remote parking area and use a shuttle bus to transfer construction workers to the job site.
- Maintain pedestrian access. Prepare specific construction management plans to address maintenance of pedestrian access during the construction period. If sidewalks are maintained along the construction site frontage, provide covered walkways.
- Maintain bicycle access. Prepare specific construction management plans to address maintenance of bicycle access during the construction period.
- Restrict construction hours. Limit construction material deliveries to outside of peak traffic periods.
- Establish construction truck routes for delivery of all construction-related equipment and materials. Prohibit heavy construction vehicles from accessing the site via other routes.
- Protect public roadways during construction. Repair any structural damage to public roadways, returning any damaged sections to their original structural condition. Survey the condition of the public roadways along truck routes providing access to the proposed project site both before construction and after construction is complete. Complete a before-and-after survey report and submit to the Authority for review, indicating the location and extent of any damage.

- Maintain public transit access and routing. Coordinate with the appropriate transit jurisdiction before limiting access to public transit and limiting movement of public transit vehicles.
- Prepare a detailed construction transportation plan prior to commencing any construction activities, to address in detail the activities to be carried out in each construction phase. Such activities include, but are not limited to, the routing and scheduling of materials deliveries, construction employee arrival and departure schedules, employee parking locations, and emergency vehicle access. The plan would include a traffic control plan that addresses temporary road closures, detour provisions, allowable routes, and alternative access. The plan would also include communication protocols and procedures on how to inform the public on construction activities as well as temporary detours, closures, and changes in transit and existing rail operations.
- Limit construction during special events. Provide a mechanism to prevent roadway construction activities from reducing roadway capacity during special events that attract a substantial number of visitors. Mechanisms to maintain roadway capacity include police officers directing traffic, special event parking, and use of traffic cones and within-the-curb parking or shoulder lanes for through traffic.
- Minimize closure of any proximate highway facility during construction.
- Maintain passenger and freight rail operations within an active rail corridor through close coordination with Caltrain and freight operations (UPRR).
- Require construction contractors to coordinate construction methods, construction activities, best management practices, and mitigation with all applicable local jurisdictions that would be affected by construction.

Construction Period Air Quality Mitigation Strategies

- Water all active construction areas at least twice daily.
- Cover all trucks hauling soil, sand, and other loose materials or require that all trucks maintain at least 2 feet of freeboard.
- Pave, apply water three times daily, or apply (nontoxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.
- Hydroseed or apply (nontoxic) soil stabilizers to inactive construction areas (previously graded areas inactive for 10 days or more).
- Enclose, cover, water twice daily, or apply (nontoxic) soil stabilizers to exposed stockpiles (dirt, sand, etc.).
- Limit traffic speeds on unpaved roads to 15 mph.
- Install sandbags or other erosion-control measures to prevent silt runoff to public roadways.
- Replant vegetation in disturbed areas as quickly as possible.
- Use alternative fuels for construction equipment when feasible.
- Minimize equipment idling time.
- Maintain properly tuned equipment.

Construction Period Noise and Vibration Mitigation Strategies

- Use enclosures or walls to surround noisy equipment, install mufflers on engines, substitute quieter equipment or construction methods, minimize time of operation, and locate equipment further from sensitive receptors.
- Suspend construction operations between 7:00 p.m. and 7:00 a.m. and/or on weekends and holidays in residential areas.
- Require construction contractor to comply with local sound control and noise-level rules, regulations, and ordinances.
- Equip each internal combustion engine with a muffler of the type recommended by the manufacturer.
- Specify the quietest equipment available be used.
- Turn off construction equipment during prolonged periods of nonuse.
- Require contractors to maintain all equipment and train their equipment operators to reduce noise levels and increase efficiency of operation.
- Phase construction activity, use low impact construction techniques, and avoid use of vibrating construction equipment where possible to avoid vibration construction impacts.
- Construct temporary soundwalls along shooflys and other temporary facilities for work conducted within an active rail corridor to reduce noise levels.
- Use "state-of-the-art" construction equipment, materials, and abatement techniques to mitigate construction noise and vibration impacts.
- Notify local residents prior to construction operations.
- Establish a program to receive and respond to residents' concerns regarding noise, vibration, and light disturbances.
- Require construction contractors to coordinate construction activities and mitigation with all applicable local jurisdictions that would be affected by construction.

Construction Period Energy Mitigation Strategies

- Develop and implement a construction energy conservation plan.
- Use energy efficient construction equipment and vehicles.
- Locate construction material production facilities onsite or in proximity to construction sites.
- Develop and implement a program encouraging construction workers to carpool or use public transportation for travel to and from construction sites.

Construction Period Aesthetics and Land Use Mitigation Strategies

- Plan hours of construction operations and locate staging sites to minimize impacts on adjacent residences and businesses.
- Screen construction sites, as appropriate, to minimize visual construction impacts.
- Develop traffic management plans to reduce barrier effects during construction.
- To the extent feasible, maintain connectivity during construction.

Construction Period Hazard Materials and Waste Mitigation Strategies

- Prepare a Site Management Program/Contingency Plan prior to construction to address known and potential hazardous material issues, including management of contaminated soil and groundwater, site-specific Health and Safety Plan to protect construction works and the public, and procedures to protect workers and the general public in the event that unknown contamination or buried hazards are encountered.

Construction Period Cultural Resources Mitigation Strategies

- Stabilization/Monitoring during Construction. Prepare a treatment plan for the protection of historic properties/resources, in close proximity to construction activities.
- Measures to Lessen Adverse Effects. Include stipulations in the contracts of the construction contractors to ensure appropriate preservation of cultural resources minimize project impacts on historic properties/structures.
- Monitoring (Architectural/Cultural Landscape). Monitor project construction documents and new construction to ensure conformance to design guidelines and treatment procedures agreed to by consulting parties. Monitor construction by a qualified professional to identify conditions that conflict with guidelines and treatment procedures.
- Minor Repairs and Reconstruction. Ensure that inadvertent damage to historic properties/resources is repaired in accordance with the Secretary of the Interior's Standards for Treatment of Historic Properties.
- Paleontological Resources. Educate workers, monitor construction, recover fossils, temporary diversion of construction equipment for fossil recovery, and develop protocols for the handling/disposition of fossils discovered during construction.

Construction Period Geology and Soils Mitigation Strategies

- Conduct geotechnical inspections during construction to verify that no new, unanticipated conditions are encountered related to slope stability/landslides.
- Identify areas of potentially difficult excavation to ensure safe practices and monitor conditions during and after construction.
- Follow regulatory requirements for excavations in oil and gas fields, consult with agencies regarding known areas of concern, use safe and explosion-proof equipment during construction, regularly test for gases, install monitoring systems and alarms in underground construction areas where subsurface gases are present, and install gas barrier systems or gas collection systems and passive or active gas venting systems in areas where subsurface gases are identified.

Construction Period Water Quality Mitigation Strategies

- Implement the Storm Water Pollution Prevention Plans (SWPPPs) and requirements of the National Pollutant Discharge Elimination System (NPDES) permits including Best Management Practices (BMPs) to minimize short-term increases in sediment transport caused by construction and may include measures to provide permeable surfaces where feasible and to retain and treat stormwater on site using catch basins and treatment (filtering) wet basins.
- Implement BMPs which would include practices to minimize impacts to stormwater, reduce erosion of exposed soil, and maintain water quality.
- Implement a spill prevention and emergency response plan to handle potential fuel or other spills.
- Incorporate biofiltration swales to intercept surface runoff.

Construction Period Biological Resources Mitigation Strategies

- Plant Communities: Conduct plant community construction monitoring, onsite and/or offsite revegetation/restoration, and purchase of credits from an existing mitigation bank.
- Prepare Biological Resources Management Plans (BRMP) that specify the design and implementation of biological resources mitigation measures, including habitat replacement and revegetation, protection during construction, performance (growth) standards, maintenance criteria, and monitoring requirements.
- Sensitive Plant Species: Conduct preconstruction focused surveys for sensitive plant species and map on construction drawings, construction monitoring, relocation of plants, seed collection, plant propagation, outplanting to a suitable mitigation site, and participation in an existing Habitat Conservation Plan (HCP).
- Weed Prevention: Implement weed prevention measures during construction that includes identification of areas with existing weed problems and measures to control traffic moving out of those areas (e.g., cleaning construction vehicles, limiting movement of fill).
- Sensitive Wildlife Species: Conduct reconstruction focused surveys for sensitive wildlife species and map on construction drawings, construction monitoring, restoration of suitable breeding and foraging habitat, purchase of credits from an existing mitigation bank, and participation in an existing HCP. Construction could be phased to avoid breeding season for sensitive wildlife species.

Construction Period Section 4(f) and 6(f) Resources Mitigation Strategies

- Develop and implement construction practices, including scheduling, to limit impacts on wildlife, wildlife corridors, and visitor use areas within public parks.

Construction Period Safety and Security Mitigation Strategies

- Prior to the commencement of construction, contractors would conform to safety training requirements of the respective rail operators (Caltrain and UPRR) when work occurs within an active rail corridor.
- Fencing and signage would be utilized to physically buffer construction sites from public space as well as to provide sufficient warning to the public. The vulnerability of construction sites would be minimized through the use of fencing which would act as a deterrent to vandalism and trespassing.

The above mitigation strategies are generally accepted best practices during construction and are consistent with the types of construction mitigation typically implemented with heavy civil construction projects. Consistent with the conclusions reached in the 2008 Final Program EIR, these mitigation strategies, at this program level of detail, are anticipated to be effective at avoiding construction impacts or reducing them to a less than significant level with regard to the following resource areas:

- Air quality
- Noise
- Energy
- Hazardous materials and wastes
- Geology and soils
- Hydrology and water resources

Sufficient information is not available at this programmatic level to conclude with certainty that the above mitigation strategies would reduce the impacts from construction of the project to a less than significant level in all circumstances with regard to the following resource areas:

- Vibration
- Traffic (specifically, localized increases in traffic and congestion near HST-station areas and during construction)
- Land use (specifically, neighborhood disruption)
- Aesthetics and visual quality (specifically, short-term visual quality impacts)
- Cultural resources
- Biological resources
- Parks and recreation

This document therefore concludes that construction impacts may be significant, even with the application of mitigation strategies, in the ~~above-referenced areas of vibration, station area traffic, neighborhoods, short-term visual quality, archeological and historical resources, wildlife movement corridors, and parks and recreation.~~ With regard to all other resource areas, consistent with the conclusions reached in the 2008 Final Program EIR, these mitigation strategies, at this program level of detail, are anticipated to be effective at avoiding construction impacts or reducing them to a less than significant level.