2.3 Physical Environment

2.3.1 Hydrology and Floodplain

2.3.1.1 Regulatory Setting

Executive Order 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless it is the only practicable alternative. The Federal Highway Administration requirements for compliance are outlined in 23 CFR 650 Subpart A.

In order to comply, the following must be analyzed:

- The practicability of alternatives to any longitudinal encroachments
- Risks of the action
- Impacts on natural and beneficial floodplain values
- Support of incompatible floodplain development
- Measures to minimize floodplain impacts and to preserve/restore any beneficial floodplain values impacted by the project.

The base floodplain is defined as "the area subject to flooding by the flood or tide having a one percent chance of being exceeded in any given year." An encroachment is defined as "an action within the limits of the base floodplain."

2.3.1.2 Affected Environment

The analysis in this section is based on the Drainage Report prepared in September 2010 (Department, 2010f). The Drainage Report incorporated information from the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) for the cities of Hercules, Berkeley, and Emeryville.

As described in Chapter 1, the Build Alternative would implement various system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs, and information display boards. These sign and signal installations would be located within the I-80 freeway ROW on existing impervious surfaces and would not affect existing drainage systems or topography of the study area. These improvements are therefore not anticipated to have an adverse effect on the hydrology of the study area.

Three on-ramps within the project corridor would be widened to accommodate high occupancy vehicle (HOV) preferential lanes. Widening would occur at the State Route 4 on ramp (referred to as the John Muir Parkway on ramp), the University Avenue westbound loop ramp, and the Ashby Avenue westbound on-ramp. This analysis focuses on the potential drainage and floodplain impacts from the on-ramp widening locations.

John Muir Parkway

The John Muir Parkway on-ramp is located in the Refugio Creek watershed. Several branches of Refugio Creek cross underneath I-80 via man-made culverts, flowing northwest toward San Francisco Bay. The main reaches of Refugio Creek converge after crossing underneath I-80 and flow through the Hercules urbanized area within a natural open channel. The drainage system that conveys runoff from the John Muir Parkway on-ramp discharges directly to Refugio Creek on the west side of San Pablo Avenue.

As shown in **Figure 2-2** (Sheet 1 of 3), the John Muir Parkway on-ramp is not located within the 100-year floodplain and lies within Zone X (unshaded).[1] Zone X (unshaded) is defined by FEMA as, "the areas of minimal flood hazard, which are the areas outside the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2-percent-annual-chance (500-year) flood."

University Avenue

The University Avenue westbound loop ramp is located at the downstream end of the Strawberry Creek watershed. The drainage system in this area discharges runoff into a manmade culvert that carries Strawberry Creek to San Francisco Bay, approximately 500 feet downstream of this on-ramp.

As shown in **Figure 2-2** (Sheet 2 of 3), the University Avenue on-ramp is not located within the 100-year floodplain and also lies with Zone X (unshaded).[2]

Ashby Avenue

The Ashby Avenue on-ramp is located within Potter/Derby Creeks watershed of northwestern Alameda County. In this area, storm drain inlets convey runoff into manmade culverts and storm drains underneath I-80 directly to San Francisco Bay.

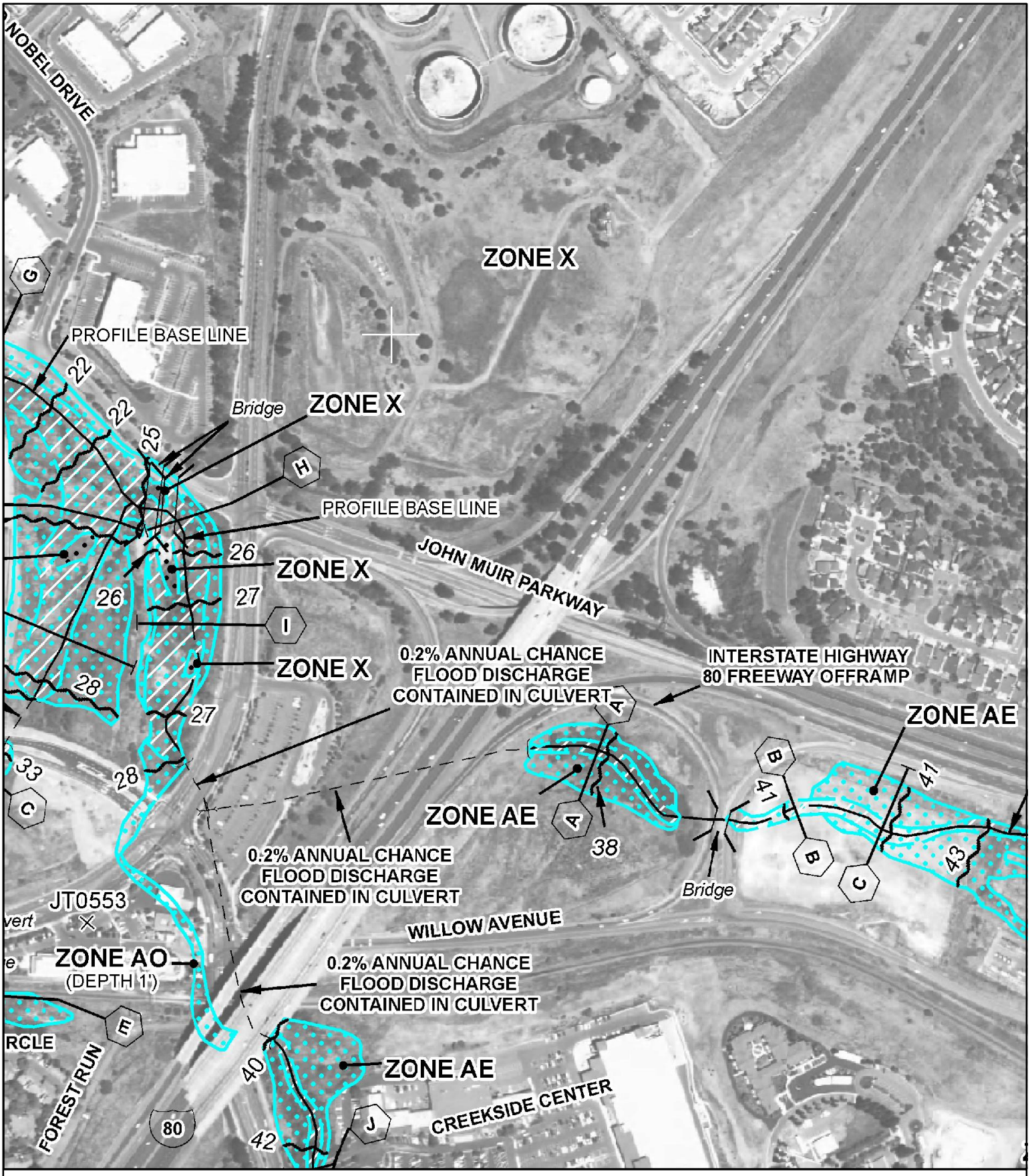
As shown in **Figure 2-2** (Sheet 3 of 3), the Ashby Avenue on-ramp is not located within the 100-year floodplain and also lies within Zone X (unshaded).[3]

Inundation Potential

A tsunami (pronounced soo-nah-mee) is a series of waves generated in a body of water by a rapid disturbance that vertically displaces the water. These changes can be caused by an underwater fault rupture (that generates an earthquake) or underwater landslides (typically triggered by earthquakes). Because of its proximity to the San Francisco Bay and San Pablo Bay, the project corridor is located within a tsunami inundation area.

Inundation from catastrophic structural dam failure can be caused by earthquake or rain overflow. Within the project corridor, dam failure inundation could affect those areas downhill, or west, of the Berryman Reservoir, located in Berkeley.

[1] FEMA FIRM Map Number 06013C0044F
[2] FEMA FIRM Map Number 06001C0056G.
[3] FEMA FIRM Number 06001C0056G



100-YEAR FLOOD PLAIN

FLOODWAY AREAS WITHIN 100-YEAR FLOOD PLAIN

500-YEAR FLOOD PLAIN

NOT TO SCALE

SOURCE: FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM, MAP NUMBER 06013C0044F

Figure 2-2
Sheet 1 of 3

Interstate 80 Integrated Corridor Mobility Project

FEMA Floodplain Maps (I-80/SR-4)

NOT TO SCALE

100-YEAR FLOOD PLAIN

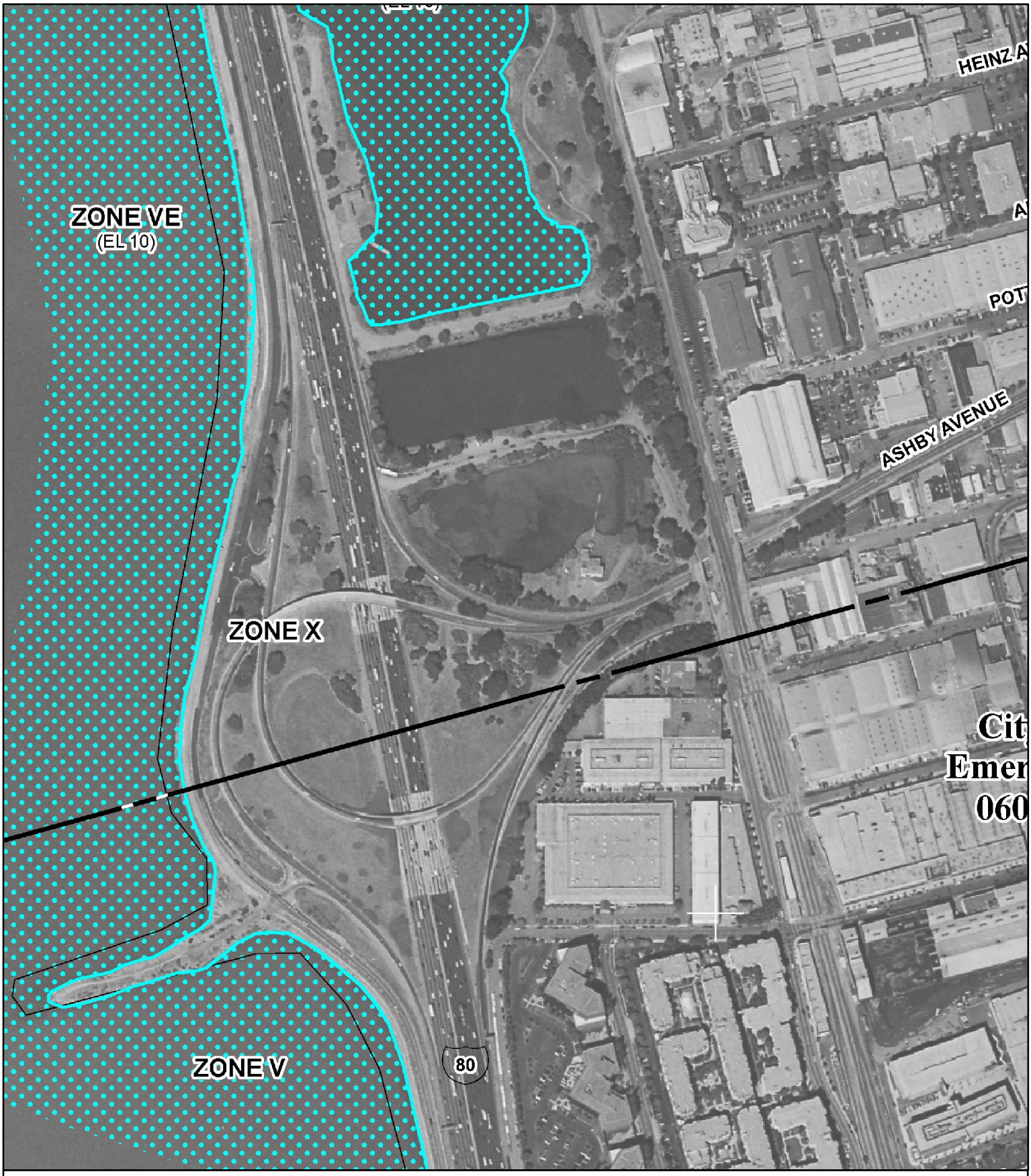
500-YEAR FLOOD PLAIN

Figure 2-2
Sheet 2 of 3

Interstate 80 Integrated Corridor Mobility Project

SOURCE: FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM, MAP NUMBER 060011C0056G

FEMA Floodplain Maps (I-80/University Avenue)



NOT TO SCALE

100-YEAR FLOOD PLAIN

500-YEAR FLOOD PLAIN

Figure 2-2
Sheet 3 of 3

Interstate 80 Integrated Corridor Mobility Project

SOURCE: FEDERAL EMERGENCY MANAGEMENT AGENCY
NATIONAL FLOOD INSURANCE PROGRAM, MAP NUMBER 06001C0056G

FEMA Floodplain Maps (I-80/Ashby Avenue)

2.3.1.3 Environmental Consequences

Build Alternative

As stated above, installation of the ramp meter signals and traffic operation signs proposed under the Build Alternative would not affect the existing hydrology of the study area.

The on-ramp widening that would occur at the John Muir Parkway on-ramp, the University Avenue westbound loop ramp, and the Ashby Avenue westbound on-ramp would result in an increase of approximately 0.75-acres of paved impervious surfaces that would create an increase in storm water runoff into the existing drainage systems. However, according to the Drainage Report, this increase in storm water runoff would not exceed hydraulic capacity of the existing systems (see Section 2.3.2 for further discussion).

Floodplain Encroachment and Risk of the Action

All three on-ramp widening improvement areas lie outside the base 100-year floodplain. In addition, the Build Alternative would not have an indirect effect on the 100-year floodplains associated with the waterways that cross the I-80 corridor within the study area since the Build Alternative would not result in a substantial amount of new runoff that would affect the size or location of the nearby 100-year floodplain. There would be no adverse effects to emergency vehicle access, or to natural or beneficial floodplain values since the project would not affect the size or location of the 100-year floodplain associated with waterways that cross the I-80 corridor. Any existing flooding issues along the I-80 corridor that could impair emergency vehicle access would not be impacted by the Build Alternative. Since the project is not located within the 100-year floodplain, it would not have any effect on the beneficial values of the existing 100-year floodplain. There would be no significant floodplain risk.

Inundation Potential

The project would not add capacity to the freeway main line, on-ramps, or parallel arterials nor would it stimulate new development or alter ongoing development patterns along the I-80 corridor. Although the project corridor is located in an area with the potential for inundation from tsunamis and dam failure, the project would not expose people or structures to increased risks of loss, injury, or death involving flooding.

No-Build Alternative

The No-Build Alternative would avoid implementation of system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards proposed under the Build Alternative. However none of these facilities would affect existing hydrology or be within the 100-year floodplain. Therefore the effects of both the No-Build Alternative and the Build Alternative would be similar.

2.3.1.4 Avoidance, Minimization, and/or Mitigation Measures

The project is not expected to have an adverse effect on hydrology or floodplains and as such no avoidance, minimization, or mitigation has been incorporated into the project.

Even though the project would not result in any direct or indirect effect to the 100-year floodplains in the project vicinity, standard Best Management Practices (BMPs) as discussed in Section 2.3.2 below, would be implemented during construction to further minimize any potential indirect effect.

2.3.2 Water Quality and Storm Water Runoff

2.3.2.1 Regulatory Setting

Federal Requirements: Clean Water Act

In 1972 Congress amended the Federal Water Pollution Control Act, making the addition of pollutants to the waters of the United States (U.S.) from any point source unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. Known today as the Clean Water Act (CWA), Congress has amended it several times. In the 1987 amendments, Congress directed dischargers of storm water from municipal and industrial/construction point sources to comply with the NPDES permit scheme. Important CWA sections are:

- Sections 303 and 304 require States to promulgate water quality standards, criteria, and guidelines.
- Section 401 requires an applicant for a federal license or permit to conduct any activity, which may result in a discharge to waters of the U.S. to obtain certification from the State that the discharge will comply with other provisions of the act. (Most frequently requires in tandem with a Section 404 permit request. See below.)
- Section 402 establishes the NPDES, a permitting system for the discharges (except for dredge or fill material) of any pollutant into waters of the U.S. Regional Water Quality Control Boards (RWQCB) administer this permitting program in California. Section 402(p) requires permits for dischargers of storm water from industrial/construction and municipal separate storm sewer systems (MS4s).
- Section 404 establishes a permit program for the discharge of dredge or fill material into waters of the United States. This permit program is administered by the U.S. Army Corps of Engineers (USACE).

The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."

USACE issues two types of 404 permits: Standard and General permits. There are two types of General permits, Regional permits and Nationwide permits. Regional permits are issued for a general category of activities when they are similar in nature and cause minimal environmental effect. Nationwide permits are issued to authorize a variety of minor project activities with no more than minimal effects.

There are two types of Standard permits: Individual permits and Letters of Permission. Ordinarily, projects that do not meet the criteria for a Nationwide Permit may be permitted under one of USACE's Standard permits. For Standard permits, the USACE decision to approve is based on compliance with

U.S. EPA's Section 404 (b)(1) Guidelines (U.S. EPA CFR 40 Part 230), and whether permit approval is in the public interest. The Section 404(b)(1) Guidelines were developed by the U.S. EPA in conjunction with USACE, and allow the discharge of dredged or fill material into the aquatic system (waters of the U.S.) only if there is no practicable alternative which would have less adverse effects. The Guidelines state that USACE may not issue a permit if there is a least environmentally damaging practicable alternative (LEDPA), to the proposed discharge that would have lesser effects on waters of the U.S., and not have any other significant adverse environmental consequences. Per Guidelines, documentation is needed that a sequence of avoidance, minimization, and compensation measures has been followed, in that order. The Guidelines also restrict permitting activities that violate water quality or toxic effluent standards, jeopardize the continued existence of listed species, violate marine sanctuary protections, or cause "significant degradation" to waters of the U.S. In addition every permit from the USACE, even if not subject to the Section 404(b)(1) Guidelines, must meet general requirements. See 33 CFR 320.4.

State Requirements: Porter-Cologne Water Quality Control Act

California's Porter-Cologne Act, enacted in 1969, provides the legal basis for water quality regulation within California. This Act requires a "Report of Waste Discharge" for any discharge of waste (liquid, solid, or gaseous) to land or surface waters that may impair beneficial uses for surface and/or groundwater of the State. It predates the CWA and regulates discharges to waters of the State. Waters of the State include more than just Waters of the U.S., like groundwater and surface waters not considered Waters of the U.S. Additionally, it prohibits discharges of "waste" as defined and this definition is broader than the CWA definition of "pollutant." Discharges under the Porter-Cologne Act are permitted by Waste Discharge Requirements (WDRs) and may be required even when the discharge is already permitted or exempt under the CWA.

The State Water Resources Control Board (SWRCB) and RWQCBs are responsible for establishing the water quality standards (objectives and beneficial uses) required by the CWA, and regulating discharges to ensure compliance with the water quality standards. Details regarding water quality standards in a project area are contained in the applicable RWQCB Basin Plan. States designate beneficial uses for all water body segments, and then set criteria necessary to protect these uses. Consequently, the water quality standards developed for particular water segments are based on the designated use and vary depending on such use. In addition, each state identifies waters failing to meet standards for specific pollutants, which are state listed in accordance with CWA Section 303(d). If a state determines that waters are impaired for one or more constituents and the standards cannot be met through point source controls, the CWA requires the establishment of Total Maximum Daily Loads (TMDLs). TMDLs specify allowable pollutant loads from all sources (point, non-point, and natural) for a given watershed.

State Water Resources Control Board and Regional Water Quality Control Boards

The SWRCB administers water rights, water pollution control, and water quality functions throughout the state. RWCQBs are responsible for protecting beneficial uses of water resources within their regional jurisdiction using planning, permitting, and enforcement authorities to meet this responsibility.

National Pollution Discharge Elimination System (NPDES) Program

Municipal Separate Storm Sewer Systems

Section 402(p) of the CWA requires the issuance of NPDES permits for five categories of storm water dischargers, including Municipal Separate Storm Sewer Systems (MS4s). The U.S. EPA defines an MS4 as any conveyance or system of conveyances (roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, human-made channels, and storm drains) owned or operated by a state, city, town, county, or other public body having jurisdiction over storm water, that are designed or used for collecting or conveying storm water. The SWRCB has identified the Department as an owner/operator of an MS4 by the SWRCB. This permit covers all Department ROW, properties, facilities, and activities in the state. The SWRCB or the RWQCB issues NPDES permits for five years, and permit requirements remain active until a new permit has been adopted.

The Department's MS4 Permit, under revision at the time of this update, contains three basic requirements:

1. The Department must comply with the requirements of the Construction General Permit (see below);
2. The Department must implement a year-round program in all parts of the State to effectively control storm water and non-storm water discharges; and
3. The Department storm water discharges must meet water quality standards through implementation of permanent and temporary (construction) Best Management Practices (BMPs) and other measures.

To comply with the permit, the Department developed the Statewide Storm Water Management Plan (SWMP) to address storm water pollution controls related to highway planning, design, construction, and maintenance activities throughout California. The SWMP assigns responsibilities within the Department for implementing storm water management procedures and practices as well as training, public education and participation, monitoring and research, program evaluation, and reporting activities. The SWMP describes the minimum procedures and practices the Department uses to reduce pollutants in storm water and non-storm water discharges. It outlines procedures and responsibilities for protecting water quality, including the selection and implementation of Best Management Practices (BMPs). The project would be programmed to follow the guidelines and procedures outlined in the latest SWMP to address storm water runoff.

Part of and appended to the SWMP is the Storm Water Data Report (SWDR) and its associated checklists. The SWDR documents the relevant storm water design decisions made regarding project compliance with the MS4 NPDES permit. The preliminary information in the SWDR prepared during the Project Initiation Document (PID) phase will be reviewed, updated, confirmed, and if required, revised in the SWDR prepared for the later phases of the project. The information contained in the SWDR may be used to make more informed decisions regarding the selection of BMPs and/or recommended avoidance, minimization, or mitigation measures to address water quality impacts.

Construction General Permit

Construction General Permit (Order No. 2009-009-DWQ), adopted on September 2, 2009, became effective on July 1, 2010. The permit regulates storm water discharges from construction sites which result in a Disturbed Soil Area (DSA) of one acre or greater, and/or are smaller sites that are part of a

larger common plan of development. By law, all storm water discharges associated with construction activity where clearing, grading, and excavation results in soil disturbance of at least one acre must comply with the provisions of the General Construction Permit. Construction activity that results in soil disturbances of less than one acre is subject to this Construction General Permit if there is potential for significant water quality impairment resulting from the activity as determined by the RWQCB. Operators of regulated construction sites are required to develop storm water pollution prevention plans; to implement sediment, erosion, and pollution prevention control measures; and to obtain coverage under the Construction General Permit.

The 2009 Construction General Permit separates projects into Risk Levels 1, 2, or 3. Risk levels are determined during the planning and design phases, and are based on potential erosion and transport to receiving waters. Requirements apply according to the Risk Level determined. For example, a Risk Level 3 (highest risk) project would require compulsory storm water runoff pH and turbidity monitoring, and before construction and after construction aquatic biological assessments during specified seasonal windows. For all projects subject to the permit, applicants are required to develop and implement an effective Storm Water Pollution Prevention Plan (SWPPP). In accordance with the Department's Standard Specifications, a Water Pollution Control Plan (WPCP) is necessary for projects with DSA less than one acre.

Section 401 Permitting

Under Section 401 of the CWA, any project requiring a federal license or permit that may result in a discharge to a water body must obtain a 401 Certification, which certifies that the project will be in compliance with State water quality standards. The most common federal permits triggering 401 Certification are CWA Section 404 permits issued by USACE. The 401 permit certifications are obtained from the appropriate RWQCB, dependent on the project location, and are required before USACE issues a 404 permit.

In some cases the RWQCB may have specific concerns with discharges associated with a project. As a result, the RWQCB may issue a set of requirements known as Waste Discharge Requirements (WDRs) under the State Water Code that define activities, such as the inclusion of specific features, effluent limitations, monitoring, and plan submittals that are to be implemented for protecting or benefiting water quality. WDRs can be issued to address both permanent and temporary discharges of a project.

2.3.2.2 Affected Environment

The analysis in this section is based on the following technical reports: the Drainage Report prepared in September 2010 (Department, 2010f). As described in the previous section, the implementation of various system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards under the Build Alternative would not affect the existing hydrology of the study area. As such, no adverse effects to water quality are anticipated from the operation of these components of the Build Alternative.

The on-ramp widening that would occur at the John Muir Parkway on-ramp, University Avenue westbound loop ramp, and the Ashby Avenue westbound on-ramp would result in an increase of approximately 0.75acres in paved impervious surfaces that would slightly increase storm water runoff into the existing drainage systems which in turn could affect water quality. As such, this analysis focuses on the on the potential effects from the three ramp-widening improvement areas.

All of the ramp-widening improvement areas are located within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (SFBWQCB), Region 2.

The ramp-widening improvement areas are located in watersheds that drain into San Francisco Bay or San Pablo Bay. Both the San Francisco Bay and San Pablo Bay are listed as CWA Section 303(d) Water Quality Limited Segments. The CWA identifies the water bodies as impaired by mercury, polychlorinated biphenyls, selenium, dioxins, diazinon, dieldrin, dichlorodiphenyltrichloroethane, chlordane, and furan compounds.

John Muir Parkway

The John Muir Parkway on-ramp is located within the Refugio Creek watershed, which encompasses approximately 3,116 acres and drains from the foothills southeast of the City of Hercules to the San Pablo Bay. Land uses within the upper reaches of this watershed consist mainly of ranch and regional park land. The Refugio Creek watershed is generally isolated from the urban development within the city of Hercules.

University Avenue

The University Avenue westbound loop ramp is located within the Strawberry Creek watershed, which encompasses approximately 1,163 acres and drains from the foothills of north Berkeley to San Francisco Bay. Land uses within upper reaches of this watershed consist mostly of private and regional preserve open space. The watershed is generally isolated from the urban development within the city of Berkeley.

Ashby Avenue

The Ashby Avenue westbound on-ramp is located within the Potter/Derby Creeks watershed. This watershed drains from northwestern Alameda County to San Francisco Bay. Potter Creek and Derby Creek have been completely filled-in and replaced with a storm drainage network, which receives large amounts of urban runoff from the cities of Berkeley and Emeryville.

2.3.2.3 Environmental Consequences

Build Alternative

As stated above, the implementation of system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards proposed under the Build Alternative would not affect the water quality of the project corridor and therefore would not affect aquatic organisms.

The ramp-widening improvements proposed under the Build Alternative would result in a combined 0.75-acre of new impervious paved surfaces. According to Section 4 of the Department's Storm Water Quality Handbook, permanent treatment BMPs are only required if a project results in a net increase of more than 1 acre of impervious surface. Since the increase in impervious area for ramp-widening improvements is less than 1 acre (at each individual ramp location), permanent BMPs are not required because the anticipated adverse affect would be negligible.

John Muir Parkway

The total increase in impervious area due to modifications of the John Muir Parkway on-ramp is 0.22 acres. Ramp-widening at this location would require the relocation of four existing inlets and one new concrete v-ditch. The existing drainage systems serving the northern and southern portions of the on-ramp area have excess capacity to convey peak flows to the storm drain system. According to the Drainage Report, the additional 0.22 acres of impervious surface area created by the ramp-widening would increase peak flows to several existing inlets from 0.2 to 4.4 cubic feet per second. However, the relocation of the inlets and the increase in peak flows would not significantly affect water quality, aquatic organisms, and the hydraulic capacity of the existing downstream drainage system, which has substantial excess capacity to convey peak runoff from this area.

University Avenue

The total increase in impervious area due to modifications of the University Avenue westbound loop ramp is 0.06 acres. Ramp-widening at this location would require the installation of an additional inlet with a connecting 12-inch pipe. The existing drainage system has significant excess capacity to convey peak flows to the existing culvert. According to the Drainage Report, the additional 0.06 acres of impervious surface area would increase peak flows to two existing inlets by 0.1 cubic feet per second. This minor modification to the existing storm drain system and the increase in peak flows would not significantly affect water quality, aquatic organisms, and the hydraulic capacity of the system, which has substantial excess capacity to convey peak runoff from this area.

Ashby Avenue

The total increase in impervious area due to modifications of the Ashby Avenue westbound on-ramp is 0.46 acres. Ramp-widening at this location may require the relocation of two existing inlets. The drainage system serving the northern portion of the on-ramp has significant excess capacity to convey peak flows while the drainage system of the central portion of the on-ramp is at or near capacity to convey peak flows. There is significant excess capacity of the drainage system at the southern portion of the on-ramp area. According to the Drainage Report, the additional 0.46 acres of impervious surface area would increase peak flows to several existing inlets from 0.3 to 0.5 cubic feet per second. The Drainage Report determined that the relocation of these inlets and the increase in peak flows would not affect water quality, aquatic organisms, and the hydraulic capacity of the existing downstream drainage system.

Temporary Construction Impacts

Earth-moving and other construction activities could cause minor erosion and runoff of topsoils into the drainage systems along the project corridor during construction which could temporarily affect water quality in local waterways.

No-Build Alternative

The No-Build Alternative would avoid implementation of system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards proposed under the Build Alternative and therefore avoid the creation of 0.75 acres of new impervious surface and temporary construction effects on water quality associated with the Build Alternative.

2.3.2.4 Avoidance, Minimization, and/or Mitigation Measures

Construction activities would adhere to the Department's Statewide NPDES permit which regulates storm water discharges from activities on its freeways and highways. Additionally, the project engineer or construction contractor would be required to prepare and implement a Storm Water Pollution Prevention Plan in compliance with the Basin Plan prepared by the RWQCB and the General Construction Permit. Incorporation of these BMPs and any measures outlined in the Storm Water Pollution Prevention Plan would ensure that the Build Alternative would not adversely affect water quality in local waterways or groundwater quality. Protective measures would include, at a minimum:

- No discharge of pollutants from vehicle and equipment cleaning will be allowed into any storm drains or water courses.
- Vehicle and equipment fueling and maintenance operations will be at least 50 feet away from water courses, except at established commercial gas stations or established vehicle maintenance facility.
- Concrete wastes will be collected in washouts and water from curing operations will be collected and disposed of and not allowed into water courses.
- Dust control will be implemented, including use of water trucks and tackifiers to control dust in excavation and fill areas, rocking temporary access road entrances and exits, and covering temporary stockpiles when weather conditions require.
- Protection of graded areas from erosion using a combination of silt fences, fiber rolls along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas.
- Spill containment kits will be maintained on site at all times during construction operations and/or staging or fueling of equipment.

2.3.3 Geology/Soils/Seismic/Topography

2.3.3.1 Regulatory Setting

For geologic and topographic features, the key federal law is the Historic Sites Act of 1935, which establishes a national registry of natural landmarks and protects "outstanding examples of major geological features." Topographic and geologic features are also protected under the California Environmental Quality Act.

This section also discusses geology, soils, and seismic concerns as they relate to public safety and proposed project design. Earthquakes are prime considerations in the design and retrofit of structures. The Department's Office of Earthquake Engineering is responsible for assessing the seismic hazard for

Department projects. The current policy is to use the anticipated Maximum Credible Earthquake (MCE), from young faults in and near California. The MCE is defined as the largest earthquake that can be expected to occur on a fault over a particular period of time.

2.3.3.2 Affected Environment

The analysis in this section is based on the Preliminary Geotechnical Report completed in September 2010 (Department, 2010i).

Site Geology and Subsurface Conditions

The study area consists of gently sloping lowlands with relatively young sediments derived from erosion of the adjacent hills of the Coastal Range. No natural landmarks or other examples of a major geologic feature (such as a scenic rock outcropping) occur in the study area.

Subsoils in the study area consist of alluvial soil (of varying thicknesses) overlying bedrock. The Franciscan Complex is the underlying "basement" bedrock in the project region. The main rock types of the Franciscan Complex are predominately marine sedimentary rocks such as sandstone and shale with lesser amounts of marine basaltic rocks and chert as well as serpentinite, a hydro-thermally altered ultramafic (low silica, high iron and magnesium) oceanic crust. From south to north, the project corridor is underlain by the following sediment deposits:

- Artificial fill over estuarine mud (United States Geological Survey (USGS)[4] code: "afem")
- Artificial fill ("af")
- Holocene alluvial fan deposits ("Qhf")
- Pleistocene alluvial fan deposits ("Qpf")
- Holocene to Pleistocene alluvial fan deposits ("Qf")
- Pre-Quaternary deposits ("br")

Groundwater

The groundwater elevation varies greatly along the project corridor. In general, groundwater levels were encountered at a depth of approximately 5 to 12 feet below grade; the depths vary over time due to seasonal groundwater fluctuation, surface and subsurface flows, ground surface run-off, water level in the creeks, and other factors.

Seismic Conditions

The study area is located in a seismically active area of California. Many faults in this area are capable of producing earthquakes that may cause strong ground shaking. **Table 2.3-1** presents the maximum earthquake magnitudes of faults in the vicinity of the I-80 corridor.

[4] Witter, et al, 2006. USGS Open-File Report 2006-1037

Table 2.3-1: Maximum Earthquake Magnitudes for Faults in the Vicinity of the I-80 Corridor

Fault	Closest Distance from I-80 (mi)	Maximum Magnitude Earthquake
Southampton fault	5.6	6.3
Hayward fault zone (Northern section)	0	7.3
San Andreas fault zone (North Coast section)	16.6	7.9
San Andreas fault zone (Peninsula section)	15.6	7.9

Liquefaction Susceptibility

The area between Powell Street and Central Avenue consists of artificial fill over estuarine mud. The fill materials were imported, and consist of disturbed mud, sand, and gravel. In general, sediment deposits in the study area have already settled due to compression of the mud under the weight of the artificial fill. Sediment deposits between Powell Street and Central Avenue are classified by the USGS and the California Geological Survey as having a very high susceptibility to liquefaction.[5]

2.3.3.3 Environmental Consequences

Build Alternative

Proposed improvements would occur within the paved ROW and landscaped areas of the I-80 corridor, and would not require substantial earthmoving activities. In addition, soil erosion would be minimal because very little vegetation would be removed during installation of the proposed improvements.

The project is located in a seismically active region. Without proper seismic engineering, improvements located adjacent to or spanning I-80 could collapse onto the freeway, on-ramps, or other structures or facilities as a result of strong ground shaking or liquefaction.

Temporary Construction Impacts

Construction workers could be exposed to potential seismic hazards during installation of the proposed improvements since the project is located in a seismically active region.

No-Build Alternative

The No-Build Alternative would avoid implementation of system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards proposed under the Build Alternative and therefore avoid the geologic and seismic effects associated with the Build Alternative.

[5] Liquefaction is an unstable ground condition in which water-saturated soils change from a solid to semi-liquid state because of a sudden shock or strain.

2.3.3.4 Avoidance, Minimization, and/or Mitigation Measures

Under the Build Alternative, any new structures would be constructed in compliance with the Department's standard design and construction guidelines. No avoidance, minimization, or mitigation measures would be required beyond the implementation of the Department's standard design and construction guidelines. Site specific subsurface soil conditions and groundwater conditions within the project corridor should be verified during the Plans, Specifications, and Estimates phase.

With respect to worker safety during construction, the Occupational Safety and Health Act (OSHA) requires employers to comply with hazard-specific safety and health standards. Pursuant to Section 5(a)(1) of the OSHA, employers must provide their employees with a workplace free from recognized hazards likely to cause death or serious physical harm. Potential seismic-related hazards to workers during construction are expected to be less than substantial with compliance with the OSHA and compliance with the Department's standard design and construction guidelines.

As described above in Section 2.3.2.4, erosion control measures would be implemented during construction activities in accordance with the best management practices outlined in the SWPPP. Protective measures would reduce soil erosion and minimize impacts to water quality.

2.3.4 Paleontology

2.3.4.1 Regulatory Setting

Paleontology is the study of life in past geologic time based on fossil plants and animals. A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized or funded projects. (e.g., Antiquities Act of 1906 [16 USC 431-433], Federal-Aid Highway Act of 1960 [23 USC 305]), and the Omnibus Public Management Act of 2009 [16 USC 470aaa]). Under California law, paleontological resources are protected by the California Environmental Quality Act.

2.3.4.2 Affected Environment

This section is based on the Paleontological Identification Report approved in January of 2011(Department, 2011b). The paleontological study area includes the I-80 corridor plus a ¼-mile buffer on either side of the freeway.

The study area is located within the Coastal Range, which is the topographic landform between the Pacific Ocean to the west and the Great Valley of Central California to the east. Geological units within the vicinity of the study area are described above in Section 2.3.3.2. The study area contains several geologic formations that have a high paleontological sensitivity, including the Pleistocene alluvial fan deposits, Holocene to Pleistocene alluvial fan deposits, and Pre-Quaternary deposits (of the Tertiary Period).

2.3.4.3 Environmental Consequences

Build Alternative

Construction activities could impact unknown paleontological resources in highly sensitive geologic units. Installation of gantries and on-ramp widening improvements would require earthmoving activities that would result in ground disturbance. Impacts to fossils may occur by destroying them or otherwise altering them in such a way that their scientific value is lost.

Installation of the project components would require excavation to a depth of up to 33 feet, as listed below:

- Active traffic management gantries: up to 33 feet
- Information display boards: up to 22 feet
- Variable advisory speed signs: 5 feet
- Closed-circuit television cameras: 5 feet

According to the Paleontological Identification Report, less than 18 percent of the total disturbance from deep excavations would occur within paleontological sensitive formations. Five of the components requiring deep excavation would be constructed within these sensitive geologic units.

No-Build Alternative

The No-Build Alternative would avoid implementation of system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards proposed under the Build Alternative and therefore avoid the effects on paleontological resources associated with the Build Alternative.

2.3.4.4 Avoidance, Minimization, and/or Mitigation Measures

The following mitigation measure would reduce the likelihood of potential adverse effects to paleontological resources in the study area.

- **Mitigation Measure PAL-1:** Prior to the start of construction, a qualified paleontologist shall be retained to conduct a field survey of the project ROW to identify exposures of sensitive stratigraphic units that may be disturbed during project construction. A Paleontological Evaluation Report (PER) shall be prepared to define actual locations where monitoring will be necessary based upon the project design. The PER shall be prepared in accordance with the Department's Standard Environmental Reference (SER).

  For any areas where surface expressions of sensitive stratigraphic units are identified, and for any areas where subsurface excavation is anticipated, the project paleontologist shall both design and implement a paleontological mitigation program (PMP) for the project. The PMP shall be designed by the project paleontologist consistent with Society of Vertebrate Paleontology guidelines (Society of Vertebrate Paleontology 1995, 1996) and with the Department's SER. The PMP shall include at a minimum:

- Preconstruction coordination;
- Construction monitoring;
- Data recovery;
- Fossil treatment;
- Curation procedures; and
- Reporting.

Measures contained in the PMP would reduce potential paleontological impacts to a less-than-significant level by allowing for the recovery of fossil remains and associated specimen data and corresponding geologic and geographic site data that otherwise would be lost.

2.3.5 Hazardous Waste/Materials

2.3.5.1 Regulatory Setting

Hazardous materials and hazardous wastes are regulated by many state and federal laws. These include not only specific statutes governing hazardous waste, but also a variety of laws regulating air and water quality, human health and land use.

The primary federal laws regulating hazardous wastes/materials are the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). The purpose of CERCLA, often referred to as Superfund, is to clean up contaminated sites so that public health and welfare are not compromised. RCRA provides for "cradle to grave" regulation of hazardous wastes. Other federal laws include:

- Community Environmental Response Facilitation Act (CERFA) of 1992
- Clean Water Act
- Clean Air Act
- Safe Drinking Water Act
- Occupational Safety and Health Act (OSHA)
- Atomic Energy Act
- Toxic Substances Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

In addition to the acts listed above, Executive Order 12088, Federal Compliance with Pollution Control, mandates that necessary actions be taken to prevent and control environmental pollution when federal activities or federal facilities are involved.

Hazardous waste in California is regulated primarily under the authority of the federal Resource Conservation and Recovery Act of 1976, and the California Health and Safety Code. Other California laws that affect hazardous waste are specific to handling, storage, transportation, disposal, treatment, reduction, cleanup and emergency planning.

Worker health and safety and public safety are key issues when dealing with hazardous materials that may affect human health and the environment. Proper disposal of hazardous material is vital if it is disturbed during proposed project construction.

2.3.5.2 Affected Environment

The analysis summarized in this section is based on the Hazardous Materials Technical Memorandum prepared in June 2010 (Department, 2010j). This analysis focuses on those areas that would have the most intensive ground disturbance under the Build Alternative; specifically, the ramp widening associated with the John Muir Parkway on-ramp, University Avenue westbound loop ramp, and the Ashby Avenue westbound on-ramp.

A hazardous materials regulatory database search was conducted for the three ramp widening improvement areas in order to identify nearby hazardous waste/material sites and/or unauthorized releases with the potential to impact the project. Sites were considered to warrant further consideration if they: (1) involved groundwater contamination; (2) were thought to be located hydrologically upgradient of the ROW with respect to anticipated groundwater flow; and/or (3) were located hydrologically upgradient with respect to surface water flow/stormwater runoff.

A site reconnaissance of the three ramp widening improvement areas was also conducted in order to further identify nearby sites or land uses that might contain hazardous materials that could adversely affect the project.

The following potential concerns with respect to hazardous materials and hazardous waste were identified:

Identified hazardous waste/materials sites

John Muir Parkway

The regulatory database search identified two sites within a half mile of the John Muir Parkway on-ramp with recorded hazardous material releases and/or contamination. However, a field reconnaissance and further evaluation of database records for these sites did not indicate that there was a potential for the migration of hazardous materials to the on-ramp widening area. Accordingly, the identified sites are not expected to pose an environmental concern with respect to the on-ramp widening improvements at this location.

University Avenue

The regulatory database search identified two sites within a half mile of the University Avenue westbound loop that could pose an environmental concern to the project. Both sites were listed in the database as having soil and groundwater contamination. Due to the fact that these sites are located hydrologically upgradient and are within close proximity of the proposed ramp improvements, there is a potential that contaminated groundwater from these sites has impacted the area.

Ashby Avenue

The regulatory database search identified 15 sites within a half mile of the Ashby Avenue westbound on-ramp improvements that may pose an environmental concern. All these properties were reported to have soil and/or groundwater contamination. Due to the fact that these sites are located hydrologically upgradient and are within close proximity of the proposed ramp improvements, there is a potential that contaminated groundwater from these sites has impacted the area.

Aerially Deposited Lead

Until their use was banned in the 1990s, additives in gasoline expelled lead-based compounds from engine exhaust. Consequently, lead was aerially deposited as a particulate, frequently concentrating onto the adjacent road shoulders and in medians. Lead can be hazardous to humans as exposure can adversely affect the nervous, circulatory, and reproductive systems and can severely damage the brain and kidneys. The U.S. EPA has determined that lead is a probable human carcinogen.

Historical aerial photographs show that the I-80 corridor has supported vehicular traffic from the late 1950s. Due to this long-term vehicular activity, it is likely that the surface soils along these on-ramps contain aerially deposited lead.

Asbestos and Lead-Based Paint

Asbestos was commonly used in construction materials, such as insulation in buildings and piping, until the 1980s, when its use was phased out. Similarly, lead-based paints, such as the ones used to paint overpasses, were used up until 1978. The Department of Health and Human Services, the World Health Organization, and the U.S. EPA have determined that asbestos is a human carcinogen. Retaining walls, overpasses, and bridge structures in the vicinity of the project were constructed prior to the 1980s, and may contain asbestos, particularly in older concrete and lead-based paint.

2.3.5.3 Environmental Consequences

Build Alternative

Several sites near the University Avenue westbound loop ramp and the Ashby Avenue westbound on-ramp improvement areas are known to have active cases for the unauthorized release of various hazardous materials. Due to the close proximity of these sites, and the fact that they are located hydrologically upgradient, construction activities such as grading and excavation could encounter contamination from these sites. Construction workers may also be exposed to aerially deposited lead in surface soils, which could result in significant health hazards.

The project would not involve demolition of existing bridge structures or other freeway elements that potentially contain asbestos or lead-based paint. Accordingly, no adverse effects related to asbestos or lead-based paint would occur.

No-Build Alternative

The No-Build Alternative would avoid implementation of system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards proposed under the Build Alternative and therefore avoid the hazardous waste effects associated with the Build Alternative.

2.3.5.4 Avoidance, Minimization, and/or Mitigation Measures

In accordance with the Department's Standard Special Provision 07-330, the contractor would be notified that increased concentrations of aerially deposited lead may be present in the ramp widening improvement areas, and would be required to prepare a Lead Compliance Plan to prevent or minimize

worker exposure. Proper waste characterization and disposal of lead-containing materials would be conducted in accordance with Title 22 of the California Code of Regulations and Section 25157.8 of the California Health and Safety Code.

A preliminary site investigation would be prepared during the Plans, Specifications and Estimates Phase at the University Avenue westbound loop ramp and the Ashby Avenue westbound on-ramp improvement areas to identify and delineate any hazardous substances that may be present. In accordance with Department protocol, a Site Safety Plan would be prepared and implemented prior to initiation of any construction/development activities to reduce potential health and safety hazards to workers and the public.

2.3.6 Air Quality

2.3.6.1 Regulatory Setting

The Federal Clean Air Act (FCAA) as amended in 1990 is the federal law that governs air quality. The California Clean Air Act of 1988 is its companion state law. These laws, and related regulations by the United States Environmental Protection Agency (U.S. EPA) and California Air Resources Board (ARB), set standards for the quantity of pollutants that can be in the air. At the federal level, these standards are called National Ambient Air Quality Standards (NAAQS). NAAQS and State ambient air quality standards have been established for six transportation-related criteria pollutants that have been linked to potential health concerns. The criteria pollutants are: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM, broken down for regulatory purposes into particles of 10 micrometers or smaller – PM_{10} and particles of 2.5 micrometers and smaller – $PM_{2.5}$), lead (Pb), and sulfur dioxide (SO_2). In addition, State standards exist for visibility reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride. The NAAQS and State standards are set at a level that protects public health with a margin of safety, and are subject to periodic review and revision. Both State and Federal regulatory schemes also cover toxic air contaminants (air toxics); some criteria pollutants are also air toxics or may include certain air toxics within their general definition..

Federal and State air quality standards and regulations provide the basic scheme for project-level air quality analysis under the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). In addition to this type of environmental analysis, a parallel "Conformity" requirement under the FCAA also applies.

FCAA Section 176(c) prohibits the U.S. Department of Transportation and other Federal agencies from funding, authorizing, or approving plans, programs or projects that are not first found to conform to State Implementation Plan (SIP) for achieving the goals of Clean Air Act requirements related to the NAAQS. "Transportation Conformity" takes place on two levels: the regional, or planning and programming, level, and at the project level. The proposed project must conform at both levels to be approved. Conformity requirements apply only in nonattainment and "maintenance" (former nonattainment) areas for the NAAQS, and only for the specific NAAQS that are or were violated. U.S. EPA regulations at 40 CFR 93 govern the conformity process.

Regional conformity is concerned with how well the regional transportation system supports plans for attaining the standards set for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), and in some areas sulfur dioxide (SO_2). California has attainment or

maintenance areas for all of these transportation-related "criteria pollutants" except SO_2 and also has a nonattainment area for lead (Pb). However, lead is not currently required by the FCAA to be covered in transportation conformity analysis. Regional conformity is based on the Regional Transportation Plans (RTPs) and Federal Transportation Improvement Programs (FTIPs) that include all of the transportation projects planned for a region over a period of at least 20 years for the RTP) and 4 years (for the FTIP). RTP and FTIP conformity is based on use of travel demand and air quality models to determine whether or not the implementation of those projects would conform to emission budgets or other tests showing that requirements of the Clean Air Act and the SIP are met. If the conformity analysis is successful, the Metropolitan Planning Organization (MPO), Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA), make the determinations that the RTP and FTIP are in conformity with the SIP for achieving the goals of the FCAA. Otherwise, the projects in the RTP and/or FTIP must be modified until conformity is attained. If the design concept, scope, and :open to traffic" schedule of a proposed transportation project are the same as described in the RTP and FTIP, then the proposed project is deemed to meet regional conformity requirements for purposes of project-level analysis.

Conformity at the project-level also requires "hot spot" analysis if an area is "nonattainment" or "maintenance" for carbon monoxide (CO) and/or particulate matter (PM_{10} or $PM_{2.5}$). A region is "nonattainment" if one or more of the monitoring stations in the region measures violation of the relevant standard And U.S. EPA officially designated the area nonattainment. Areas that were previously designated as nonattainment areas but subsequently meet the standard may be officially redesignated to attainment by U.S. EPA and are then called "maintenance" areas. "Hot spot" analysis is essentially the same, for technical purposes, as CO or particulate matter analysis performed for NEPA purposes. Conformity does include some specific procedural and documentation standards for projects that require a hot spot analysis. In general, projects must not cause the "hot spot"-related standard to be violated, and must not cause any increase in the number and severity of violations in nonattainment areas. If a known CO or particulate matter violation is located in the proposed project vicinity, the project must include measures to reduce or eliminate the existing violation(s) as well.

2.3.6.2 Affected Environment

The analysis for this section was based on the Air Quality Technical Report completed in August 2010 (Department, 2010k).

The project corridor is located within the San Francisco Bay Area Air Basin (SF Air Basin) and within the jurisdictional boundaries of the Bay Area Air Quality Management District (BAAQMD).

Meteorological conditions such as wind speed, the altitude at which pollutants are mixing and dispersing, and atmospheric conditions affect the region's air quality. Temporary, short-term variations (like seasonal or daily conditions) result from frequent changes in these factors. For example, meteorological factors of the SF Air Basin, such as clear skies and relatively warm temperatures (common during the summer months) mix with localized and/or transported pollutant emissions and decrease air quality conditions. Variations in long-term air quality conditions are directly related to changes in the type and amount of air pollutant emissions in the region.

The project corridor is located in a climate subregion that stretches from the City of Richmond to the City of San Leandro with a western boundary of the San Francisco Bay and an eastern boundary of the Oakland-Berkeley hills. The prevailing winds for most of this subregion are from the west. Temperatures in this subregion have a narrow range due to the proximity of the moderating marine air. During the summer, temperatures range from the mid-70s down to the mid-50s and during the winter, temperatures range from the high 50s down to the low 40s.

2.3.6.3 Environmental Consequences

Build Alternative

Regional Air Quality Conformity

The BAAQMD monitors pollutants of concern, known as criteria pollutants, and air quality conditions throughout the SF Air Basin. The current attainment status for the SF Air Basin according to national and state standards of criteria pollutants is included in **Table 2.3-2**.

Table 2.3-2: San Francisco Bay Area Air Basin Attainment Status

Pollutant	Averaging Time	State [9] Standards	Federal [9] Standards	Principal Health & Atmospheric Effects	Typical Sources	Attainment Status
Ozone (O_3) [2]	1 hour	0.09 ppm	-- [4]	High concentrations irritate lungs. Long-term exposure may cause lung tissue damage and cancer. Long-term exposure damages plant materials and reduces crop productivity. Precursor organic compounds include many known toxic air contaminants. Biogenic VOC may also contribute.	Low-altitude ozone is almost entirely formed from reactive organic gases/volatile organic compounds (ROG or VOC) and nitrogen oxides (NOx) in the presence of sunlight and heat. Major sources include motor vehicles and other mobile sources, solvent evaporation, and industrial and other combustion processes.	Federal: Nonattainment State: Nonattainment
	8 hour	0.070 ppm	0.075 ppm [6]			
	8 hours (conformity process [5])	--	0.08 ppm			
Carbon monoxide (CO)	1 hour	20 ppm	35 ppm	CO interferes with the transfer of oxygen to the blood and deprives sensitive tissues of oxygen. CO also is a minor precursor for photochemical ozone.	Combustion sources, especially gasoline-powered engines and motor vehicles. CO is the traditional signature pollutant for on-road mobile sources at the local and neighborhood scale.	Federal: Attainment State: Attainment
	8 hour	9.0 ppm [1]	9 ppm			
Nitrogen dioxide (NO_2)	1 hour	0.18 ppm	0.100 ppm [7]	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown. Contributes to acid rain. Part of the "NOx" group of ozone precursors.	Motor vehicles and other mobile sources; refineries; industrial operations.	Federal: Attainment State: Attainment
	Annual	0.030 ppm	0.053 ppm			

Pollutant	Averaging Time	State [9] Standards	Federal [9] Standards	Principal Health & Atmospheric Effects	Typical Sources	Attainment Status
Sulfur dioxide (SO_2)	1 hour	0.25 ppm	0.075 ppm [8]	Irritates respiratory tract; injures lung tissue. Can yellow plant leaves. Destructive to marble, iron, steel. Contributes to acid rain. Limits visibility.	Fuel combustion (especially coal and high-sulfur oil), chemical plants, sulfur recovery plants, metal processing; some natural sources like active volcanoes. Limited contribution possible from heavy-duty diesel vehicles if ultra-low sulfur fuel not used.	Federal: Attainment State: Attainment
	3 hours	--	0.5 ppm			
	24 hours	0.04 ppm	0.14 ppm			
	Annual	--	0.030 ppm			
Particulate matter (PM_{10}) [2]	24 hours	50 µg/m^3	150 µg/m^3	Irritates eyes and respiratory tract. Decreases lung capacity. Associated with increased cancer and mortality. Contributes to haze and reduced visibility. Includes some toxic air contaminants. Many aerosol and solid compounds are part of PM_{10}.	Dust- and fume-producing industrial and agricultural operations; combustion smoke; atmospheric chemical reactions; construction and other dust-producing activities; unpaved road dust and re-entrained paved road dust; natural sources (wind-blown dust, ocean spray).	Federal: Unclassified State: Nonattainment
	Annual	20 µg/m^3	-- [2]			
Fine particulate matter ($PM_{2.5}$) [2]	24 hours	--	35 µg/m^3	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and produces surface soiling. Most diesel exhaust particulate matter – a toxic air contaminant – is in the $PM_{2.5}$ size range. Many aerosol and solid compounds are part of $PM_{2.5}$.	Combustion including motor vehicles, other mobile sources, and industrial activities; residential and agricultural burning; also formed through atmospheric chemical (including photochemical) reactions involving other pollutants including NOx, sulfur oxides (SOx), ammonia, and ROG.	Federal: Attainment for annual, Nonattainment for 24 hour State: Nonattainment
	Annual	12 µg/m^3	15.0 µg/m^3			
	24 hours (conformity process [5])	--	65 µg/m^3			
Lead (Pb) [3]	Monthly	1.5 µg/m^3	--	Disturbs gastrointestinal system. Causes anemia, kidney disease, and neuromuscular and neurological dysfunction. Also a toxic air contaminant and water pollutant.	Lead-based industrial processes like battery production and smelters. Lead paint, leaded gasoline. Aerially deposited lead from gasoline may exist in soils along major roads.	Federal: Attainment State: Attainment
	Quarterly	--	1.5 µg/m^3			
	Rolling 3-month average	--	0.15 µg/m^3			

Notes: ppm = parts per million; µg/m^3 = micrograms per cubic meter; ppb=parts per billion (thousand million)

[1] Rounding to an integer value is not allowed for the State 8-hour CO standard. Violation occurs at or above 9.05 ppm. Violation of the Federal standard occurs at 9.5 ppm due to integer rounding.

[2] Annual PM_{10} NAAQS revoked October 2006; was 50 μg/m^3. 24-hr. $PM_{2.5}$ NAAQS tightened October 2006; was 65 μg/m^3. In 9/09 U.S. EPA began reconsidering the $PM_{2.5}$ NAAQS; the 2006 action was partially vacated by a court decision.

[3] The ARB has identified vinyl chloride and the particulate matter fraction of diesel exhaust as toxic air contaminants. Diesel exhaust particulate matter is part of PM_{10} and, in larger proportion, $PM_{2.5}$. Both the ARB and U.S. EPA have identified lead and various organic compounds that are precursors to ozone and $PM_{2.5}$ as toxic air contaminants. There are no exposure criteria for adverse health effect due to toxic air contaminants, and control requirements may apply at ambient concentrations below any criteria levels specified above for these pollutants or the general categories of pollutants to which they belong. Lead NAAQS are not required to be considered in Transportation Conformity analysis.

[4] Prior to 6/2005, the 1-hour NAAQS was 0.12 ppm. The 1-hour NAAQS is still used only in 8-hour ozone early action compact areas, of which there are none in California. However, emission budgets for 1-hour ozone may still be in use in some areas where 8-hour ozone emission budgets have not been developed.

[5] The 65 μg/m^3 $PM_{2.5}$ (24-hr) NAAQS was not revoked when the 35 μg/m^3 NAAQS was promulgated in 2006. Conformity requirements apply for all NAAQS, including revoked NAAQS, until emission budgets for the newer NAAQS are found adequate or SIP amendments for the newer NAAQS are completed.

[6] As of 9/16/09, U.S. EPA is reconsidering the 2008 8-hour ozone NAAQS (0.075 ppm); U.S. EPA is expected to tighten the primary NAAQS to somewhere in the range of 60-70 ppb and to add a secondary NAAQS. U.S. EPA plans to finalize reconsideration and promulgate a revised standard by August 2010.

[7] Final 1-hour NO_2 NAAQS published in the Federal Register on 2/9/2010, effective 3/9/2010. Initial nonattainment area designations should occur in 2012 with conformity requirements effective in 2013. Project-level hot spot analysis requirements, while not yet required for conformity purposes, are expected.

[8] U.S. EPA finalized a 1-hour SO_2 standard of 75 ppb in June 2010.

[9] State standards are "not to exceed" unless stated otherwise. Federal standards are "not to exceed more than once a year" or as noted above.

As shown in **Table 2.3-2**, the SF Air Basin is not in attainment of state or federal standards with respect to Ozone or $PM_{2.5}$. In addition, the SF Air Basin is not in attainment of state standards for PM_{10}.

As discussed in Chapter 1, the project is intended to improve traffic flow on I-80 and would not increase traffic volumes or increase capacity of the freeway. The proposed system management strategies would improve traffic flow and would not result in an increase in vehicle emissions in the I-80 corridor.

The I-80 ICM project is fully funded and included in the approved MTC *Transportation 2035* RTP and the FY 2010/2011 Transportation Improvement Program (TIP). In addition, the TIP identifies the project as being exempt from the requirement to determine regional air quality conformity, as it would provide "traffic control devices and operating assistance other than signalization." These types of improvements are among the list of exempt projects in Table 2 of 40 CFR 93.126. Although the project corridor is located in a non-attainment area for a number of criteria pollutants, the project is exempt from conformity with regional air quality standards in accordance with 40 CFR 93.126. Accordingly, no carbon monoxide or particulate matter hot spot analysis is required.

Mobile Source Air Toxics (MSAT)

In addition to the criteria pollutants, mobile source air toxics (MSAT) are regulated by the EPA in order to meet air quality attainment goals. MSAT are a subset of the 188 hazardous air pollutants identified by the Clean Air Act as harmful to human health. MSATs are emitted into the air as fuel evaporates or passes through engines unburned.

As discussed above, the project is exempt from the requirement to determine regional and project level air quality conformity in accordance with 40 CFR 93.126. Accordingly, the Build Alternative is considered to have no meaningful potential MSAT effects as defined in the *Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents* published by the Federal Highway Administration (FHWA) on September 30, 2009.

Temporary Construction Impacts

During construction, short-term degradation of air quality may occur due to the release of particulate emissions (airborne dust) generated by excavation, grading, hauling, and other activities related to construction. Sources of airborne or fugitive dust would include disturbed soils in the construction areas.

In addition to dust-related emissions, heavy trucks and construction equipment powered by gasoline and diesel engines would generate carbon monoxide, sulfur dioxide, nitrogen oxides, volatile organic compounds, and some soot particulate matter from equipment exhaust emissions. Additional ozone could be formed through chemical reactions derived from nitrogen oxides and volatile organic compounds mixing with sunlight and heat. Emissions from associated construction vehicles or idling equipment could expose individuals in residences and businesses in the vicinity of the project corridor to pollutants in the exhaust.

No-Build Alternative

The No-Build Alternative would avoid implementation of system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards proposed under the Build Alternative. However the Build Alternative would improve traffic and not result in an increase in air pollutant emissions. The No-Build Alternative would avoid the temporary construction air pollutant emissions associated with the Build Alternative.

Global Climate Change

Climate change is analyzed in Section 2.6 under “Climate Change (CEQA)”. Neither EPA nor FHWA has promulgated explicit guidance or methodology to conduct project-level greenhouse gas analysis. As stated on FHWA’s climate change website (http://www.fhwa.dot.gov/hep/climate/index.htm), climate change considerations should be integrated throughout the transportation decision-making process—from planning through project development and delivery. Addressing climate change mitigation and adaptation up front in the planning process would facilitate decision-making and improve efficiency at the program level, and would inform the analysis and stewardship needs of project-level decision-making. Climate change considerations can easily be integrated into many planning factors, such as supporting economic vitality and global efficiency, increasing safety and mobility, enhancing the environment, promoting energy conservation, and improving the quality of life.

Because there have been more requirements set forth in California legislation and executive orders regarding climate change, the issue is addressed in the CEQA chapter of this environmental document and may be used to inform the NEPA decision. The four strategies set forth by FHWA to lessen climate

change impacts do correlate with efforts that the state has undertaken and is undertaking to deal with transportation and climate change. The four strategies include improved transportation system efficiency, cleaner fuels, cleaner vehicles, and reduction in the growth of vehicle hours travelled.

2.3.6.4 Avoidance, Minimization, and/or Mitigation Measures

Most of the construction impacts to air quality are short-term in duration and would not result in adverse or long-term conditions. Implementation of the following measures would avoid or minimize any air quality impacts resulting from construction activities:

- The construction contractor shall comply with the Department's Standard Specifications Section 7-1.01F and Sections 10 and 18 of the Department's Standard Specifications (2006).

  a) Section 7, "Legal Relations and Responsibility," addresses the contractor's responsibility on many items of concern, such as: air pollution; protection of lakes, streams, reservoirs, and other water bodies; use of pesticides; safety; sanitation; and convenience of the public; and damage or injury to any person or property as a result of any construction operation. Section 7-1.01F specifically requires compliance by the contractor with all applicable laws and regulations related to air quality, including air pollution control district and air quality management district regulations and local ordinances.
  b) Section 10 is directed at controlling dust. If dust palliative materials other than water are to be used, material specifications are contained in Section 18.

- BAAQMD has identified the set of feasible PM_{10} control measures for construction activities shown below. When applicable, inclusion of these measures in construction contracts for the proposed project would reduce potential construction-related emissions to less than significant according to the BAAQMD. The Department shall ensure that the contractor requires that the control measures identified below be included in contracts awarded for the construction of the proposed project where applicable.

  a) All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
  b) All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
  c) All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day.
  d) Limit traffic speeds on unpaved roads to 15 miles per hour.
  e) All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be load as soon as possible after grading unless seeding or soil binders are used.
  f) Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to five minutes. Clear signage shall be provided for construction workers at all access points.
  g) All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

h) Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. BAAQMD's phone number shall also be visible to ensure compliance with applicable regulations.

2.3.7 Noise

2.3.7.1 Regulatory Setting

The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) provide the broad basis for analyzing and abating highway traffic noise effects. The intent of these laws is to promote the general welfare and to foster a healthy environment. The requirements for noise analysis and consideration of noise abatement and/or mitigation, however, differ between NEPA and CEQA.

California Environmental Quality Act

CEQA requires a strictly baseline versus build analysis to assess whether a proposed project will have a noise impact. If a proposed project is determined to have a significant noise impact under CEQA, then CEQA dictates that mitigation measures must be incorporated into the proposed project unless such measures are not feasible.

National Environmental Policy Act and 23 CFR 772

For highway transportation projects with FHWA involvement (and the Department, as assigned), the federal-Aid Highway Act of 1970 and the associated implementing regulations (23 CFR 772) govern the analysis and abatement of traffic noise impacts. The regulations require that potential noise impacts in areas of frequent human use be identified during the planning and design of a highway project. The regulations contain noise abatement criteria (NAC) that are used to determine when a noise impact would occur. The NAC differ depending on the type of land use under analysis. For example, the NAC for residences (67 dBA) is lower than the NAC for commercial areas (72 dBA). The following table lists the noise abatement criteria for use in the NEPA-23 CFR 772 analysis.

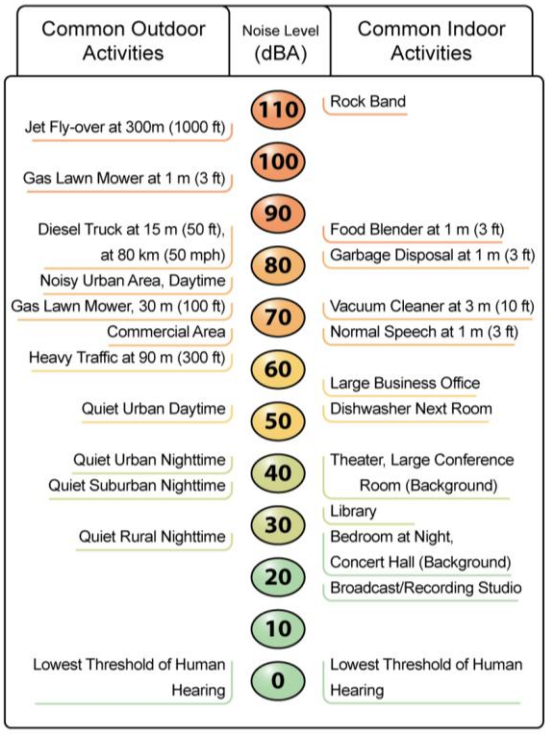
Table 2.3-3: Noise Abatement Criteria

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA L_{eq}(h)	Description of Activities
A	57 Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 Exterior	Picnic areas, recreation areas, playgrounds, active sport areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 Exterior	Developed lands, properties, or activities not included in Categories A or B above.

Activity Category	NAC, Hourly A-Weighted Noise Level, dBA $L_{eq}(h)$	Description of Activities
D	–	Undeveloped lands.
E	52 Interior	Residence, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Table 2.3-4 lists the noise levels of common activities to enable readers to compare the actual and predicted highway noise-levels discussed in this section with common activities.

Table 2.3-4: Noise Levels of Common Activities



In accordance with the Department's *Traffic Noise Analysis Protocol for New Highway Construction and Reconstruction Projects, August 2006*, a noise impact occurs when the project results in a substantial increase in noise level (defined as a 12 dBA or more increase) or when the future noise level with the project approaches or exceeds the NAC. Approaching the NAC is defined as coming within 1 dBA of the NAC.

If it is determined that the project will have noise impacts, then potential abatement measures must be considered. Noise abatement measures that are determined to be reasonable and feasible at the time of final design are incorporated into the project plans and specifications. This document discusses noise abatement measures that would likely be incorporated in the project.

The Department's *Traffic Noise Analysis Protocol* sets forth the criteria for determining when an abatement measure is reasonable and feasible. Feasibility of noise abatement is basically an engineering concern. A minimum 5 dBA reduction in the future noise level must be achieved for an abatement

measure to be considered feasible. Other considerations include topography, access requirements, other noise sources and safety considerations. The reasonableness determination is based on a cost-benefit analysis. Factors used in determining whether a proposed noise abatement measure is reasonable include: residents acceptance, the absolute noise level, build versus existing noise, environmental impacts of abatement, public and local agencies input, newly constructed development versus development pre-dating 1978 and the cost per benefited residence.

2.3.7.2 Affected Environment

The following analysis is based on the Noise Technical Memorandum completed in July 2010 (Department, 2010l).

The existing noise environment throughout the project corridor varies by location, depending on site characteristics such as proximity to I-80, the relative local elevations and terrain, and any intervening structures or barriers. There is a mix of single-family and multi-family residential, commercial, industrial, and agricultural land uses throughout the project corridor. **Figure 2-3** depicts the location of noise sensitive areas within 500 feet of I-80. Category B land uses – in the form of single-family and multi-family residential land uses and open space such as parks and golf courses – border parts of the project corridor.

No noise sensitive land uses are located adjacent to three ramp-widening locations. Land uses in the vicinity of these three ramp areas are commercial, industrial, and/or undeveloped. No other projects with noise-sensitive areas have been planned, designed, and programmed adjacent to these ramp-widening locations. Therefore, there are no receivers that could potentially be exposed to traffic noise impacts from the project, and detailed traffic noise analysis is not required.

Title 23, Part 772 of the Code of Federal Regulations – Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772) defines a Type I project as a "proposed Federal or Federal-aid highway project for the construction of a highway on new location or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through-traffic lanes." The FHWA has defined Type I projects as those that could "include the addition of an interchange, ramp, auxiliary lane, or truck-climbing lane to an existing highway, or the widening of an existing ramp by a full lane for its entire length. As such, the ramp widening improvement areas may be considered Type I. The FHWA noise regulations require noise analyses for all Type I projects.

2.3.7.3 Environmental Consequences

Build Alternative

As discussed in Chapter 1, the project is intended to improve traffic flow on I-80 and would not increase the capacity of the freeway. As such, existing noise levels along the project corridor would not be affected by the operation of the proposed intelligent transportation system equipment. The proposed ramp widening improvement areas are the only components of the Build Alternative that would have the potential to increase noise levels, and may be considered a Type I project under 23 CFR 772. However, there are no noise sensitive land uses in proximity to the three ramp-widening locations (John Muir Parkway on-ramp, the University Avenue westbound loop ramp, and the Ashby Avenue westbound on-

ramp). No proposed projects with noise-sensitive land uses have been planned, designed, or programmed adjacent to the proposed ramp-widening locations of the project. The project is not a Type I project under 23 CFR 772 and therefore, a detailed traffic noise analysis is not required.

Temporary Construction Impacts

The level of noise generated by construction activities would be a function of the type of construction equipment used, duration of the construction phase, and distance between the noise source and receptor. **Table 2.3-5** lists the types of construction equipment that would be used to construct the improvements proposed under the Build Alternative. **Table 2.3-6** shows average construction equipment noise levels at 50 feet from the source. Hand tool noise and electrical work was expected to be negligible in the presence of motorized equipment.

Table 2.3-7 includes the combined construction noise levels that would be generated from the construction/installation of the improvements proposed under the Build Alternative. Noise levels are presented at specified distances from the expected source (i.e., the construction equipment). As shown in this table, noise from the construction equipment generally attenuates at a rate of 6 dBA per doubling of distance from the source.

Table 2.3-5: Types of Construction Equipment and Installation Requirements

Type of Construction/ Installation	Construction Equipment Needed	Daytime Construction (per each installation)	Nighttime Construction (per each installation)	Electrical Work (per each installation)
Adaptive Ramp Metering	Trencher Front-End Loader Concrete Mixing Truck Concrete Pump Water Truck Hand Tools	4 days	None	4 months
HOV Preferential Lanes (non-widening locations)	Striping Machine Stencils Hand Spray Equipment	None	2-3 nights	None
HOV Preferential Lanes (widening locations)	Striping Machine Stencils Hand Spray Equipment Asphalt Paver Roller Backhoe Concrete Cutting Machine Front-End Loader Hydro-Seeding Machine	80 days	None	1 month

Type of Construction/ Installation	Construction Equipment Needed	Daytime Construction (per each installation)	Nighttime Construction (per each installation)	Electrical Work (per each installation)
Standalone Variable Advisory Speed Sign Devices	Backhoe Lift Crane (40-Ton) Concrete Mixing Truck Concrete Pump Water Truck Hand Tools	2 days	None	4 months
Active Traffic Management Gantries (including attached Lane Use Signal signs and Variable Advisory Speed Signs)	CIDH Drill Rig Crane (80-Ton) Concrete Mixing Truck Concrete Pump Backhoe Water Truck Hand Tools	None	6 nights	4 months
Closed-Circuit Television Cameras	CIDH Drill Rig Crane (40-Ton) Concrete Mixing Truck Backhoe Water Truck Hand Tools	5 days	None	4 months
Information Display Boards	CIDH Drill-Rig Backhoe Crane (40-Ton) Concrete Mixing Truck Concrete Pump, Water Truck Hand Tools	3 days	None	4 months

Table 2.3-6: Construction Equipment Noise Levels

Equipment	Average Noise Level at 50’	Equipment	Average Noise Level at 50’
Trencher	80 dBA	Concrete Cutter	78 dBA
Front-End Loader	79 dBA	Hydro-Seeder	75 dBA
Concrete Mixing Truck	85 dBA	Lift	75 dBA
Concrete Pump	85 dBA	Crane (40-Ton)	82 dBA
Water Truck	85 dBA	CIDH Drill Rig	78 dBA
Striping Machine	75 dBA	Crane (80-Ton)	85 dBA
Asphalt Paver	88 dBA	Sawcut Machine	78 dBA
Roller	73 dBA	Sealant Machine	73 dBA
Backhoe	80 dBA		

Table 2.3-7: Combined Construction Noise Levels

Type of Construction/ Installation	Combined Noise Level			
	50 feet	100 feet	200 feet	400 feet
Adaptive Ramp Metering	91 dBA	85 dBA	79 dBA	73 dBA
HOV Preferential Lanes (non-widening)	75 dBA	69 dBA	63 dBA	57 dBA
HOV Preferential Lanes (widening)	90 dBA	84 dBA	78 dBA	72 dBA
Variable Advisory Speed Signs	91 dBA	85 dBA	79 dBA	73 dBA
Gantries	92 dBA	86 dBA	80 dBA	74 dBA
Closed-Circuit Television Cameras	90 dBA	84 dBA	78 dBA	72 dBA
Information Display Boards	91 dBA	85 dBA	79 dBA	73 dBA

During the construction period, some of the noise sensitive locations that are close to I-80 may be exposed to high noise levels. Worst-case noise levels would be expected between the Carlson Boulevard/I-80 interchange and Potrero Avenue, where the installation of the proposed components of the Build Alternative would be approximately 50 feet from single-family residences. Periodic noise levels may be as high as 91 dBA Leq(h) in this area. Avoidance measures below include compliance with the Department's Standard Specifications that require contractors to comply with local regulations and ordinances on sound control and noise levels during construction.

No-Build Alternative

The No-Build Alternative would avoid implementation of system management strategies within the project corridor, including ramp meter signal installations, large gantries, stand-alone variable advisory speed signs and information display boards proposed under the Build Alternative and therefore avoid the noise effects associated with the Build Alternative.

2.3.7.4 Avoidance, Minimization, and/or Mitigation Measures

Noise from project construction activities would be regulated through the Department's Standard Specifications. Section 7-1.101I of the Department's Standard Specifications states that, "…contractors shall comply with all local sound control and noise levels rules, regulations, and ordinances which apply…" and that, "…each internal combustion engine, used for any purpose shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall operate without a muffler."

Section 14-8.02 of the Department's Standard Specifications states that construction noise shall not exceed 86 dBA Leq(h) at 50 feet from the job site activities from 9pm to 6am, and that construction equipment shall use an alternative warning method instead of a sound signal (such as a reverse drive warning buzzer) unless required by safety laws.

CEQA Noise Analysis

As discussed above, the Build Alternative would not result in any adverse noise effects from project operation (i.e., traffic noise impacts). The project would not have a significant noise impact under CEQA.

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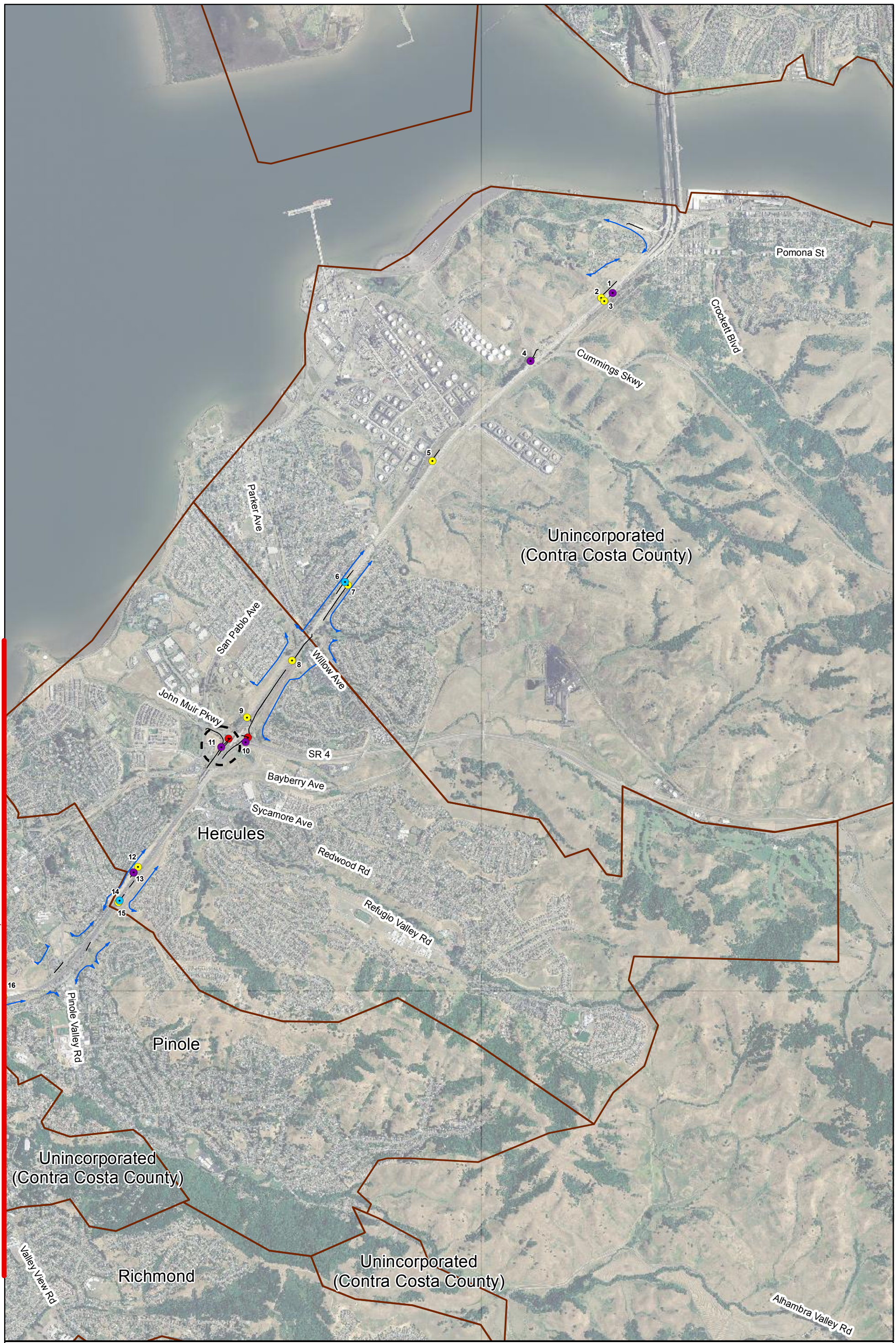


0 500 1,000 2,000 3,000 4,000 Feet

SOURCE: ©2004, Aerial Express Map

SIGN BRIDGE STRUCTURE (GANTRY)

INFORMATION DISPLAY BOARD

VARIABLE ADVISORY SPEED SIGN

VARIABLE MESSAGE SIGN (TYPE 1)

CLOSED CIRCUIT TELEVISION CAMERA

CONDUIT RUN

NOISE SENSITIVE AREAS WITHIN 500 FEET OF PROJECT COMPONENETS

CITY BOUNDARY

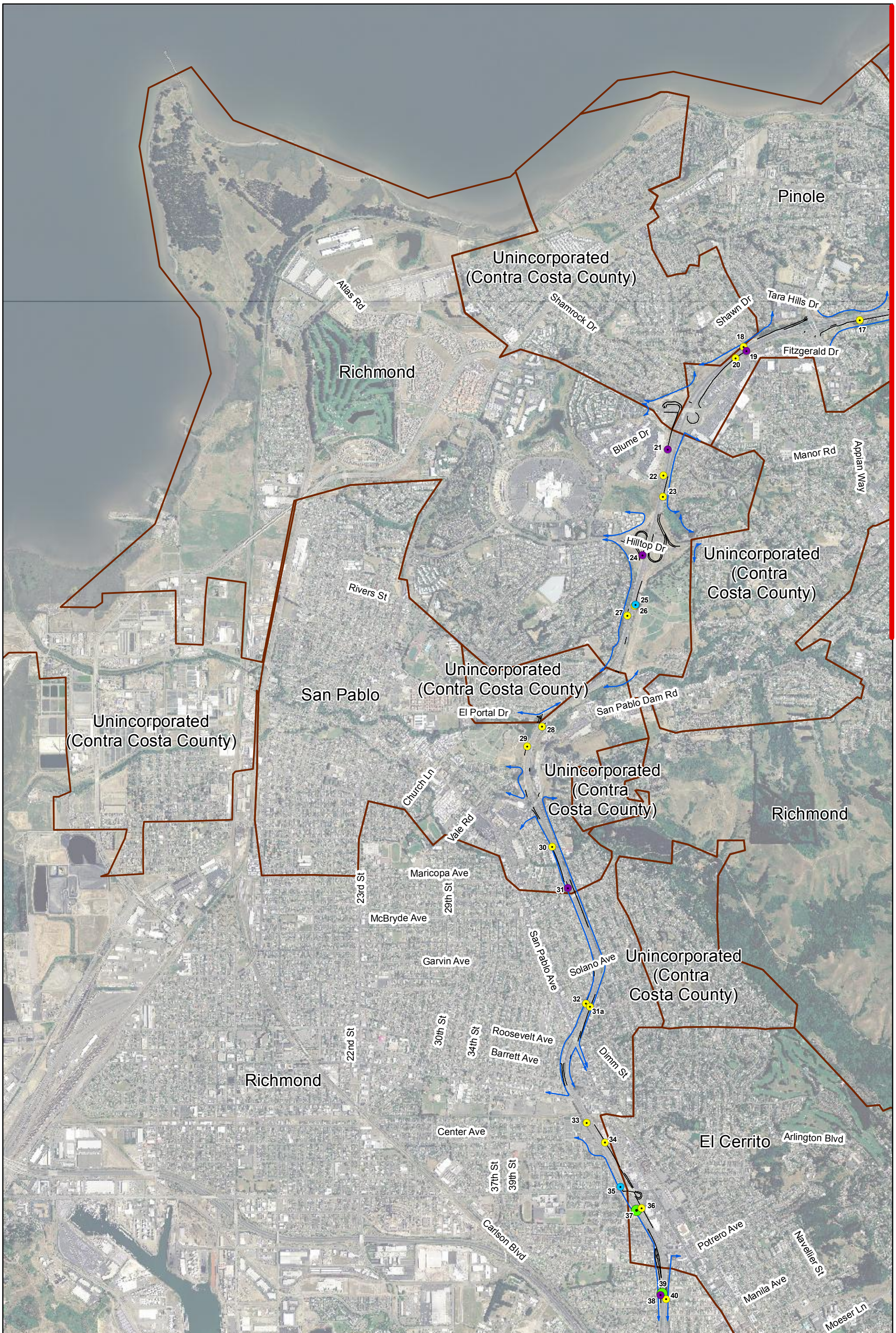
LOCATION OF RAMP WIDENING FOR HOV PREFERENTIAL LANE

Figure 2-3
Sheet 1 of 3

Interstate 80 Integrated Corridor Mobility Project

NOISE SENSITIVE AREAS WITHIN 500 FEET OF PROJECT COMPONENTS

Back of Figure 2-3 (Sheet 1 of 3)



MATCHLINE FIGURE 2-3, Sheet 1

MATCHLINE FIGURE 2-3, Sheet 3

0 500 1,000 2,000 3,000 4,000 Feet

SOURCE: ©2004, Aerial Express Map

SIGN BRIDGE STRUCTURE (GANTRY)

INFORMATION DISPLAY BOARD

VARIABLE ADVISORY SPEED SIGN

VARIABLE MESSAGE SIGN (TYPE 1)

CLOSED CIRCUIT TELEVISION CAMERA

CONDUIT RUN

NOISE SENSITIVE AREAS WITHIN 500 FEET OF PROJECT COMPONENETS

CITY BOUNDARY

LOCATION OF RAMP WIDENING FOR HOV PREFERENTIAL LANE

Figure 2-3
Sheet 2 of 3

Interstate 80 Integrated Corridor Mobility Project

NOISE SENSITIVE AREAS WITHIN 500 FEET OF PROJECT COMPONENTS

Back of Figure 2-3 (Sheet 2 of 3)

MATCHLINE FIGURE 2-3, Sheet 2

SOURCE: ©2004, Aerial Express Map

Figure 2-3
Sheet 3

Interstate 80 Integrated Corridor Mobility Project

NOISE SENSITIVE AREAS WITHIN 500 FEET OF PROJECT COMPONENTS

Back of Figure 2-3 (Sheet 3 of 3)