[ Chapter 4 Continued – Part 4 ]

### Viewpoint 6: Telegraph Avenue and 31st Street

The overall change produced by the proposed project in this viewpoint would be negligible. The project would locate a station with two platforms on Telegraph Avenue, combined with the BRT guideway. These improvements would have the effect of breaking up the expanse of pavement in this area, as shown in Figure 4.6-6. The station would also block the view of the I-580 overpass which would be considered a beneficial effect.

**Table 4.6-9: Summary of Visual Effects from Viewpoint 6**

| Alternative | Visual Dominance of Project | View Obstruction | Community Disruption/ Orientation/ Privacy | Vividness | Intactness | Unity | Overall Visual Quality |
|---|---|---|---|---|---|---|---|
| Change with Proposed Project | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible |

### Viewpoint 7: 20th Street Between Broadway and Telegraph Avenue (Uptown Station)

The proposed project would not have a measurable effect on the overall visual quality of this viewpoint. The Uptown Transit Center, currently in construction, would provide a bus station for Rapid Bus Route 1R and other bus routes at this location. The East Bay BRT Project would make minor improvements to the Center, mainly in the form of passenger amenities, including fare vending.

**Table 4.6-10: Summary of Visual Effects from Viewpoint 7**

| Alternative | Visual Dominance of Project | View Obstruction | Community Disruption/ Orientation/ Privacy | Vividness | Intactness | Unity | Overall Visual Quality |
|---|---|---|---|---|---|---|---|
| Change with Proposed Project | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible | Negligible |

### Viewpoint 8: International Boulevard at 34th Avenue

The proposed project would remove a portion of the existing median and trees on International Boulevard south of 34th Avenue to accommodate a BRT station, as shown in Figure 4.6-8. Removal of the landscaped median and construction of the bus station and related amenities would adversely affect the intactness, unity, and over all visual quality of the view.

**Table 4.6-11: Summary of Visual Effects from Viewpoint 8**

| Alternative | Visual Dominance of Project | View Obstruction | Community Disruption/ Orientation/ Privacy | Vividness | Intactness | Unity | Overall Visual Quality |
|---|---|---|---|---|---|---|---|
| Change with Proposed Project | Adverse | Negligible | Negligible | Adverse | Adverse | Adverse | Adverse |



**Figure 4.6-6: Viewpoint 6–Telegraph Avenue and 31st Street**

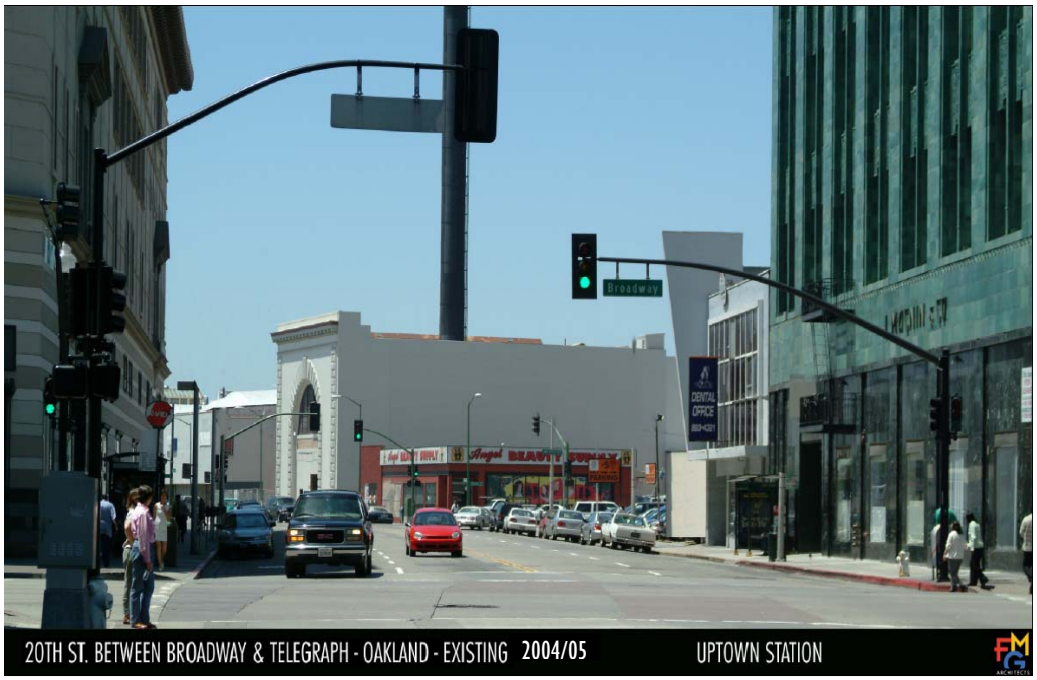



**Figure 4.6-7: Viewpoint 7—20th Street between Broadway and Telegraph Avenue**

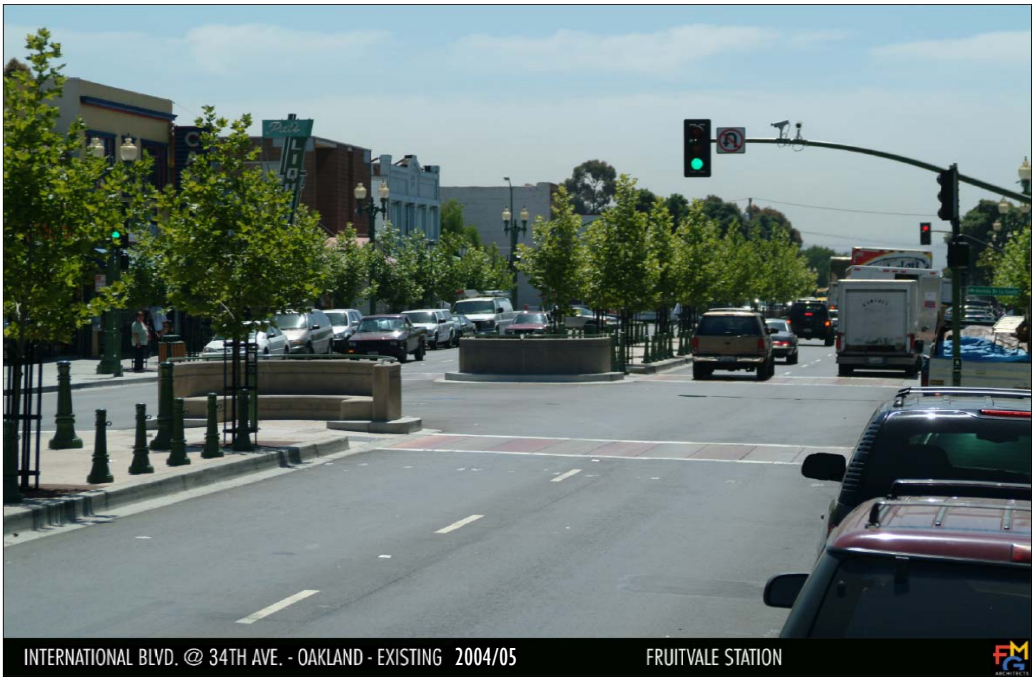



**Figure 4.6-8: Viewpoint 8—International Boulevard at 34th Street**

### Viewpoint 9: International Boulevard at 98th Avenue

The proposed project would have a slightly adverse effect on the overall visual quality of this viewpoint. The existing landscaped median would be removed and replaced with BRT lanes and a station platform, as shown in Figure 4.6-9. In some locations the BRT lanes would be separated from traffic lanes by a raised landscaped median and replacement landscaping, including trees, would be provided where feasible.

**Table 4.6-12: Summary of Visual Effects from Viewpoint 9**

| Alternative | Visual Dominance of Project | View Obstruction | Community Disruption/ Orientation/ Privacy | Vividness | Intactness | Unity | Overall Visual Quality |
|---|---|---|---|---|---|---|---|
| Change with Proposed Project | Slightly Adverse | Slightly Adverse | Negligible | Slightly Adverse | Slightly Adverse | Slightly Adverse | Slightly Adverse |

### Viewpoint 10: East 14th Street Between Davis and Estudillo Streets

Viewpoint 10 applies only to Alternatives 1 and 3, each of which terminates at the BayFair BART station. Alternatives 2 and 4 turn off of East 14th Avenue and onto Davis Street to terminate at the San Leandro BART station.

The proposed project would construct a BRT station on East 14th Street and reconstruct the existing sidewalk. BRT would travel on an outside shared lane and would not have a dedicated bus lane. Reconstruction of the sidewalk would include landscaping, decorative brick pavement, and a fountain, as shown in Figure 4.6-10. These amenities would increase the vividness of the view, but would only have a negligible effect on the intactness, unity and overall visual quality as the main elements of the existing view (mature trees, bus shelter, sidewalk) would not change dramatically.

**Table 4.6-13: Summary of Visual Effects from Viewpoint 10**

| Alternative | Visual Dominance of Project | View Obstruction | Community Disruption/ Orientation/ Privacy | Vividness | Intactness | Unity | Overall Visual Quality |
|---|---|---|---|---|---|---|---|
| Change with Proposed Project | Negligible | Slightly Adverse | Negligible | Slightly Beneficial | Negligible | Negligible | Negligible |

### Viewpoint 11: East 14th Street at 143rd Avenue

Viewpoint 11 applies only to Alternatives 1 and 3, each of which terminates at the BayFair BART station. Alternatives 2 and 4 turn off of East 14th Avenue and onto Davis Street to terminate at the San Leandro BART station.

The proposed project could result in negligible impacts to the overall visual character and quality of the viewpoint, assuming implementation of the city's *East 14th Street South Area Development Strategy*. BRT lanes and platform stations would be constructed in the median of East 14th Street with raised landscaped medians on each side. The landscaped medians would visually improve the

view, as shown in Figure 4.6-11, compared to existing conditions. However, the City of San Leandro has approved a program to improve this area as part of the *East 14th Street South Area Development Strategy*, which would add a landscaped median on East 14th Street through Viewpoint 11. The East Bay BRT Project would replace center median landscaping with side median landscaping (adjacent the BRT transitway) where feasible. The East Bay BRT Project would slightly obstruct views but the overall visual impact would be considered negligible.

**Table 4.6-14: Summary of Visual Effects from Viewpoint 11**

| Alternative | Visual Dominance of Project | View Obstruction | Community Disruption/ Orientation/ Privacy | Vividness | Intactness | Unity | Overall Visual Quality |
|---|---|---|---|---|---|---|---|
| Change with Proposed Project | Negligible | Slightly Adverse | Beneficial | Negligible | Negligible | Negligible | Negligible |

#### 4.6.3.2 CONSISTENCY WITH GENERAL PLAN POLICIES

Tables 4.6-15, 4.6-16 and 4.6-17 present the consistency of the proposed project with relevant scenic/visual plans and policies as set forth in the following documents:

- City of Berkeley General Plan
- Downtown Berkeley Specific Plan
- City of Oakland General Plan, Open Space Conservation and Recreation Element
- City of San Leandro General Plan

In general, the proposed project would result in changes to the existing visual quality and character of the project corridor only in locations where characteristic landscaping or streetscape elements would be removed to accommodate station platforms or the BRT transitway. Potential inconsistencies with relevant plans or policies would occur where the removal of landscaping or streetscape elements would have an adverse impact on the overall visual character of certain locations along the project alignment, particularly in Downtown Berkeley under parking configuration *c. Buffered Angle Parking*, and the Fruitvale and International-Elmhurst Districts in Oakland. (In Downtown Berkeley, project alternatives incorporating *a.Unbuffered Angle Parking* or *b.Unbuffered Parallel Parking* would replace most median landscaping and therefore have only a minor effect on the overall visual character.) In most cases, the inconsistencies determined in Tables 4.6-15, 4.6-16 and 4.6-17 would be cleared at the design review phase prior to project approval. Appropriate mitigation for potential inconsistencies would include wherever possible the replacement of streetscape elements and landscaping, including landscaped medians or sidewalks, crosswalks, and street furniture.



**Figure 4.6-9: Viewpoint 9—International Boulevard at 98th Avenue**

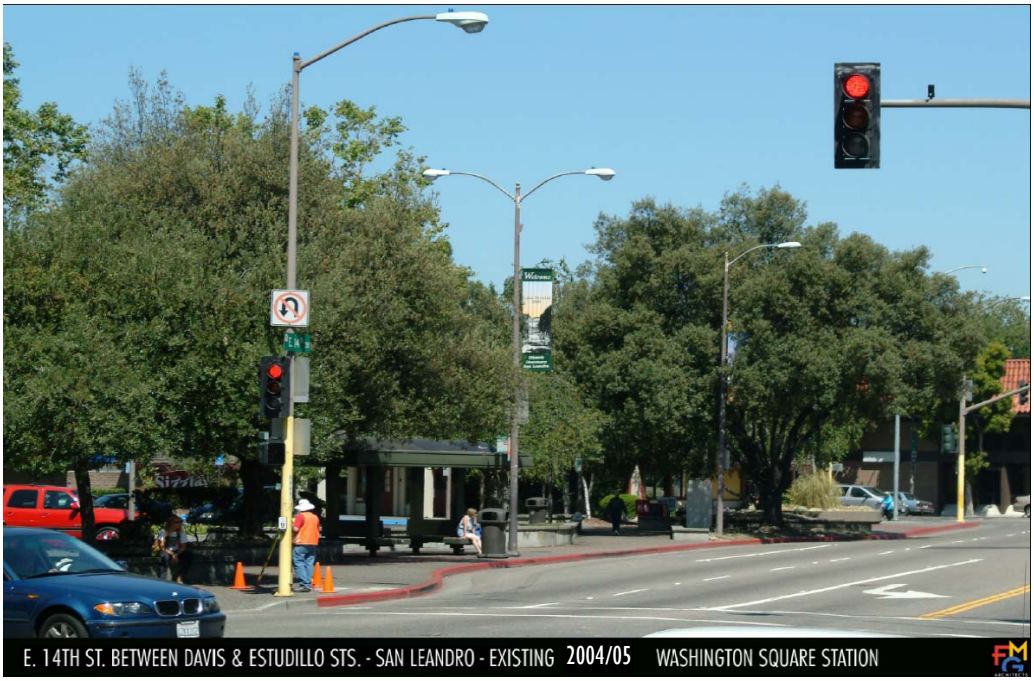



**Figure 4.6-10: Viewpoint 10—East 14th Street between Davis and Estudillo Streets**



**Figure 4.6-11: Viewpoint 11—East 14th Street at 143rd Avenue**

**Table 4.6-15: City of Berkeley Policies**

| Policy | Consistency |
|---|---|
| **City of Berkeley General Plan** | |
| Policy LU-20 Downtown Pedestrian and Transit Orientation<br>Reinforce the pedestrian orientation of the Downtown.<br>Actions:<br>A. Continue to explore options for the partial or complete closure of Center Street, Addison Street or Allston Way to automobiles to promote the pedestrian and commercial vitality and enhance Civic Center Park use and appearance. When exploring options, carefully consider the experiences of other cities where closures have proven to be successful and where closures have proven to be unsuccessful or detrimental.<br>B. Continue to explore costs and plans for the daylighting of Strawberry Creek. (Also see Environmental Management Policy EM-27.)<br>C. Implement capital improvement projects that reinforce the pedestrian, transit, commercial, arts, and entertainment orientation of the Downtown and improve the quality of life for visitors and residents of the area.<br>D. Reconstruct the Downtown BART Station and Plaza to be more pedestrian-friendly and visually attractive.<br>E. Encourage development of public spaces, plazas, and restoration of natural areas in the Downtown and other areas of the city where appropriate to enhance the pedestrian environment. | **Consistent.** The project would include the addition of BRT platforms, pedestrian facilities and streetscape elements such as planter boxes, light posts, and banners at stations in important neighborhoods (i.e. Sather Gate Station in Berkeley) that would enhance the pedestrian-friendly character of these locations. |
| Policy UD-5 Architectural Features<br>Encourage, and where appropriate require, retention of ornaments and other architecturally interesting features in the course of seismic retrofit and other rehabilitation work.<br>Action:<br>A. Use design review and establish new effective means to protect architectural features and ornaments that have historical value or visual interest. | **Consistent.** Urban Design Guidelines for the project have been developed in consultation with the City of Berkeley. |
| Policy UD-19 Visually Heterogeneous Areas<br>In areas that are now visually heterogeneous, a project should be responsive to the best design elements of the area or neighborhood. | **Consistent.** The station platforms would not detract from the overall visual character of any of the landscape units within the project area, as the stations would be one story in height and would not be solid structures. |
| Policy UD-8 Public Works Projects<br>In public works projects, seek to preserve desirable historic elements such as ornamental sidewalk features, lampposts, and benches.<br>Actions:<br>A. Carefully review planned utility undergrounding, sidewalk repair, and other public works projects to avoid unnecessary removal of light fixtures, planting, and other features with historic or aesthetic value.<br>B. Establish procedures for the review of work by PG&E, EBMUD, and other agencies responsible for work in the public right-of-way.<br>C. Provide for review by the Landmarks Preservation Commission of public works projects involving potential change to desirable historic elements. | **Potentially Inconsistent.** The project would involve the removal of some streetscape elements, and possibly some historic streetscape elements. |

**Table 4.6-15: City of Berkeley Policies**

| Policy | Consistency |
|---|---|
| **Historic Preservation and Urban Design Element** | |
| Objective 1:<br>Provide continuity between the old and the new in the built environment. Retain the scale and the unique character of the downtown. | **Consistent.** The proposed project would introduce various station platforms and bus shelters that would be one-story in height and would not detract from the scale and character of the neighboring buildings downtown. |
| Policy DT-9<br>Create a visually cohesive district, which retains its early 20th century characteristics. | **Consistent.** Urban Design Guidelines for the project have been developed in consultation with the City of Berkeley. |
| Objective 3:<br>Improve the visual and environmental quality of the downtown, with an emphasis on the pedestrian environment. | **Consistent.** Urban Design Guidelines for the project have been developed in consultation with the City of Berkeley. |
| Policy DT-11<br>Develop a detailed streetscape plan. Create plazas and other urban spaces as identified in the Downtown Public Improvements Plan (1997), to enhance the pedestrian environment and increase the number of people who will use downtown. Enhance sidewalks and streetscapes to reflect the scale and early 20th century historic quality of downtown architecture. | **Consistent.** Urban Design Guidelines for the project have been developed in consultation with the City of Berkeley. |
| Policy DT-12<br>As part of private and public development and renovation projects, attempt to maximize green spaces, natural surfaces, plants and streetscaping in the development plans. | **Potentially Inconsistent.** Some options in the proposed project would decrease the amount of landscaped area within the project area. The removal of mature vegetation without replacing it would be inconsistent with this policy of maximizing green spaces and streetscaping. Appropriate mitigation is discussed in Section 4.6.4, Avoidance, Minimization and/or Mitigation Measures. |
| Policy DT-17<br>Development along the Oxford edge should incorporate open spaces to provide a transition between the Oxford edge and the more dense areas of the downtown. Maintain visual openness along Oxford Street. | **Potentially Inconsistent.** The proposed project would require the removal of some median strips with mature vegetation. The removal of these medians would make the transition from the UC Berkeley open space to the Downtown Berkeley/Shattuck Avenue corridor area more distinct, and would decrease the overall visual continuity of the Oxford/Fulton Street environment. Mitigation measures as described in Section 4.6.4 Avoidance, Minimization and/or Mitigation Measures would reduce potential impacts. |

**Table 4.6-15: City of Berkeley Policies**

| Policy | Consistency |
|---|---|
| Policy DT-34<br>Provide a variety of outdoor spaces for pedestrians, particularly gathering spaces. | **Consistent.** The project would include the addition of some streetscape elements, including wider sidewalks and pedestrian gathering areas near some significant stations (such as the Sather Gate station). |
| **Downtown Berkeley Design Guidelines**<br>Historic Preservation and Urban Design Element of the Berkeley Downtown Plan | |
| Open Spaces − Views of the hills and bay from Downtown locations provide a visual connection between natural and manmade environments. Inviting open spaces should be provided throughout the Downtown in order to reinforce this connection. These spaces should be suitably scaled to their surroundings, and sited in locations which reinforce rather than disrupt pedestrian flow. The most successful open spaces are those which are strongly defined by building forms and/or landscaping, and designed to encourage public use. | **Consistent.** The project would include the construction of one-story bus shelters that would not substantially obscure views of the distant hills. |
| All Buildings − 1. Preserve views of the hills and bay from Downtown. | **Consistent.** The project would include the construction of one-story bus shelters that would not substantially obscure views of the distant hills. |
| Important Vistas 0 1. Preserve important vistas within the downtown area. Important vistas include: University Avenue in both directions; streets with views of the hills to the east; the west termination of Center Street; the east and west termination of Kittredge Street; and the portion of Shattuck Avenue that terminates at University Avenue. | **Consistent.** The BRT corridor would not adversely affect the scenic vista along Telegraph Avenue looking north toward the UC campus and distant hills. |

Source: *Visual Impact Assessment for the AC Transit Berkeley-Oakland-San Leandro Corridor Bus Rapid Transit (BRT) Project Technical Memorandum*, CirclePoint, July 2005. CirclePoint, 2005

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**Table 4.6-16: City of Oakland Policies**

| Policy | Consistency |
|---|---|
| **City of Oakland General Plan** | |
| Policy D2.1 Enhancing the Downtown<br>Downtown should be visually interesting, harmonize with its surroundings, respect and enhance important views in and of the downtown, respect the character, history, and pedestrian-orientation of the downtown, and contribute to an attractive skyline. | **Consistent.** The project would not substantially affect the visual character of areas with distinct historic resources or historic character. The platforms would be one story in height, and would not substantially affect the visual quality of the skyline in the project area. |
| **Open Space Conservation and Recreation (OSCAR)** | |
| Action OS-10.2.1: Visual Analysis for New Development<br>On an on-going basis, the Office of Planning and Building will require visual analysis for new developments which could significantly impact views and vistas. | **Consistent.** Urban Design Guidelines for the project have been developed in consultation with the City of Oakland. |
| Policy OS 10-3: Underutilized Visual Resources<br>Enhance Oakland's underutilized visual resources, including the waterfront, creeks, San Leandro Bay, architecturally significant buildings or landmarks, and major thoroughfares. | **Potentially Inconsistent.** The project would result in the removal of some streetscape elements such as landscaping, median strips, lightposts, and banner posts, especially in the Fruitvale area along International Boulevard. The replacement of displaced streetscape elements and redesign of the median would mitigate any adverse effects. |
| Policy T6.2 Improving Streetscapes<br>The City should make major efforts to improve the visual quality of streetscapes. Design of the streetscape, particularly in neighborhoods and commercial centers, should be pedestrian oriented, include lighting, directional signs, trees, benches, and other support facilities. | See above. |
| Policy D2.1 Enhancing the Downtown<br>Downtown development should be visually interesting, harmonize with its surroundings, respect and enhance important views in and out of the downtown, respect the character, history, and pedestrian orientation of the downtown, and contribute to an overall attractive skyline. | **Consistent.** The project would not substantially affect the visual character of areas with distinct historic resources or historic character, as the stations would not be solid structures and would not be large enough to substantially detract from the visual quality of any historic or visually interesting areas. The platforms would be one story in height, and would not have a major adverse impact on the visual quality of the skyline. |

Source: *Visual Impact Assessment for the AC Transit Berkeley-Oakland-San Leandro Corridor Bus Rapid Transit (BRT) Project Technical Memorandum*, CirclePoint, July 2005. CirclePoint, 2005

**Table 4.6-17: City of San Leandro Policies**

| Policy | Consistency |
|---|---|
| **San Leandro General Plan** | |
| 8.03 AESTHETICS<br>Upgrade the City's commercial corridors by building upon their existing strengths and improving their aesthetic qualities. The City should implement programs to underground utilities, abate weeds and graffiti, eliminate litter, improve buffers to adjacent residential uses, control excessive signage, and provide streetscape amenities and landscaping along the corridors. | **Consistent** - Throughout the landscape units in San Leandro, the visual character is maintained, particularly in the Downtown area where little roadwork will occur as there will be no dedicated BRT lane. |
| Action 42.01-B: Neighborhood Gateways<br>Expand the neighborhood gateway sign program and explore funding sources, potential sites, and potential designs for additional gateway signs. | **Potentially Inconsistent.** The project would involve the relocation of some streetscape elements, such as the San Leandro entry gate at the Oakland border under Alternatives 1 and 3. Design mitigation is proposed to maintain the gateway by including a landscaped median in the transitway north of Broadmoor Boulevard. East 14th Street would be widened by approximately one foot along each curb. As a result, the mitigated project would not be inconsistent with this action. |
| Goal: A More Visually Attractive City<br>Create a more visually attractive City, with well-landscaped and maintained streets, open spaces, and gathering places. | **Consistent** - Within the City of San Leandro, where dedicated bus lanes are proposed, landscaping is also included. |
| 44.01 GREENING SAN LEANDRO<br>Promote landscaping, tree planting, and tree preservation along San Leandro streets as a means of improving aesthetics, making neighborhoods more pedestrian-friendly, providing environmental benefits, and creating or maintaining a park-like setting. | **Consistent** - Mature landscaping will be preserved in San Leandro and landscaping will be included in several areas along the route. |
| 44.03 TREE REMOVAL AND REPLACEMENT<br>Discourage the removal of healthy trees and require replacements for any trees that are removed from street rights-of-way. Where healthy trees must be removed, consider their relocation to other suitable sites instead of their disposal. Encourage the preservation and proper care of mature trees throughout the City, particularly those which may have historic importance or contribute substantially to neighborhood character. | **Consistent** - Mature landscaping will be preserved in San Leandro and landscaping will be included in several areas along the route. |
| 44.05 STREET BEAUTIFICATION<br>Upgrade the City's commercial thoroughfares by building upon their existing strengths and improving their aesthetic qualities. The City should implement programs to underground utilities, abate weeds and graffiti, eliminate litter, improve buffers to adjacent residential uses, prohibit excessive or out-of-scale signage, remove billboards, and provide streetscape amenities and landscaping along these thoroughfares. | **Consistent** - Throughout the landscape units in San Leandro, the visual character is maintained, particularly in the Downtown area where little roadwork will occur as there will be no dedicated BRT lane. |
| Policy 3.10 - Consider the introduction of a raised, tree-lined median at the center of East 14th Street south of San Leandro Blvd. (Southern Downtown and McKinley Residential Districts excluded). | **Consistent** - The portion of the project on East 14th Street, south of San Leandro Boulevard would include a dedicated bus lane and landscaping. |

Source: *Visual Impact Assessment for the AC Transit Berkeley-Oakland-San Leandro Corridor Bus Rapid Transit (BRT) Project Technical Memorandum*, CirclePoint, July 2005. CirclePoint, 2005

#### 4.6.3.3 REMOVAL/RELOCATION OF ROADWAY LANDSCAPING AND OTHER URBAN DESIGN FEATURES

Areas of existing and proposed (by others) in-street landscaping along the BRT alignment are identified in Table 4.6-3. The proposed East Bay BRT Project would remove or relocate landscaping and other urban design treatments in several locations within the areas listed below:

- Shattuck Avenue, Berkeley
- Telegraph Avenue, Berkeley
- Telegraph Avenue, Oakland
- International Boulevard, Oakland
- East 14th Street, San Leandro

Minor median treatments for channeling traffic, such as along Telegraph Avenue in South Berkeley and North Oakland, would not be replaced. The proposed project would include substantial landscape improvements that would replace the landscaped features removed in all but two locations. The locations where landscaping would not be replaced are:

- Shattuck Avenue between Allston Way and Bancroft Avenue in Berkeley. Median landscaping would not be provided by the East Bay BRT Project under Build Alternatives that incorporate parking configuration "c", which retains buffered angled parking along the east and west curbs of Shattuck Avenue. The existing landscaped median in Shattuck Avenue would be removed. (Replacement landscaping in the median of Shattuck Avenue, alongside the proposed BRT transitway, would be provided under Build Alternatives that incorporate parking configuration *a.Unbuffered Angle Parking* or *b.Unbuffered Parallel Parking.* See Chapter 2, Section 2.2.3.1, for additional information on Shattuck Avenue parking configurations.)
- East 14th Street median landscaping between Bristol Boulevard and Broadmoor Boulevard in San Leandro. The median would not be replaced under Alternatives 1 and 3 except in the vicinity of the City of San Leandro monument just north of Broadmoor Boulevard. The project proposes to avoid moving the monument by designing the BRT transitway to go around the monument (see Section 4.6.4). Existing landscaping would not be affected by Alternatives 2 and 4.

At both of these locations there is insufficient roadway width to provide, in the same section, traffic lanes, the BRT transitway, and landscape improvements. Roadway widening and right-of-way acquisition would be necessary but are not considered practicable. Therefore, landscaping cannot be replaced.


**Figure 4.6-12: San Leandro Monument**

Overall, the total area of landscaping to be provided as part of the project would be substantially larger than the total area removed. One of the design objectives of the East Bay BRT Project is to enhance the attractiveness of the street section, making it more appealing to users and local businesses and residents.

In addition to the removal and replacement of landscaping, the proposed project would require the relocation of one art structure:

- A public art structure at the Shattuck Square sidewalk along Shattuck Avenue (southbound) would be removed and relocated to another site designated by the City of Berkeley.

### 4.6.4 Avoidance, Minimization and/or Mitigation Measures

The East Bay BRT Project would be designed with streetscape elements similar to those being removed, including decorated medians and landscaping, to maintain the existing visual character. Additionally, all stations and related amenities would be designed in coordination with the cities of Berkeley, Oakland and San Leandro. It is anticipated that city guidelines would include requirements and limitations on height, bulk, setback, landscaping and character. Compliance with these guidelines would help to ensure the visual character and quality of the corridor is not adversely affected.

The project design would be modified to avoid removing the city of San Leandro monument at Broadmoor Street. A short landscaped area that includes the monument would be located in the median of the transitway (i.e. between the southbound and northbound BRT lanes). This would require widening the street slightly, by approximately two feet. No further mitigation of landscaping impacts is proposed beyond the treatments that would be included in the basic design of the East Bay BRT Project.

## 4.7 Cultural Resources

### 4.7.1 Regulatory Setting

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to take into account the effects of their activities and programs on historic properties. Section 110 of the Act lays out affirmative agency responsibilities with respect to historic properties and establishes the National Register of Historic Places (NRHP) for identifying and listing historic properties of importance to the nation, the states, and local communities.

Guidelines for implementing Section 106 requirements are promulgated by the Advisory Council on Historic Preservation (ACHP) in "Protection of Historic Properties" (36 CFR Part 800). These guidelines require agencies to comply also with other federal laws related to historic preservation, including the National Environmental Policy Act of 1969; the Archaeological and Historic Preservation Act of 1979; and Executive Order 11593 (1971), addressing "Protection and Enhancement of the Cultural Environment." Other agency-specific legislation requires consideration of the impacts of federal actions on cultural resources. Transportation projects must comply with the provisions of Section 4(f) of the Department of Transportation (DOT) Act of 1966.

23 CFR Part 771.135 of the DOT Regulations implementing NEPA (citing Title 49 of the United States Code, Part 303) states that the Administration may not approve the use of land from a significant publicly owned public park, recreation area, or wildlife and waterfowl refuge, or any significant historic site unless there is no feasible and prudent alternative to the use of land from the

property and the action includes all possible planning to minimize harm to the property resulting from such use. This provision is commonly termed, "Section 4(f)."

The State of California references cultural resources in the California Environmental Quality Act (CEQA—Public Resources Code (PRC) Division 13, Sections 21000-21178); archaeological and historical resources are specifically treated under Sections 21083.2 and 21084.1, respectively. California PRC 5020.1 through 5024.6 (effective 1992) creates the California Register of Historical Resources (CRHR) and sets forth requirements for protection of historic cultural resources.

City-designated structures and districts are presumed historic resources under the California Environmental Quality Act (CEQA) as they are on a local register. In addition, resources listed or determined eligible for listing in the CRHR or in the NRHP are also considered historic resources under CEQA.

## 4.7.2 Archaeological Resources

### 4.7.2.1 AFFECTED ENVIRONMENT

#### Archaeological Area of Potential Effects

An Area of Potential Effects (APE) for archaeological resources was delineated by FTA in consultation with the State Historic Preservation Officer (SHPO). This APE was defined as the extent of proposed construction for the project — that is, the project "footprint" or Area of Direct Impact.

#### Research

An archaeological field survey was conducted on November 18, 22, and 26, and December 2, 2004. During the archaeological survey, both sides of the entire length of the proposed project alignment and alignment variations were inspected. Sources at the Bancroft, Anthropology, and Map Libraries, the Archaeological Research Facility, and the Phoebe Hearst Museum at the University of California, Berkeley were consulted for background historical, archaeological, and anthropological information. In addition original records for sites recorded by U.C. Berkeley archaeologists in the 1940s and 1950s were reviewed at the Hearst Museum. An archaeological record search was also conducted in November 2004 at the Northwest Information Center of the California Historic Research Information System, Sonoma State University, Rohnert Park. A report of archaeological sites and studies within one-half mile of the project area was requested. The National Register of Historic Places, the California Inventory of Historic Resources, and the California Historic Landmarks lists were also consulted.

#### Native American Consultation

In November 2004, a letter was sent to the Native American Heritage Commission (NAHC) and to eight Native American contacts from a list supplied by the NAHC. The letter solicited information and concerns about Native American cultural resources within the project area. (Copies of these letters are in Appendix G, Correspondence.) Only Andrew Galvan of the Ohlone Indian Tribe replied by telephone. He knew of no resources in the specific project area. Follow-up calls were made to the other seven contacts in July 2005. Ella Rodriguez requested further information, which was sent to

her on July 19, 2005. The remaining contacts were not reachable by listed phone numbers or had no further comment on the project.

**Recorded Resources**

One report was on file at the Northwest Information Center for a prehistoric Indian burial that is immediately adjacent to the APE in Berkeley. This site is covered by commercial buildings, and no cultural materials were observed. Three more prehistoric sites were recorded 0.5 mile from the project area in Berkeley.

Six archaeological sites have been recorded in or immediately adjacent to the project alignment in the Downtown Oakland area. These include a human burial and a large animal tooth; a sandy midden with some shell, a skull, and a mortar; a well, a sewer line, a privy, a pit feature, and two mortared brick foundations associated with a building erected in 1900 (evaluated and judged not eligible for the National Register); elements of the old urban railroad system; and an abandoned concrete masonry manhole.

At least six other archaeological sites are recorded within a half-mile of the project corridor in Downtown Oakland. None appear to be close enough to be affected by the project. Note also that in the early 1880s two early Oakland cemeteries were reported to be located not far from the project area. No archaeological sites were recorded in the southern half of the project area. None should be affected by this project.

#### 4.7.2.2 ENVIRONMENTAL CONSEQUENCES

The project corridor passes through areas that are highly sensitive for archaeological resources. These areas are under highly built environments with little open space in or adjacent to the proposed BRT alignment. The project would be constructed largely on the surface of existing streets and sidewalks with little disturbance of existing pavement; therefore, the potential for impacts to archaeological resources would be low.

#### 4.7.2.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Although the likelihood of impacts is low, precautions would be taken to reduce the potential for shallow construction activities to affect archaeological sites. The highly built environment makes testing for buried resources impractical. Therefore, an archaeologist would monitor any construction work within the project alignment in sensitive locations identified in the *Site Treatment Plan for the Alameda–Contra Costa Transit District's East Bay Rapid Transit Project in Berkeley, Oakland, and San Leandro* (Archaeological/Historical Consultants, January 2005). If buried cultural materials (either prehistoric or historic) are encountered during construction, work would stop and measures would be taken as specified in Section 4.16.6, Construction Impacts – Cultural Resources, of this EIS/EIR.

## 4.7.3 Historic Resources

### 4.7.3.1 AFFECTED ENVIRONMENT

The APE for historic architectural resources was delineated by FTA and AC Transit in consultation with the State Historic Preservation Officer (SHPO). The APE was defined to take into account the two categories of potential impacts associated with the various project components: those involving minor changes to city streets within the existing curb-lines and those that propose construction of BRT stations, alterations to existing sidewalks and curb-lines, or construction of new traffic signals at selected intersections. The boundary of the APE was established at the existing curb-line wherever the project would be completely confined within the existing curb-line of a major thoroughfare and restricted to re-striping or minor construction of traffic control hardscape (i.e., median separation curbing, left turn curbing and cut-outs, etc.). The APE has been expanded beyond the existing curb-line to include parcels adjacent to the proposed work at all proposed BRT stations, even those completely within the existing curb-lines, because their construction would affect the over-all streetscape in each location, and may have the potential to obstruct the view of historic resources at their locations. In downtown locations of Berkeley or Oakland the APE was set to take in parcels on both sides of the street at BRT station locations to account for the streetscape. In mixed residential/commercial areas (such as along Telegraph Avenue or along International Boulevard) the APE was set to take in parcels on the side of the street where the BRT station is to be located. Finally, any area in which the existing curb-line would be altered was included in this category, owing to the potential for indirect visual effects on historic resources. The architectural APE encompasses 441 buildings, groups of buildings, structures or objects, of which 339 contain resources constructed in or before 1960. These 339 resources make up the known historic-era resources, or "survey population," for this project. The inventory and evaluation efforts conducted for this project address each resource of the survey population by applying the appropriate National Register and California Register evaluation criteria. Although resources evaluated for these programs are usually 50 years old or older, this survey includes all resources within the APE that are 45 years old or older as of 2005 to account for the passage of time between the period of project review and project completion. The remaining 102 properties contained only buildings, structures or objects that were constructed in or after 1961 and were not subject to evaluation. The APE also included 51 properties that were vacant at the time of the survey. These non-historic and vacant parcels required no further study.

A Historic Property Survey Report (HPSR) that identifies and summarizes eligible and cultural resources within the area was submitted to the SHPO on December 12, 2005. Although the APE contains properties that are eligible for the National Register, these properties would not be affected by the project. The SHPO concurred with this determination on March 15, 2006. A copy of the SHPO's letter with these findings is provided in Appendix D, Agency Correspondence.

### 4.7.3.2 ENVIRONMENTAL CONSEQUENCES

None of the Build Alternatives under the East Bay BRT Project propose the physical destruction or alteration of any historic property; thus, there are no direct effects on any of the historic properties within the proposed project. There are no cumulative impacts (i.e. no known past, present, or future

projects that, together with this undertaking, would affect historic properties within the APE). Under indirect effects, the proposed project would not result in auditory, vibration, or neglect of historic properties. There would be indirect effects in that platforms, medians, landscaping, and traffic signals would be visible from historic properties and, therefore, would change the setting at each location. As these historic properties are located in a dense, urban setting, these indirect effects would not substantially alter the features of the properties eligible for listing in the NRHP and/or CRHR, and there would be no adverse effect under this criterion.

#### 4.7.3.3 AVOIDANCE, MINIMIZATION, AND/OR MITIGATION MEASURES

Because the proposed project would have no adverse impact on historic architectural resources, no mitigation is necessary.

## 4.8 Hydrology and Floodplain

This section summarizes the regulatory setting; affected environment; environmental consequences; and measures to avoid, mitigate, or compensate for long-term, permanent impacts to hydrologic resources and floodplains as a result of the proposed project. Construction-phase impacts and avoidance measures are presented in Section 4.16.7. Documents reviewed in support of this study include the *East Bay Bus Rapid Transit Project for the Alameda Contra Costa Transit District Water Quality, Hydrology, and Floodplain Technical Memorandum* (Parsons, 2005).

### 4.8.1 Regulatory Setting

Executive Order 11988 (Floodplain Management) directs all federal agencies to refrain from conducting, supporting, or allowing actions in floodplains unless there is no other practicable alternative. The Federal Highway Administration requirements for compliance are outlined in 23 CFR 650, Subpart A.

### 4.8.2 Affected Environment

Hydrologic studies were done for the various drainages within the project area. The results are summarized below.

#### 4.8.2.1 STRAWBERRY, DERBY AND TEMESCAL CREEKS

Strawberry, Derby and Temescal Creeks are located in the north project area. In each case, construction should minimally impact these drainages. Since the area has been fully developed, little to no change to the impervious area is anticipated and no construction is anticipated within the water courses in this area.

#### 4.8.2.2 MERRITT CHANNEL

The Merritt Channel is a tidal channel that conducts flow from Lake Merritt directly to San Francisco Bay. It is considered a flood channel by the Federal Emergency Management Agency (FEMA) and is listed as Floodplain Zone A1 in the Flood Insurance Rate Map (FIRM) panel 065048-0015B (1992). No adverse impacts or encroachments to the floodplain are anticipated as a result of the proposed project.

#### 4.8.2.3 14TH AVENUE, SAUSAL, PERALTA, ARROYO VIEJO AND ELMHURST CREEKS

The 14th Avenue, Sausal, Peralta, Arroyo Viejo and Elmhurst creeks are located in the central portion of the project area within the city of Oakland. Since the area has been fully developed, little to no change to the impervious area is anticipated due to this project in this vicinity, and no construction is anticipated within the water courses.

#### 4.8.2.4 SAN LEANDRO CREEK AND ESTUDILLO CANAL

The San Leandro Creek and Estudillo Canal are located in the southern portion of the project area within the City of San Leandro. Since the project in this area would primarily utilize the median for additional traveled ways, no widening of the structure over San Leandro Creek is anticipated. Therefore, no impact to flood flows in this channel is anticipated. The Estudillo Canal, which routes storm drain and surface runoff westerly toward the bay, is located at the southernmost portion of corridor for Alternative 1 and Alternative 3, which would extend BRT service to BayFair BART. Alternative 2 and Alternative 4 terminate north of the canal area. Alternatives 1 and 3 would be utilizing a previously paved area adjacent to the canal and would have little to no impact on the canal itself or the floodplain since little to no grading and no increase in impervious area are anticipated.

### 4.8.3 Environmental Consequences

No significant encroachments or impacts to the floodplain are anticipated as a result of the proposed project; therefore, no mitigation measures are proposed.

## 4.9 Water Quality and Storm Water Runoff

This section summarizes the regulatory setting; affected environment; impacts; and measures to avoid, mitigate, or compensate for impacts to water quality as a result of the proposed project. Documents reviewed in support of this study include the *East Bay Bus Rapid Transit Project for the Alameda Contra Costa Transit District Water Quality, Hydrology, and Floodplain Technical Memorandum* (Parsons, 2005).

### 4.9.1 Regulatory Setting

The primary federal law regulating water quality is the Clean Water Act. Section 401 of the Act requires a water quality certification from the State or Regional Water Resources Control Board when a project: 1) requires a federal license or permit, and 2) would result in a discharge to waters of the United States. Section 402 of the Clean Water Act establishes the National Pollutant Discharge Elimination System (NPDES) permit system for the discharge of any pollutant (except dredge or fill material) into waters of the United States. To ensure compliance with Section 402, the State Water Resources Control Board has developed an NPDES Statewide Storm Water Permit to regulation storm water and non-storm water discharges both during and after construction.

## 4.9.2 Affected Environment

### 4.9.2.1 HYDROLOGIC SETTING

The north section of the project, within the cities of Berkeley and Oakland, crosses various storm drain systems that convey flows from three water bodies: Strawberry Creek, Derby Creek, and Temescal Creek. The central section of the project, within the city of Oakland, crosses the Merritt Channel, 14th Avenue Creek Culvert, Sausal Creek Culvert, Peralta Creek Culvert, Seminary Avenue Drain, Arroyo Viejo Creek, and Elmhurst Creek Culvert. The south portion of the project, within the city of San Leandro, crosses San Leandro Creek and terminates immediately north of the Estudillo Canal. More information on these watercourses appears in Section 4.8, Hydrology and Floodplain.

Most of the water courses have been covered to well outside the project construction limits, with the exception of San Leandro Creek, the Lake Merritt Channel, Arroyo Viejo Creek, and the Estudillo Canal. None of these four water courses is anticipated to be affected by project construction. Therefore, the project should not require a Section 401 Water Quality Certification, a Section 404 Permit (required for any placement of fill within the federal waters), or 1601 Streambed Alteration Agreement (required if the project includes any alterations within the streambeds).

### 4.9.2.2 REGIONAL WATER QUALITY

The project corridor is part of the *1995 Water Quality Control Plan for the San Francisco Bay Basin* set forth by the San Francisco Bay Regional Water Quality Control Board (RWQCB). The north segment of the project corridor falls within the Central Basin Hydrologic Planning Area while the central and south segments of the project corridor fall within the South Bay Basin Hydrologic Planning Area. The only inland surface water crossing the project alignment that maintains any beneficial use is the Lower San Leandro Creek, used for freshwater replenishment, fish spawning and migration, recreation, warm freshwater habitat and wildlife habitat.

The East Bay Plain Groundwater Basin is a large groundwater regime found under the entire project area, in both the Central and South Bay Basins. Groundwater of the East Bay Plain Basin is used for municipal, agricultural, and industrial service. Because the groundwater basin is so expansive, a special plan was developed that divided the groundwater basin into seven subareas, three of which are based on the overlying cities of Berkeley, Oakland, and San Leandro.[3]

In accordance with the 2002 Clean Water Act, Section 303(d) List of Water Quality Limited Segments (impaired water bodies), the only water body within the project area that is considered impaired is the Lower San Leandro Creek, where diazinon is listed as the only pollutant of concern. To date, there are no special requirements or concerns raised by the San Francisco Bay RWQCB regarding this project.

[3] San Francisco Bay Regional Water Quality Control Board Groundwater Committee, *East Bay Plain Groundwater Basin Beneficial Use Evaluation Report, Final Report*, June 1999.

### 4.9.3 Environmental Consequences

#### 4.9.3.1 WATER QUALITY IMPACTS

The proposed project traverses areas that are entirely urbanized. Within the project limits, existing pavement drainage flows to catch basins that convey flow to an underground storm drain system located within the existing arterials. Because the proposed project would include only median paving with little to no widening of the pavement along the shoulders, the increase in impervious service is extremely minor. Moreover, although there would be some paving of landscaped medians, there also would be an equal or greater amount of landscaping added. Areas adjacent to the BRT platforms and new medians adjacent to the BRT lanes would be landscaped as part of the project. Therefore, there would be no net increase in impervious surface.

Potential pollutants found on city streets that could enter the storm drain systems that ultimately discharge into the San Francisco Bay include heavy metals, organic compounds (including petroleum hydrocarbons), sediments, trash, debris, oil, and grease. Concentrations of such pollutants are generally highest during the "first flush" of an initial rain storm, after which concentration levels decrease rapidly.

### 4.9.4 Avoidance, Minimization, and/or Mitigation Measures

Best Management Practices (BMPs) would be designed and implemented to reduce the discharge of pollutants from the storm drain system to the maximum extent practicable. Due to site constraints within the narrow project corridor, the drainage system must balance pollutant removal with economic factors related to maintenance, right-of-way, and construction costs. Landscape areas provided by the project would be designed to minimize and reduce total run-off. Consideration would be given to drought-tolerant or native plants to minimize water use.

## 4.10 Geology/Soils/Seismic/Topography

This section describes the geologic resources along the study area and describes the anticipated effects that could result from the East Bay BRT Project. Geologic resources include geology, topography, subsurface soil conditions, groundwater, and seismicity. Geologic resources are discussed in more detail in the *Geologic Assessment Technical Report* (September, 2005).

### 4.10.1 Geologic Setting

#### 4.10.1.1 GEOLOGY AND SOILS

The East Bay BRT Project lies entirely on the Bay Plain, which extends from the eastern margin of San Francisco Bay to the base of the Oakland-Berkeley Hills. This plain, along with the greater San Francisco Bay Area, constitutes the portion of coastal California that is known as the Coast Range Geomorphic Province. This province forms a nearly continuous barrier between the Pacific Ocean to the west and the San Joaquin Valley to the east.

Natural landforms within the Bay Plain have resulted from the interaction of erosion of a lithologically complex bedrock terrain along the eastern Bay margin and the adjacent hills, and

deposition of alluvial and marine sediments on the low-lying ground between the hills and the Bay, combined with changing sea levels and tectonics related to ongoing fault movements associated with the San Andreas Fault system. The natural landforms present along the project corridor generally consist of low-lying undulating topography, which generally slopes gently toward the south and west, with local variations in slope caused by the numerous streams draining the hills to the east.

The topography along the project corridor is generally gently to moderately sloping toward the Bay, with elevations ranging from a high of 268 feet in Berkeley to about 8 feet near Jack London Square in Oakland. The project corridor generally lies in an oblique angle to the direction of local stream drainages, and passes transversely across the slopes of the surrounding terrain.

These landforms have been modified along the Bay Plain by the grading and placement of fill materials to varying extent along the entire length of the project corridor during urban development and to a larger extent south of Lake Merritt and along the Bay margin to reclaim usable land from the Bay. The project alignment follows existing paved streets and parking areas, which are predominantly underlain by varying thicknesses of artificial fill overlaying native materials.

The project area is underlain at depth by mélange of late Mesozoic era bedrock of the Franciscan Complex. Beneath the Bay Plain on the eastern margin of San Francisco Bay, the Franciscan bedrock is overlain directly by an unconsolidated sedimentary sequence, which in places exceeds 400 feet in thickness.

The *Geologic Assessment* indicates that encountered groundwater was restricted to coarse-grained layers within finer grained materials within the Temescal and San Antonio Formations. The groundwater in these units is described as shallow, confined or partially confined, and exhibiting slightly elevated piezometric conditions. Groundwater levels near the project area at the time of the geologic assessment ranged from 4 to 30 feet, with an average depth at about 8 to 11 feet.[4] None of the geologic formations at the surface along the project corridor are considered aquifers, primarily due to the poor quality of the water found in these deposits.

#### 4.10.1.2 SEISMICITY

The project corridor is located in a seismically active region which has been subjected to a history of strong earthquakes. No active faults are known to cross the project corridor. The Hayward Fault lies between 0.64 and 7.0 km northeast of the project corridor, closest at both the northern and southern ends, and dominates the seismic hazard due to its proximity. The other major active faults that could cause significant shaking of the project area are the San Andreas, Concord, Calaveras, Rodgers Creek, and San Gregorio Faults.

The maximum moment magnitude earthquake (Mmax) is defined as the largest earthquake that a given fault is calculated to be capable of generating. The Mmax on the Hayward Fault would be a magnitude 7.1 event and the Mmax on the San Andreas Fault would be a magnitude 7.9 event. The controlling Mmax that could affect the project area would be a magnitude 7.1 earthquake along the

[4] Groundwater levels reported are representative of conditions within the survey area at the time of drilling and are expected to vary both seasonally and annually based on regional rainfall, local conditions, and localized pumping.

Hayward Fault at approximately 0.64 km from the project corridor. The duration of strong shaking from this earthquake would be approximately 15 to 25 seconds, with a predominant period of approximately 0.25 to 0.35 seconds at the ground surface.

Correlations of the distance from a causative fault and mean values of the peak bedrock accelerations and the effects of local soil conditions on peak ground accelerations have been developed by Seed and Idriss (1982), Joyner and Boore (1988), Idriss (1990), and Campbell (1997). These correlations indicate that, if a Mmax 7.1 event were to occur on the Hayward Fault, the mean peak ground surface acceleration within the project area would range from 0.50 to 0.60 g.

Table 4.10-1 lists the major active faults that may affect the project area in order of proximity to the project corridor.

**Table 4.10-1: Active Fault Seismicity**

| Fault | Distance to Project Area (km) | Maximum Moment Magnitude Earthquake (Mmax) |
|---|---|---|
| Hayward | 0.64-7.0 | 7.1 |
| Calaveras | 15-27 | 6.8 |
| Concord | 17-29 | 6.9 |
| San Andreas | 26-35 | 7.9 |
| Rodgers Creek | 29-51 | 7.0 |
| San Gregorio | 31-40 | 7.3 |
| Greenville | 35-46 | 6.9 |

Source: Geologic Assessment, AGS Inc., September 2005

## 4.10.2 Environmental Consequences

Given that there is no evidence that the project area is located within identified active faults, damage due to surface fault rupture is considered unlikely. The project area, however, is expected to experience very strong to violent ground shaking during large earthquakes occurring on any of the major active faults.

The project corridor south of Lake Merritt and the portion of International Boulevard at 13$^{th}$ Avenue, which are underlain by artificial fill, are considered to have high susceptibility to liquefaction. All other portions are considered to have low to moderate susceptibility to liquefaction due to the density of the granular materials or the presence of stiff cohesive soils.

## 4.10.3 Avoidance, Minimization, and/or Mitigation Measures

The results of the preliminary geologic assessment indicate that there are no substantial geologic hazard impacts that would not be fully addressed by design requirements, and no additional mitigation measures are proposed.

# 4.11 Hazardous Waste/Materials

This section summarizes potential impacts from pre-existing hazardous wastes that could expose construction workers or the general public to health risks and that may require the implementation of special soil and/or groundwater management procedures. Section 4.16.8 discusses the potential impacts of hazardous materials that may be used or stored in conjunction with construction activities.

## 4.11.1 Affected Environment

AGS, Inc. (AGS) conducted a *Hazardous Waste Initial Site Assessment* (ISA) for the AC Transit East Bay BRT Project. The ISA identified previous and current land uses that could contribute to the contamination of the project area. AGS requested a corridor search for the project alternatives of standard Federal, State, and local regulatory databases by Track Info Services, LLC., of Environmental FirstSearch™ Network. Environmental FirstSearch™ integrates data from governmental agency lists into one database, which is continuously updated as data are released. The Environmental FirstSearch™ was used to review the records of each environmental risk site in the project vicinity and is included in the *Draft Hazardous Waste Initial Site Assessment, AC Transit East Bay BRT DEIS/R, Alameda County, California* (AGS, Inc., 2005) and are summarized below.

To determine which sites might pose an environmental risk to the project, AGS conducted a file review of sites with street addresses on each Build Alternative and on cross streets in close proximity to the alternatives. In addition, AGS reviewed sites with soil and groundwater contamination located ¼ mile or less and upgradient from the project alternatives. Since regional groundwater in the area of the project generally flows from the upland areas of the Oakland-Berkeley hills in the east towards the San Francisco Bay to the west, it was assumed that sites to the west of the corridor would not pose any environmental risk to the project and, therefore, they were not reviewed.

## 4.11.2 Environmental Consequences

The ISA identified a total of 80 potential environmental risk sites. Of these sites, 37 are on the project alignment for Alternatives 2 and 4, which terminate at the San Leandro BART station, and 44 are on the alignment for Alternatives 1 and 3, which terminate at the BayFair BART station. Thirteen sites were in close proximity to and possibly on Alternatives 2 and 4, and 14 sites near or on Alternatives 1 and 3. Twenty-two sites were ¼-mile or less upgradient from the Alternatives 1 through 4, as described below. These sites are described in Tables 4.11-1 through 4.11-3.

All of the identified sites are listed on the Leaking Underground Storage Tank (LUST) database provided by the California Environmental Protection Agency (CAL EPA). Two sites also are listed on State Sites Database (STATE), developed by the CAL EPA Department of Toxic Substances Control (DTSC), to provide information on sites that are contaminated with hazardous substances. Of these two sites, one additionally is listed on the EPA's Resource Conservation and Recovery Agency Corrective Action Order (RCRA COR) database, which contains information about RCRA facilities that have conducted or that are currently conducting a corrective action. A Corrective Action Order is issued pursuant to RCRA Section 3008(h) when there has been a release of hazardous waste or constituents into the environment from an RCRA facility.

#### 4.11.2.1 ENVIRONMENTAL RISK SITES ON THE PROJECT ALIGNMENT

Of the 80 potential environmental risk sites, 37 are on the alignment for all four Build Alternatives; 36 of these sites are LUST sites, and one is listed as a STATE, RCRA COR, and LUST site. Seven sites in San Leandro are on Alternatives 1 and 3 only; these sites are all LUST sites. A summary of the file review identifying the name and location of each site, the type of hazardous material found, and action to date is presented in Table 4.11-1.

**Table 4.11-1: Environmental Risk Sites on the AC Transit East Bay BRT Project Alternatives (44 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| Shell | 2200 Durant Avenue, Berkeley | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1983. The substance leaked was diesel fuel affecting soil and groundwater. The abatement method was to remove free-floating product from the water table. Post remedial action monitoring is underway. |
| Tosco Facility #0852 | 3001 Telegraph Avenue, Berkeley | (LUST, updated 5/26/04). A leak was discovered during inventory control in 1994. The substance leaked was gasoline affecting soil and groundwater. No action has yet been taken. |
| Chevron Service Station | 2996 Telegraph Avenue, Berkeley | (LUST, updated 5/26/04). A leak was discovered in 1965. The substance leaked was gasoline affecting soil and groundwater. Remedial action is underway. |
| Arco | 6407 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1988. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to remove free-floating product from the water table, and pump and treat groundwater. A pollution characterization is underway. |
| Thrifty Oil | 6125 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1986. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to remove free-floating product from the water table. A remediation plan is underway. |
| Telegraph Business Properties | 5427 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1992. The substance leaked was waste oil affecting soil. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| Autopro | 5200 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1991. The substance leaked was gasoline affecting soil. A preliminary assessment is underway and no action has yet been taken. |
| Chevron | 5101 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline affecting soil and groundwater. A preliminary assessment is underway and no action has yet been taken. |
| Kelley Auto Parts | 4400 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1988. The substance leaked was Stoddard solvent affecting soil and groundwater. Post remedial action monitoring is underway. |
| Simas Brothers | 4013 Telegraph Avenue, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1986. The substance leaked was gasoline. The leak is being confirmed and no action has yet been taken. |

**Table 4.11-1: Environmental Risk Sites on the AC Transit East Bay BRT Project Alternatives (44 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| Shell | 2800 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1988. The substance leaked was gasoline. The abatement method was to excavate and dispose of the contaminated soil. A pollution characterization is underway. |
| Sears Auto Center #1058 | 2633 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was waste oil. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| Dave's Station | 2250 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline. The abatement method was to excavate and treat or dispose of the contaminated soil. A pollution characterization is underway. |
| Exxon | 2225 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to remove contaminated soil and free-floating product from the water table, pump and treat groundwater, and vent soil. Remedial action is underway. |
| Chevron 9-3600 | 2200 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered in 2000. The substance leaked was gasoline. A preliminary assessment is underway. |
| East Bay Packing Company | 208 Jackson Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was diesel fuel. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| Miller Packing Company II | 206 2nd Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was diesel fuel affecting soil. A preliminary assessment is underway. |
| Miller Packing | 201 2nd Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline. A preliminary assessment is underway. |
| Cooper Tire Shop Former | 1220 East 12th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1996. The substance leaked was gasoline affecting soil. The leak is being confirmed. |
| JR Used Auto Parts | 823 East 12th Street, Oakland | (LUST, updated 7/11/92). A leak was discovered during tank closure in 1988. The substance leaked was mineral spirits affecting soil. The leak is being confirmed and no action has yet been taken. |
| Harley Davidson Motorcycle | 744 East 12th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during inventory control in 1996. The substance leaked was gasoline. The leak is being confirmed. |
| Mobil | 14994 International Boulevard, Oakland | This site is listed on two LUST databases, both updated on 5/26/04. Leaks were discovered during tank closures in 1986 and 1987. The substance leaked was gasoline affecting soil and groundwater. Post remedial action monitoring is underway. |
| Quan's Automotive | 10100 International Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1994. The substance leaked was gasoline. The leak is being confirmed. |
| Arco #02185 | 9800 International Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered in the piping during inventory control in 1989. The substance leaked was gasoline affecting soil and groundwater. A preliminary assessment is underway. |

**Table 4.11-1: Environmental Risk Sites on the AC Transit East Bay BRT Project Alternatives (44 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| Ms. Eddie M. Jones Property | 8332 International Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1991. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| General Electric Company | 5441 International Boulevard, Oakland | (STATE, updated 11/9/04). The STATE database indicates that the General Electric Oakland plant manufactured electrical transformers from 1927 to 1975. Soil and groundwater are contaminated with volatile organic compounds, transit oil, and polychlorinated biphenyls. Abatement has been ongoing at the site since 1981. Contaminants have been detected in soil on private property off-site, as well as in the groundwater to depths of 351 feet. GE is conducting investigations at and downgradient from the site to investigate and characterize the nature and extent of contamination of soil and groundwater. GE prepared and submitted a draft Risk Assessment in 2002, which is under review by the California Department of Toxic Substances and Control.<br>(RCRC COR, updated 9/13/04). The RCRA COR database lists six enforcement actions and 14 violations for the site.<br>(LUST, updated 5/26/04). The LUST database indicates that a leak was discovered during tank closure in 1987. The substance leaked was miscellaneous motor vehicle fuels. The leak is being confirmed and no action has yet been taken. |
| Grand Auto | 4240 International Boulevard, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1992. The substance leaked was mineral spirits. A preliminary assessment work plan is submitted and no action has yet been taken. |
| Continental Volvo | 4030 International Boulevard, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1987. The substance leaked was waste oil affecting soil. The leak is being confirmed and no action has yet been taken. |
| Dorothy Day Trust | 4028 International Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1996. The substance leaked was waste oil. A preliminary assessment is underway. |
| Tony's Express Auto Service | 3609 International Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1993. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| Taxi Taxi Inc | 2345 International Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1988. The substance leaked was gasoline affecting soil. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| Shell | 510 International Boulevard, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1988. The substance leaked was gasoline. The leak is being confirmed and no action has yet been taken. |
| Unocal * | 15803 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A pollution characterization is underway. |
| Unocal * | 15008 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1991. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and |

**Table 4.11-1: Environmental Risk Sites on the AC Transit East Bay BRT Project Alternatives (44 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| | | dispose of the contaminated soil and to use enhance biodegration. A pollution characterization is underway. |
| Quality Tune Up * | 14901 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1998. The substance leaked was gasoline affecting soil and groundwater. A pollution characterization is underway. |
| Nella Oil Site * | 14880 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered in 2001. The substance leaked was gasoline. A preliminary assessment is underway. |
| Maskell Oil Company * | 14500 East 14th Street, San Leandro | This site is listed on two LUST databases, both updated 5/26/04. A leak was discovered during tank closure in 1985. The substance leaked was solvents. Another leak was discovered during tank closure in 1988. The substance leaked was diesel fuel. The leaks are being confirmed and a pollution characterization is underway. No action has yet been taken. |
| Simas Bros Service Station * | 14180 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1986. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A pollution characterization is underway. |
| Chevron * | 1990 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during subsurface monitoring in 1997. The substance leaked was gasoline affecting soil and groundwater. A pollution characterization is underway. |
| Roy's Auto Repair | 806 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline. The leak is being confirmed and no action has yet been taken. |
| Minit Auto Care | 497 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was waste oil affecting soil. The leak is being confirmed and no action has yet been taken. |
| German Autocraft | 301 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline. A pollution characterization is underway and no action has yet been taken. |
| Former Service Station | 111 East 14th Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1998. The substance leaked was gasoline affecting soil and groundwater. A preliminary assessment work plan is being submitted. |
| Port of Oakland Amtrak Site | Alice Street and 2nd Street, Oakland | (LUST, updated 6/31/01). A leak was discovered during tank closure in 1983. The substance leaked was miscellaneous motor vehicle fuels affecting soil. A preliminary assessment work plan is submitted and no action has yet been taken. |

Notes:
* Indicates sites that are located on Alternatives 1 and 3 only.
Source: *Hazardous Waste Initial Site Assessment*, AGS, Inc., September 2005

#### 4.11.2.2 ENVIRONMENTAL RISK SITES IN CLOSE PROXIMITY TO THE PROJECT ALIGNMENT

Of the 80 potential environment risk sites, 13 are in close proximity to and possibly on Alternatives 1 through 4, including 12 LUST sites and one site that is listed as a STATE and LUST site. One LUST site is located in close proximity to and possibly on Alternatives 1 and 3 only. A summary of the file review identifying the name and location of each site, the type of hazardous material found, and action to date is presented in Table 4.11-2.

**Table 4.11-2: Environmental Risk Sites in Close Proximity and Possibly on the AC Transit East Bay BRT Project Alternatives (14 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| UC Berkeley Site Garage | 1952 Oxford Street, Berkeley | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1988. The substance leaked was diesel fuel. A pollution characterization is underway and no action has yet been taken. |
| Chevron | 2199 Berkeley Way, Berkeley | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to remove free-floating product from the water table and vent the soil. Post remedial action monitoring is underway. |
| Ronn Simpson | 489 43rd Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1995. The substance leaked was gasoline. A preliminary assessment is underway. |
| Shell | 500 40th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1982. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to remove free-floating product from the water table. A remediation plan is underway. |
| August Manufacturing | 1466 36th Avenue, Oakland | (LUST, updated 7/11/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline. A preliminary assessment is underway and no action has yet been taken. |
| Grant School | 417 29th Street, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1992. The substance leaked was diesel fuel affecting soil. The leak is being confirmed and no action has yet been taken. |
| Benner Automotive | 488 25th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 2003. The substance leaked was gasoline. A pollution characterization is underway. |
| Catering by Andre | 434 25th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1994. The substance leaked was diesel fuel affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| United Beverage | 105 Jackson Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1993. The substance |

**Table 4.11-2: Environmental Risk Sites in Close Proximity and Possibly on the AC Transit East Bay BRT Project Alternatives (14 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| | | leaked was gasoline. A preliminary assessment is underway and no action has yet been taken. |
| Building H 209 | 271 8th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1996. The substance leaked was diesel fuel. A preliminary assessment work plan is submitted. |
| Exxon | 250 8th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1992. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil and to use enhanced biodegradation. Remedial action is underway. |
| Shell | 105 5th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered in the piping in 1996. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment work plan is submitted. |
| Lakeside Non-Ferrous Metals | 412 Madison Street, Oakland | (STATE 4/30/03). The STATE database indicates that elevated levels of heavy metals were detected in soil samples. A preliminary endangerment assessment is required.<br>(LUST, updated 5/26/04). A leak was discovered during tank closure in 1993. The substance leaked was gasoline. A preliminary assessment is underway. |
| Richards Automotive* | 1495 Hays Street, San Leandro | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1999. The substance leaked was gasoline. A preliminary assessment is underway. |

Notes:
* Indicates sites that are located on Alternatives 1 and 3 only.
Source: *Hazardous Waste Initial Site Assessment*, AGS, Inc., September 2005

#### 4.11.2.3 ENVIRONMENTAL RISK SITES ¼-MILE OR LESS UPGRADIENT FROM THE PROJECT ALTERNATIVES

Of the 80 potential environment risk sites, 22 are located within a ¼-mile or less upgradient from the BRT project alignment, all of which are LUST sites. A summary of the file review identifying the name and location of each site, the type of hazardous material found, and action to date is presented in Table 4.11-3.

**Table 4.11-3: Environmental Risk Sites ¼-Mile or Less Upgradient from the AC Transit East Bay BRT Project Alternatives (22 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| Shell | 461 8th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1987. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to remove free-floating produced from the water table. A pollution characterization is underway. |
| Kaiser Regional Parking | 1901 Franklin Street, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1985. The substance leaked was gasoline affecting soil. The leak is being confirmed and no action has yet been taken. |
| Pacific Renaissance Plaza | 1000 Franklin Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1988. The substance leaked was waste oil affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil, pump and treat groundwater, and use enhanced biodegradation. Remedial action is underway. |
| Pacific Bell | 1519 Franklin Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1994. The substance leaked was diesel fuel. The abatement method was to excavate and dispose of the contaminated soil and to pump and treat groundwater. Post remedial action monitoring is underway. |
| Bill Louie's Auto Service | 800 Franklin Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| Bacharach and Borsuk Property | 1432 Franklin Street, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1994. The substance leaked was miscellaneous motor vehicle fuels affecting soil and groundwater. A preliminary assessment work plan is submitted. |
| Powlen Property | 2939 Summit Street, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1991. The substance leaked was diesel fuel affecting soil. The leak is being confirmed and no action has been taken. |
| Unocal | 800 Harrison Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A pollution characterization is underway. |
| Oakland Auto Parts | 706 Harrison Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1991. The substance leaked was gasoline affecting soil and groundwater. A preliminary assessment is underway. |
| Shell | 726 Harrison Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1995. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A pollution characterization is underway. |
| Chrysler Dealership | 2417 Broadway, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1994. The substance leaked was gasoline. The leak is being confirmed. |
| Arco | 731 West MacArthur Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered due to overfilling in 1993. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to |

**Table 4.11-3: Environmental Risk Sites ¼-Mile or Less Upgradient from the AC Transit East Bay BRT Project Alternatives (22 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| | | remove free-floating product from the water table, pump and treat groundwater, and use enhanced biodegradation. Remedial action is underway. |
| Unocal | 411 West MacArthur Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of contaminated soil. A preliminary assessment is underway. |
| YWCA | 1515 Webster Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1994. The substance leaked was diesel fuel affecting soil. A preliminary assessment is underway. |
| Bacharach and Borsuk Property | 1432 Harrison Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline affecting soil and groundwater. A pollution characterization is underway and no action has yet been taken. |
| Chevron | 301 14th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to remove free-floating product from the water table, vent the soil, and use vacuum extraction. A pollution characterization is underway. |
| Mobil | 160 14th Street, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1986. The substance leaked was gasoline. The leak is being confirmed and no action has been taken. |
| AlcoPark Garage | 165 13th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1988. The substance leaked was gasoline affecting soil and groundwater. A preliminary assessment is underway and no action has yet been taken. |
| Shell | 4411 Foothill Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank testing in 1991. The substance leaked was waste oil affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A remediation plan is underway. |
| BP | 4280 Foothill Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline affecting soil and groundwater. A remediation plan is underway and no action has yet been taken. |
| Chevron | 4265 Foothill Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1987. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to excavate and dispose of the contaminated soil. A remediation plan is underway. |
| BP | 4250 Foothill Boulevard, Oakland | (LUST, updated 7/11/02). A leak was discovered during tank closure in 1992. The substance leaked was miscellaneous motor vehicle fuels. The leak is being confirmed and no action has yet been taken. |
| Source: *Hazardous Waste Initial Site Assessment*, AGS, Inc., September 2005 | | |

### 4.11.3 Avoidance, Minimization and/or Mitigation Measures

The following general avoidance and prevention measures are proposed to reduce or eliminate hazardous wastes-related impacts:

- Field surveys of identified environmental risk sites would be conducted prior to construction to verify the physical locations of the sites with respect to the preferred Build Alternative and observe the current conditions of the sites.
- A regulatory file review would be conducted for each of the identified environmental risk sites prior to construction to determine the current status of the sites and, if possible, the extent of the contamination.
- If construction of the project warrants, a subsurface exploration would be conducted of the preferred Build Alternative next to or downgradient from any environmental risk site.

If the pre-construction reviews of environmental risk sites identifies contaminated areas that would be disturbed by construction activities, a remediation plan would be developed as described in Section 4.16.8.2, Hazardous Waste (Construction: Avoidance, Minimization, and/or Mitigation Measures).

## 4.12 Air Quality

### 4.12.1 Regulatory Setting

The federal Clean Air Act (CAA) governs air quality in the United States. In addition to being subject to the requirements of the CAA, air quality in California is also governed by more stringent regulations under the California Clean Air Act (CCAA). At the federal level, the United States Environmental Protection Agency (USEPA) administers the CAA. In California, the California Air Resources Board (CARB) administers the CCAA at the state level and the Air Quality Management Districts administer the CCAA at the regional and local levels.

USEPA is responsible for enforcing the CAA. USEPA is also responsible for establishing the National Ambient Air Quality Standards (NAAQS), which are required under the 1977 CAA and subsequent amendments. USEPA regulates emission sources that are under the exclusive authority of the federal government and establishes various emission standards, including those for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission standards established by CARB.

CARB, which became part of the California Environmental Protection Agency (CalEPA) in 1991, is responsible for meeting the state requirements of the federal CAA, administering the CCAA, and establishing the California Ambient Air Quality Standards (CAAQS). The CCAA, as amended in 1992, requires all air districts in the state to endeavor to achieve and maintain the CAAQS, which are generally more stringent than the corresponding federal standards. CARB oversees the functions of local air pollution control districts and air quality management districts, which in turn administer air quality activities at the regional and county level.

The Bay Area Air Quality Management District (BAAQMD) is primarily responsible for assuring that the national and state ambient air quality standards are attained in the San Francisco Bay Area. The BAAQMD has jurisdiction over an approximately 5,600 square mile area, commonly referred to as the Bay Area Air Basin (BAAB). The District includes the nine San Francisco Bay Area counties: Alameda County, Contra Costa County, Marin County, San Francisco County, San Mateo County, Santa Clara County, Napa County, southwestern Solano County and southern Sonoma County.

#### 4.12.1.1 NATIONAL AND STATE AMBIENT AIR QUALITY STANDARDS

Under the CAA and CCAA, areas are designated as either attainment or non-attainment for each criteria pollutant based on whether the NAAQS or CAAQS have been achieved. Areas are designated as non-attainment for a pollutant if air quality data show that a state or federal standard for the pollutant was violated at least once during the previous three calendar years. Exceedances that are affected by highly irregular or infrequent events are not considered violations of a state standard and are not used as a basis for designating areas as non-attainment. Table 4.12-1 summarizes the state and federal standards and lists the state and federal attainment status for Alameda County.

**Table 4.12-1: State and National Ambient Air Quality Standards**

| Pollutant | Averaging Period | California | | Federal | |
|---|---|---|---|---|---|
| | | Standards | Attainment Status | Standards | Attainment Status |
| Ozone ($O_3$) | 1 hour | 0.09 ppm (180 µg/m$^3$) | Non-attainment | -- | -- |
| | 8 hour | 0.07 (137 µg/m$^3$) | Unclassified | 0.08 ppm (157 µg/m$^3$) | Non-attainment |
| Respirable Particulate Matter ($PM_{10}$) | 24 hour | 50 µg/m$^3$ | Non-attainment | 150 µg/m$^3$ | Attainment |
| | Annual Arithmetic Mean | 20 µg/m$^3$ | Non-attainment | -- | -- |
| Fine Particulate Matter ($PM_{2.5}$)[1] | 24 hour | -- | -- | 35 µg/m$^3$ | Unclassified |
| | Annual Arithmetic Mean | 12 µg/m$^3$ | Non-attainment | 15 µg/m$^3$ | Attainment |
| Carbon Monoxide (CO) | 8 hour | 9.0 ppm (10 mg/m$^3$) | Attainment | 9 ppm (10 mg/m$^3$) | Attainment |
| | 1 hour | 20 ppm (23 mg/m$^3$) | Attainment | 35 ppm (40 mg/m$^3$) | Attainment |
| Nitrogen Dioxide ($NO_2$) | Annual Arithmetic Mean | -- | -- | 0.053 ppm (100 µg/m$^3$) | Attainment |
| | 1 hour | 0.18 ppm (470 µg/m$^3$) | Attainment | -- | -- |
| Sulfur Dioxide ($SO_2$) | Annual Arithmetic Mean | -- | -- | 0.03 ppm (80 µg/m$^3$) | Attainment |
| | 24 hour | 0.04 ppm (105 µg/m$^3$) | Attainment | 0.14 ppm (365 µg/m$^3$) | Attainment |
| | 1 hour | 0.25 ppm (655 µg/m$^3$) | Attainment | -- | -- |

Source: CARB and United States Environmental Protection Agency, February 22, 2007.

### Carbon Monoxide

CO, a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue, and can impair central nervous system functions. CO is emitted almost exclusively from the incomplete combustion of fossil fuels. Automobile exhausts release most of the CO in urban areas. CO dissipates relatively quickly, so ambient CO concentrations generally follow the spatial and temporal distributions of vehicular traffic. CO concentrations are influenced by local meteorological conditions – primarily wind speed, topography, and atmospheric stability. Under the CAA and the CCAA, the Alameda County portion of the BAAB is in attainment for CO.

### Ozone

$O_3$, a colorless toxic gas, is the chief component of urban smog. $O_3$ enters the blood stream and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. $O_3$ also damages vegetation by inhibiting growth. $O_3$ forms in the atmosphere through a chemical reaction between reactive organic gas (ROG) and nitrogen oxides ($NO_X$) under sunlight. The greatest source of smog-producing gases is the automobile. Under the CAA and the CCAA, the Alameda County portion of BAAB is in non-attainment for $O_3$.

### Nitrogen Dioxide

$NO_2$, a brownish gas, irritates the lungs. It can cause breathing difficulties at high concentrations. Like $O_3$, $NO_2$ is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and $NO_2$ are collectively referred to as NOx and are major contributors to ozone formation. $NO_2$ also contributes to the formation of $PM_{10}$. Under the CAA and the CCAA, the Alameda County portion of BAAB is in attainment for $NO_2$.

### Sulfur Dioxide

$SO_2$ is a product of high-sulfur fuel combustion. Main sources of $SO_2$ are coal and oil used in power stations, and domestic heating, and industries, such as chemical manufacturing. $SO_2$ is an irritant gas that attacks the throat and lungs. $SO_2$ can also erode iron and steel and cause plant leaves to turn yellow. In recent years, $SO_2$ concentrations have been reduced to levels well below the state and federal standards, but further reductions in emissions are needed to attain compliance with standards for sulfates and $PM_{10}$, of which $SO_2$ is a contributor. Under the CAA and the CCAA, the Alameda County portion of BAAB is in attainment for $SO_2$.

### Suspended Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles floating in the air, which can include smoke, soot, dust, salts, acids, and metals. Particulate matter also forms when gases emitted from industries and motor vehicles undergo chemical reactions in the atmosphere. Respirable particulate matter ($PM_{10}$) refers to particulate matter less than 10 microns in diameter, about one/seventh the thickness of a human hair. Fine particulate matter ($PM_{2.5}$) refers to particulate matter that is 2.5 microns or less in diameter, roughly 1/28th the diameter of a human hair. $PM_{10}$ and $PM_{2.5}$ pose a greater health risk than larger-size particles. When inhaled, these tiny particles can penetrate the human respiratory system's natural defenses and damage the respiratory tract. Major sources of $PM_{10}$ include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires and brush/waste burning, industrial sources, windblown dust from open lands;

and atmospheric chemical and photochemical reactions. $PM_{2.5}$ results from fuel combustion (from motor vehicles, power generation, industrial facilities), residential fireplaces, and wood stoves. In addition, $PM_{2.5}$ can be formed in the atmosphere from gases such as $SO_2$, $NO_X$, and volatile organic compounds. Under the CCAA, the Alameda County portion of the BAAB is in non-attainment for $PM_{10}$, and $PM_{2.5}$.

#### Lead

Prior to 1978, mobile emissions were the primary source of lead resulting in air concentrations. Between 1978 and 1987, the phase-out of leaded gasoline reduced the overall inventory of airborne lead by nearly 95 percent. Currently, industrial sources are the primary source of lead resulting in air concentrations. Since the East Bay BRT Project does not contain lead admission sources, emissions and concentrations related to lead are not analyzed in this report.

### 4.12.1.2 AIR QUALITY PLANS

The BAAQMD, in coordination with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG), is responsible for preparing air quality plans pursuant to the CAA and CCAA. Under the CAA, State Implementation Plans (SIPs) are required for areas that are designated as non-attainment for $O_3$, CO, $NO_X$, $SO_X$, or $PM_{10}$. For the BAAB, a SIP is required for $O_3$ since the region is currently designated as a federal non-attainment area for $O_3$.

The most current SIP, called the Bay Area 2001 Ozone Attainment Plan, was adopted by the MTC, ABAG, and BAAQMD in October 2001. CARB adopted this Plan in November 2001, and EPA approved the associated emissions limits in February 2002.

Whereas the SIP is prepared pursuant to the CAA (federal requirement), the Bay Area Clean Air Plan (CAP) is prepared pursuant to the CCAA (state requirement). The CAP is the region's plan for reducing ground-level ozone. The CAP identifies how the BAAB would meet the state $O_3$ standard by its attainment date. The Bay Area 2005 Ozone Strategy focuses on identifying and implementing control measures that would reduce $O_3$. It was adopted by the BAAQMD in January 2006.

### 4.12.1.3 AIR QUALITY CONFORMITY

Under the 1990 CAA Amendments, the U.S. Department of Transportation cannot fund, authorize, or approve federal actions to support programs or projects that are not first found to conform to CAA requirements. A conformity determination demonstrates that total emissions projected for a plan or program are within the emissions limits established by the air quality plan or SIP, and that transportation control measures are implemented in a timely fashion. Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) jointly make conformity determinations within air quality non-attainment and maintenance areas to ensure that federal actions conform to the "purpose" of SIPs. In late 1993, USEPA promulgated final rules for determining conformity of transportation plans, programs, and projects. These final rules, contained in 40 CFR Part 93, govern the conformity assessment for the proposed project. Section 4.12.4 (Transportation Conformity Analysis) of this EIS/EIR lists the conformity criteria that would apply to this project.

#### 4.12.1.4 AFFECTED ENVIRONMENT

##### Climate

The Bay Area can be classified as Mediterranean, characterized by cool, dry summers and mild, wet winters. The Eastern Pacific High, which is a strong persistent anticyclone, is the major influence on the climate in the area. Seasonal variations in the position and strength of this system are a key factor in producing weather changes in the area. During the summer, the general area lies in the semi-permanent high-pressure zone of the northeastern Pacific Ocean. The high-pressure cell prevents storms from affecting the California coast. Thus, the area experiences little precipitation during the summer months. During the winter, the high-pressure cell weakens and shifts southward. Storms occur more frequently and winds are usually moderate; however, the Pacific high-pressure cell periodically becomes dominant, bringing light winds.

Temperature in the project area and its vicinity averages approximately 57 degrees Fahrenheit annually, with an average maximum summer temperature of approximately 70 degrees Fahrenheit and an average minimum winter temperature of approximately 44 degrees Fahrenheit. Total precipitation in the project area averages approximately 21 inches annually. Precipitation occurs mostly during the winter and relatively infrequently during the summer. Precipitation during the winter is approximately 11.5 inches and approximately 0.25 inches during the summer.

#### 4.12.1.5 EXISTING CONDITIONS

##### Air Monitoring Data

Historical data from four BAAQMD monitoring stations were used to characterize existing conditions within the vicinity of the proposed project area and to establish a baseline for estimating future conditions. Three of the monitoring stations are located in close proximity to the proposed BRT alignment:

- Oakland—Alice Street Monitoring Station
- Oakland—International Monitoring Station[5]
- San Leandro Monitoring Station

The pollutants monitored at these stations and the distance of these stations from the proposed BRT alignment are shown in Table 4.12-2. The nearest monitoring station that monitors $PM_{10}$ is the San Pablo–Rumrill monitoring station, located approximately 7.8 miles north of the proposed BRT alignment.[6] Because the San Pablo–Rumrill station is within the same climatological subregion as the project area, it accurately characterizes existing $PM_{10}$ conditions in the project area.

The nearest monitoring station for $PM_{2.5}$ is the San Francisco—Arkansas station, located approximately 7.5 miles west of the proposed BRT alignment. It is within the same climatological subregion as the project area and therefore accurately characterizes existing $PM_{2.5}$ conditions in the project area.

[5] The Oakland-International Monitoring Station stopped collecting data in 2003. Data from this monitoring station is still considered to be representative of the project area and, as such, was included in this analysis.
[6] The San Pablo-Rumrill Monitoring Station stopped collecting data in 2003. Data from this monitoring station is still considered to be representative of the project area and, as such, was included in this analysis.

**Table 4.12-2: Pollutants Monitored at Air Monitoring Stations Near Proposed BRT Alignment**

| Monitoring Station | Pollutants Monitored | Address | Distance to BRT Alignment |
|---|---|---|---|
| Oakland – Alice Street Monitoring Station | $O_3$, CO | 822 Alice Street, Oakland | 0.07 miles |
| Oakland – International Monitoring Station | $O_3$, CO, $NO_2$, $SO_X$ | 6701 International Boulevard, Oakland | Adjacent to Proposed BRT Alignment |
| San Leandro Monitoring Station | $O_3$ | 1544 Foothill Boulevard, San Leandro | 0.45 miles |
| San Pablo – Rumrill Monitoring Station | $PM_{10,}$ CO, $NO_2$, $SO_x$ [1] | 1865 Rumrill Boulevard, San Pablo | 7.8 miles |
| San Francisco-Arkansas Monitoring Station | $PM_{2.5}$ [2] | 10 Arkansas Street, San Francisco | 7.5 miles |

Notes:
[1] The San Pablo – Rumrill Monitoring Station also monitors $O_3$, CO, $NO_X$, and $SO_X$. This monitoring station is used to characterize existing $PM_{10}$ conditions since monitoring stations that are closer to the proposed BRT alignment do not monitor $PM_{10}$. In addition, this monitoring station was used to characterize CO, $NO_2$, and $SO_X$ conditions for years 2004 and 2005 because the Oakland-International Monitoring Station stopped operating after 2003.
[2] The San Francisco – Arkansas Monitoring Station also monitors $O_3$, CO, $NO_X$, and $SO_X$ but is used only to characterize $PM_{2.5}$.
Source: CARB, Terry A. Hayes Associates LLC.

Summaries of the data recorded at the monitoring stations during the 2001-2005 period are shown in Table 4.12-3. The number of days that violations occurred is listed for each year. The 1-hour ozone standard was exceeded at least once each year from 2002 to 2005. In addition, the San Pablo Monitoring Station recorded a $PM_{10}$ violation in 2002. The number of days these violations occurred is not available from CARB, as indicated by the n/a listing in the column.

**Table 4.12-3: 2001-2003 Criteria Pollutant Violations**

| Pollutant | Concentrations/Exceedance of Standards | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| **Oakland - Alice Street Monitoring Station** | | | | | | |
| Ozone (1 hour) | Maximum 1-hr concentration (ppm)<br>Days > 0.12 ppm (federal 1-hr standard)<br>Days > 0.09 ppm (state 1-hr standard) | 0.069<br>0<br>0 | 0.053<br>0<br>0 | 0.081<br>0<br>0 | 0.080<br>0<br>0 | 0.068<br>0<br>0 |
| Ozone (8 hour) | Maximum 8-hr concentration (ppm)<br>Days > 0.08 ppm (federal 8-hr standard) | 0.043<br>0 | 0.043<br>0 | 0.054<br>0 | 0.057<br>0 | 0.045<br>0 |
| Carbon Monoxide | Maximum 8-hr concentration (ppm)<br>Days > 9.0 ppm (federal 8-hr. standard)<br>Days > 9.0 ppm (state 8-hr standard) | 3.98<br>0<br>0 | 3.34<br>0<br>0 | 2.78<br>0<br>0 | 2.64<br>0<br>0 | 2.44<br>0<br>0 |
| **Oakland – International Monitoring Station** | | | | | | |
| Ozone (1 hour) | Maximum 1-hr concentration (ppm)<br>Days > 0.12 ppm (federal 1-hr standard)<br>Days > 0.09 ppm (state 1-hr standard) | 0.038<br>0<br>0 | 0.084<br>0<br>0 | 0.073<br>0<br>0 | n/a<br>n/a<br>n/a | n/a<br>n/a<br>n/a |
| Ozone (8 hour) | Maximum 8-hr concentration (ppm)<br>Days > 0.08 ppm (federal 8-hr standard) | 0.034<br>0 | 0.56<br>0 | 0.052<br>0 | n/a<br>n/a | n/a<br>n/a |

**Table 4.12-3: 2001-2003 Criteria Pollutant Violations**

| Pollutant | Concentrations/Exceedance of Standards | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| Carbon Monoxide | Maximum 8-hr concentration (ppm) | 3.20 | 5.13 | 4.41 | n/a | n/a |
| | Days > 9 ppm (federal 8-hr. standard) | 0 | 0 | 0 | n/a | n/a |
| | Days > 9.0 ppm (state 8-hr standard) | 0 | 0 | 0 | n/a | n/a |
| Nitrogen Dioxide | Maximum 1-hr concentration (ppm) | 0.062 | 0.080 | 0.056 | n/a | n/a |
| | Days > 0.18 ppm (state 1-hr standard) | 0 | 0 | 0 | n/a | n/a |
| Sulfur Dioxide | Maximum 24-hr concentration (ppm) | 0.004 | 0.006 | 0.009 | n/a | n/a |
| | Days > .14 ppm (federal 24-hr standard) | 0 | 0 | 0 | n/a | n/a |
| | Days > .04 ppm (state 24-hr standard) | 0 | 0 | 0 | n/a | n/a |
| **San Leandro Monitoring Station** | | | | | | |
| Ozone (1 hour) | Maximum 1-hr concentration (ppm) | 0.093 | 0.101 | 0.097 | 0.104 | 0.999 |
| | Days > 0.12 ppm (federal 1-hr standard) | 0 | 0 | 0 | 0 | 0 |
| | Days > 0.09 ppm (state 1-hr standard) | n/a | 1 | 2 | 1 | 1 |
| Ozone (8 hour) | Maximum 8-hr concentration (ppm) | 0.056 | 0.061 | 0.071 | 0.066 | 0.061 |
| | Days > 0.08 ppm (federal 8-hr standard) | 0 | 0 | 0 | 0 | 0 |
| **San Pablo–Rumrill Monitoring Station** | | | | | | |
| $PM_{10}$ | Maximum 24-hr concentration (µg/m$^3$) | | | | | |
| | Estimated days > 50 µg/m$^3$ (state 24-hr standard) | n/a | 69.6 | 49.4 | n/a | n/a |
| | Estimated days > 150 µg/m$^3$ (federal 24-hr standard) | n/a | n/a | 0 | n/a | n/a |
| | | n/a | n/a | 0 | n/a | n/a |
| Carbon Monoxide | Maximum 8-hr concentration (ppm) | n/a | 2.00 | 1.78 | 1.83 | 1.33 |
| | Days > 9 ppm (federal 8-hr. standard) | n/a | 0 | 0 | 0 | 0 |
| | Days > 9.0 ppm (state 8-hr standard) | n/a | 0 | 0 | 0 | 0 |
| Nitrogen Dioxide | Maximum 1-hr concentration (ppm) | n/a | 0.054 | 0.07 | 0.055 | 0.054 |
| | Days > 0.18 ppm (state 1-hr standard) | n/a | 0 | 0 | 0 | 0 |
| Sulfur Dioxide | Maximum 24-hr concentration (ppm) | n/a | 0.005 | 0.006 | 0.005 | 0.006 |
| | Days > .14 ppm (federal 24-hr standard) | n/a | 0 | 0 | 0 | 0 |
| | Days > .04 ppm (state 24-hr standard) | n/a | 0 | 0 | 0 | 0 |
| **San Francisco–Arkansas Monitoring Station** | | | | | | |
| $PM_{2.5}$ | Maximum 24-hr concentration (µg/m$^3$) | | | | | |
| | Estimated days > 12 µg/m$^3$ (state standard, arithmetic mean) | 76.6 | 70.2 | 41.6 | 45.8 | 43.6 |
| | Estimated days > 35 µg/m$^3$ (federal 24-hr standard) | n/a | n/a | n/a | n/a | n/a |
| | | n/a | n/a | n/a | n/a | n/a |

Notes:
n/a – number of days are not available
Source: CARB.

### Background Carbon Monoxide

CO concentrations are typically used as an indicator of conformity because CO levels are directly related to vehicular traffic volumes and can be modeled using USEPA methods. A review of data from the Oakland–Alice Street and Oakland–International monitoring stations for the 2001-2005 period indicates that the ambient eight-hour CO concentration is 2.4 ppm in the area surrounding the Alice Street monitoring station and 4.9 ppm in the area surrounding the Oakland–International monitoring station.[7] Ambient CO concentrations as monitored at the Oakland–International

[7] The *Caltrans Transportation Project-Level Carbon Monoxide Protocol* defines the ambient 8-hour CO concentration as the highest of the second highest maximum 8-hour CO reading in the last two years as reported

monitoring station were used since this monitoring station experiences higher CO concentrations than the Oakland–Alice Street monitoring station. Assuming a typical persistence factor of 0.7, the estimated one-hour background concentration is approximately 7.0 ppm. The existing eight-hour background concentrations do not exceed the state and federal eight-hour CO standard of 9.0 ppm. Additionally, the existing one-hour background concentration does not exceed the state and federal one-hour CO standards of 20 ppm and 35 ppm, respectively.

### Localized CO Analysis Methodology for Project Area Intersections

CO is a localized gas that dissipates very quickly under normal meteorological conditions. The highest CO concentrations are typically found along sidewalks directly adjacent to congested roadway intersections and decrease substantially as distance from the intersection increases. The localized CO analysis was conducted in accordance to the guidelines provided in the *Caltrans Transportation Project-Level Carbon Monoxide Protocol* (Caltrans 1997).

A worst-case simulation of CO concentrations within the project area was modeled near ten intersections. The ten intersections that were analyzed in this air quality analysis were selected based on the following methodology. Of the intersections that would experience LOS E or F under the Build Alternatives, the three that would be most congested were selected. For the remaining intersections that would experience LOS E or F under the Build Alternatives, two to four intersections within each city were selected to provide a geographic representation. These intersections would experience the most change in delay or LOS when Build conditions are compared to No-Build conditions and/or would be located in close proximity to sensitive receptors. Both existing and future traffic-related CO contributions were modeled and added to the ambient CO concentration discussed in the previous subsection

### Sensitive Receptors

The following categories of people, as identified by CARB, are most likely to be affected by air pollution: children under 14, the elderly over 65, athletes, and people with cardiovascular and chronic respiratory diseases. Locations that may contain a high concentration of these sensitive population groups are called sensitive receptors and include residential areas, hospitals, daycare facilities, elder care facilities, elementary schools, and parks.

The selected intersections are listed in Table 4.12-4, Carbon Monoxide Concentrations (Modeled for Existing Conditions). The state CO standards, more stringent than federal, are listed on the table for comparison to No-Build conditions.

by CARB. The second highest maximum 8-hour CO readings at the Alice Street Monitoring Station were 2.38 ppm in 2004 and 2.29 in 2005. The second highest maximum 8-hour CO readings at the International Boulevard Station were 4.89 ppm in 2002 and 4.30 ppm in 2003. CARB readings are listed in Appendix B of the *AC Transit East Bay BRT Project Air Quality Impact Technical Study* (Terry Hayes Associates, 2006). This conservative analysis utilized the data from the Oakland-International Monitoring Station.

**Table 4.12-4: Carbon Monoxide Concentrations (Modeled for Existing Conditions)[1]**

| Intersection | Receptor | Parts Per Million | |
|---|---|---|---|
| | | 1-hour | 8-hour |
| **Federal CO Standard** | | **35** | **9** |
| **California State CO Standard** | | **20** | **9.0** |
| **Berkeley** | | | |
| Fulton Street and Bancroft Way | Sidewalk Adjacent to Intersection | 9.6 | 6.7 |
| | UC Berkeley – Edwards Track Stadium | 8.0 | 5.6 |
| Adeline Street and Alcatraz Avenue | Sidewalk Adjacent to Intersection | 10.2 | 7.1 |
| | Residences on 63rd Street | 8.1 | 5.7 |
| **Oakland** | | | |
| College Avenue and Claremont Avenue | Sidewalk Adjacent to Intersection | 8.9 | 6.2 |
| | Residences on Florio Street | 7.9 | 5.5 |
| Telegraph Avenue and 40th Street | Sidewalk Adjacent to Intersection | 9.1 | 6.4 |
| | Residences on 40th Street | 8.3 | 5.8 |
| International Boulevard and Seminary Avenue | Sidewalk Adjacent to Intersection | 8.6 | 6.0 |
| | Residences on Seminary Avenue | 8.3 | 5.8 |
| International Boulevard and 66th Avenue | Sidewalk Adjacent to Intersection | 8.9 | 6.2 |
| | Lockwood Elementary School | 8.3 | 5.8 |
| Broadway and West Grand Avenue | Sidewalk Adjacent to Intersection | 9.0 | 6.3 |
| | Future Residences[2] | 9.0 | 6.3 |
| **San Leandro** | | | |
| East 14th Street and Dutton Avenue | Sidewalk Adjacent to Intersection | 8.4 | 5.9 |
| | Residences on Dutton Avenue | 8.4 | 5.9 |
| East 14th Street and Davis Street/Callan Street | Sidewalk Adjacent to Intersection | 9.3 | 6.5 |
| | Residences on Arroyo Avenue | 7.6 | 5.3 |
| East 14th Street and Fairmont Drive | Sidewalk Adjacent to Intersection | 10.0 | 7.0 |
| | Residences on Fairmont Avenue | 8.8 | 6.2 |

Notes:
[1] All concentrations include one- and eight-hour ambient concentrations of 7.0 ppm and 4.9 ppm, respectively.
[2] During the preparation of the air quality analysis, a housing development was being constructed at the corner of Broadway and West Grand Avenue.

Source: Terry A. Hayes Associates LLC, 2006.

Modeled results representing existing CO concentrations at sidewalks adjacent to the selected intersections and at the sensitive receptors closest to the selected intersections are shown in the table. One-hour CO concentrations range from approximately 8.4 ppm to 10.2 ppm at worst-case sidewalk receptors; eight-hour CO concentrations range from approximately 5.9 ppm to 7.1 ppm at worst-case sidewalk receptors. At sensitive receptors closest to each intersection, one-hour CO concentrations range from approximately 7.6 ppm to 8.8 ppm, and eight-hour CO concentrations range from approximately 5.3 ppm and 6.2 ppm. Since CO is a localized gas that disperses quickly, CO concentrations at specific sensitive receptors are lower than concentrations immediately adjacent to the intersections. Presently, CO concentrations at sidewalks and sensitive receptors closest to the study intersections do not exceed the state and federal one-hour CO standards of 20 ppm and 35 ppm, respectively. CO concentrations at sidewalks and sensitive receptors closest to the selected intersections also do not exceed the state and federal eight- hour CO standard of 9.0 ppm.

## 4.12.2 Air Quality Impacts

### 4.12.2.1 METHODOLOGY

The following calculation methods and estimation models were used to determine air quality impacts:

- BAAQMD's construction emissions calculation formulas,
- CARB's EMFAC2002 emissions factor model,
- USEPA's CAL3QHC microscale dispersion model, and
- USEPA's Industrial Source Complex-Short Term (ISCST3) dispersion model.

The localized CO analysis was conducted in accordance with the guidelines provided in Caltrans' *Transportation Project-Level Carbon Monoxide Protocol* (Caltrans 1997). The ten intersections that were analyzed in this air quality analysis were selected based on the following methodology. First, intersections that would experience LOS E or F under the Build Alternatives were selected. Of these intersections, the three most congested intersections under the Build Alternatives were selected. For the remaining intersections that would experience LOS E or F under the Build Alternatives, two to four intersections within each city were selected to provide a geographic representation. These intersections would experience the greatest change in delay or LOS when Build conditions are compared to No-Build conditions and/or would be located in closest proximity to sensitive receptors.

The proposed project does not contain lead emissions sources. Therefore, emissions and concentrations related to this pollutant were not analyzed.

### 4.12.2.2 IMPACT ANALYSIS

The proposed project would have an adverse effect on air quality if one or more of the following conditions exist:

- The change (increase) in operational emissions exceed the BAAQMD daily operational emissions thresholds for CO, ROG, $NO_X$, or $PM_{10}$, as shown in Table 4.12-5;

**Table 4.12-5: BAAQMD Daily Operational Emissions Thresholds for the BAAB**

| Criteria Pollutant | Pounds per Day[1] |
|---|---|
| Carbon Monoxide (CO) | 550 |
| Reactive Organic Gas (ROG) | 80 |
| Nitrogen Oxides ($NO_X$) | 80 |
| Particulates ($PM_{10}$) | 80 |
| Particulates ($PM_{2.5}$) | n/a |

Notes:
[1] Threshold is the increase in emissions (compared to the No-Build) attributable to the project.
Source: Bay Area Air Quality Management District.

- Operational emissions exceed federal daily or yearly emissions thresholds, as shown in Table 4.12-6;

**Table 4.12-6: Federal Emissions Thresholds for Non-attainment Areas**

| Pollutant | Pounds per Day[1,2] | Tons per Year[1] |
|---|---|---|
| ROG | 270 | 50 |
| $NO_X$ | 550 | 100 |

Notes:
[1] Federal thresholds are expressed in tons per year. For ease of comparison, federal thresholds have been converted to pounds per day.
[2] Threshold is the increase in emissions (compared to the No-Build) attributable to the project.
Source: United States Code of Federal Regulations, Title 40, Part 93.

The proposed project causes CO, $PM_{10}$, or $PM_{2.5}$ concentrations to violate state or federal standards, shown in Table 4.12-1, in an area that is in attainment for the pollutant; or

Project-related CO, $PM_{10}$ or $PM_{2.5}$ concentrations exceed five percent of the state or federal standards in an area where the ambient CO, $PM_{10}$, or $PM_{2.5}$ concentrations already exceed the state or federal standards. Five percent of the state and federal one-hour CO standard is 1 ppm and 1.75 ppm, respectively. Five percent of the state and federal eight-hour CO standard is 0.45 ppm. For $PM_{10}$, 5 percent of the state and federal 24-hour standard is 2.5 $\mu g/m^3$ and 7.5 $\mu g/m^3$, respectively. For $PM_{2.5}$, 5 percent of the federal 24-hour standard is 1.75 $\mu g/m^3$

### No-Build Alternative

The No-Build Alternative is the basis against which the Build Alternatives are compared.

**Criteria Pollutant Emissions.** In the project area, mobile emissions are the primary source of air pollution. Table 4.12-7 compares the total mobile emissions in the project corridor under the No-Build and Build Alternatives. This analysis considers emissions from all vehicles in the corridor (not just buses).

**Carbon Monoxide Concentration.** Overall CO concentrations in year 2010 and 2025 are expected to be lower than existing conditions due to stringent state and federal mandates for lowering vehicle emissions. Although future traffic volumes would be higher, these increases would be offset by increases in cleaner-running cars as a percentage of the entire vehicle fleet on the road. Therefore, the decrease in pollutant levels from 2010 to 2025 can be attributed primarily to the change in ambient levels and not to the Build Alternatives. The actual difference in emissions between No-Build and Build is calculated in Table 4.12-7.

**Table 4.12-7: Alameda County Criteria Pollutant Emissions Comparison**

| Scenario | Criteria Pollutant Emissions (pounds per day) | | | | | |
|---|---|---|---|---|---|---|
| | CO | ROG | $NO_X$ | $SO_X$ | $PM_{10}$ | $PM_{2.5}$[1] |
| **2010** | | | | | | |
| No-Build | 388,481 | 45,101 | 88,593 | 381 | 3,698 | 3,565 |
| Build | 388,351 | 45,086 | 88,564 | 381 | 3,696 | 3,563 |
| *Build vs. No-Build* | *-130 (-0.03%)* | *-15 (-0.03%)* | *-29 (-0.03%)* | *0 (0%)* | *-2 (-0.05%)* | *-2 (-0.05%)* |
| **2025** | | | | | | |
| No-Build | 130,470 | 19,486 | 31,057 | 439 | 3,754 | 3,619 |
| Build | 130,428 | 19,480 | 31,047 | 439 | 3,753 | 3,618 |
| *Build vs. No-Build* | *-42 (-0.03%)* | *-6 (-0.03%)* | *-10 (-0.03%)* | *0 (0%)* | *-1 (-0.03%)* | *-1 (-0.03%)* |

Notes:
[1] Regional operational $PM_{2.5}$ emissions were calculated as 96.4 percent of $PM_{10}$ emissions.
Source: Terry A. Hayes Associates LLC, 2005.

Year 2010 CO concentrations at the ten selected intersections are shown in Table 4.12-8. Year 2025 CO concentrations are shown in Table 4.12-9. The state and federal one- and eight-hour CO standards would not be exceeded at worst-case sidewalk receptor locations or the sensitive receptors closest to the roadway intersections. Thus, no adverse impacts are anticipated for the year 2010 or 2025 for the No-Build Alternative.

**$PM_{10}$ Concentrations**. The No-Build Alternative is anticipated to introduce 90 additional buses per day to each transit station. Buses idling as passengers board or leave the buses would likely increase $PM_{10}$ concentrations in the area surrounding the transit stations. In 2010, the idling of buses under the No-Build Alternative would incrementally increase the 24-hour $PM_{10}$ concentration at sidewalks adjacent to the transit stations by approximately 0.3 $\mu g/m^3$ over the 2010 ambient $PM_{10}$ concentration without the additional 90 buses per day. In 2025, the idling of buses under the No-Build Alternative would incrementally increase the 24-hour $PM_{10}$ concentration at sidewalks adjacent to the transit stations by approximately 0.2 $\mu g/m^3$ over the estimated 2025 ambient $PM_{10}$ concentration without the additional bus trips. The 24-hour ambient $PM_{10}$ concentrations in year 2010 and 2025 under the No-Build condition would therefore be 60.8 $\mu g/m^3$ and 60.5 $\mu g/m^3$, respectively.

The No-Build Alternative ambient $PM_{10}$ concentrations in 2010 and 2025 would not exceed the federal 24-hour standard of 150 $\mu g/m^3$. However, ambient $PM_{10}$ concentrations would exceed the state $PM_{10}$ standard of 50 $\mu g/m^3$ in both years.

**$PM_{2.5}$ Concentrations**.[8] Ambient $PM_{2.5}$ concentrations in 2010 and 2025 are estimated to be 39.1 and 25.8 $\mu g/m^3$, respectively, under the No-Build Alternative. The 2010 concentration would exceed the federal standard of 35 $\mu g/m^3$. By 2025, because the ambient $PM_{2.5}$ concentration is expected to decrease, it would be below the federal 24-hour standard.

[8] Currently, there are few or no $PM_{2.5}$ emissions factors for combustion processes. Therefore, an indirect approach for calculating $PM_{2.5}$ emissions was conducted, which followed guidance provided by the South Coast Air Quality Management District (*Final—Methodology to Calculate Particulate Matter $(PM)_{2.5}$ and $PM_{2.5}$ Significance Thresholds*, October 2006.

## Table 4.12-8: 2010 Carbon Monoxide Concentrations[1]

| Intersection | Receptor | 1-Hour | | 8-Hour | |
|---|---|---|---|---|---|
| | | No-Build Alternative | Build Alternatives | No-Build Alternative | Build Alternatives |
| **Federal CO Standard** | | **35** | | **9** | |
| **California State CO Standard** | | **20** | | **9.0** | |
| **Berkeley** | | | | | |
| Fulton Street and Bancroft Way | Sidewalk Adjacent to Intersection | 5.7 | 5.7 | 4.0 | 4.0 |
| | UC Berkeley – Edwards Track Stadium | 5.0 | 5.0 | 3.5 | 3.5 |
| Adeline Street and Alcatraz Avenue | Sidewalk Adjacent to Intersection | 6.3 | 6.4 | 4.4 | 4.5 |
| | Residences on 63rd Street | 5.0 | 5.1 | 3.5 | 3.6 |
| **Oakland** | | | | | |
| College Avenue and Claremont Avenue | Sidewalk Adjacent to Intersection | 5.7 | 5.8 | 4.0 | 4.1 |
| | Residences on Florio Street | 4.9 | 5.0 | 3.4 | 3.5 |
| Telegraph Avenue and 40th Street | Sidewalk Adjacent to Intersection | 5.7 | 5.8 | 4.0 | 4.1 |
| | Residences on 40th Street | 5.1 | 5.2 | 3.6 | 3.6 |
| International Boulevard and Seminary Avenue | Sidewalk Adjacent to Intersection | 5.5 | 5.4 | 3.9 | 3.8 |
| | Residences on Seminary Avenue | 5.3 | 5.2 | 3.7 | 3.6 |
| International Boulevard and 66th Avenue | Sidewalk Adjacent to Intersection | 5.6 | 5.4 | 3.9 | 3.8 |
| | Lockwood Elementary School | 5.5 | 5.3 | 3.9 | 3.7 |
| Broadway and West Grand Avenue | Sidewalk Receptor and Residences at the Intersection[2] | 5.5 | 5.7 | 3.9 | 4.0 |
| **San Leandro** | | | | | |
| East 14th Street and Dutton Avenue | Sidewalk Adjacent to Intersection | 5.3 | 5.4 | 3.7 | 3.8 |
| | Residences on Dutton Avenue | 5.3 | 5.4 | 3.7 | 3.8 |
| East 14th Street and Davis Street/Callan Street | Sidewalk Adjacent to Intersection | 5.8 | 5.7 | 4.1 | 4.0 |
| | Residences on Arroyo Avenue | 5.0 | 4.8 | 3.5 | 3.4 |
| East 14th Street and Fairmont Drive | Sidewalk Adjacent to Intersection | 6.2 | 6.2 | 4.4 | 4.4 |
| | Residences on Fairmont Avenue | 5.5 | 5.4 | 3.9 | 3.8 |

Notes:
[1] All concentrations include 2010 one- and eight-hour ambient concentrations of 4.5 ppm and 3.2 ppm, respectively.
[2] During the preparation of the air quality analysis, a housing development was under construction at the corner of Broadway and West Grand Avenue.
Source: Terry A. Hayes Associates LLC, Appendix

**Table 4.12-9: 2025 Carbon Monoxide Concentrations[1]**

| Intersection | Receptor | 1-Hour | | 8-Hour | |
|---|---|---|---|---|---|
| | | No-Build Alternative | Build Alternatives | No-Build Alternative | Build Alternatives |
| **Federal CO Standard** | | **35** | | **9** | |
| **California State CO Standard** | | **20** | | **9.0** | |
| **Berkeley** | | | | | |
| Fulton Street and Bancroft Way | Sidewalk Adjacent to Intersection | 2.0 | 1.9 | 1.4 | 1.3 |
| | UC Berkeley – Edwards Track Stadium | 1.6 | 1.6 | 1.1 | 1.1 |
| Adeline Street and Alcatraz Avenue | Sidewalk Adjacent to Intersection | 2.2 | 2.2 | 1.5 | 1.5 |
| | Residences on 63rd Street | 1.7 | 1.7 | 1.2 | 1.2 |
| **Oakland** | | | | | |
| College Avenue and Claremont Avenue | Sidewalk Adjacent to Intersection | 1.9 | 2.0 | 1.3 | 1.4 |
| | Residences on Florio Street | 1.6 | 1.7 | 1.1 | 1.2 |
| Telegraph Avenue and 40th Street | Sidewalk Adjacent to Intersection | 2.0 | 2.0 | 1.4 | 1.4 |
| | Residences on 40th Street | 1.7 | 1.8 | 1.2 | 1.3 |
| International Boulevard and Seminary Avenue | Sidewalk Adjacent to Intersection | 1.9 | 1.8 | 1.3 | 1.3 |
| | Residences on Seminary Avenue | 1.8 | 1.7 | 1.3 | 1.2 |
| International Boulevard and 66th Avenue | Sidewalk Adjacent to Intersection | 1.9 | 1.9 | 1.3 | 1.3 |
| | Lockwood Elementary School | 1.8 | 1.8 | 1.3 | 1.3 |
| Broadway and West Grand Avenue | Sidewalk Adjacent to Intersection and Residences at the Intersection[2] | 2.1 | 2.1 | 1.5 | 1.5 |
| **San Leandro** | | | | | |
| East 14th Street and Dutton Avenue | Sidewalk Adjacent to Intersection | 1.8 | 1.9 | 1.3 | 1.3 |
| | Residences on Dutton Avenue | 1.8 | 1.9 | 1.3 | 1.3 |
| East 14th Street and Davis Street/Callan Street | Sidewalk Adjacent to Intersection | 1.9 | 1.9 | 1.3 | 1.3 |
| | Residences on Arroyo Avenue | 1.5 | 1.5 | 1.1 | 1.1 |
| East 14th Street and Fairmont Drive | Sidewalk Adjacent to Intersection | 2.1 | 2.1 | 1.5 | 1.5 |
| | Residences on Fairmont Avenue | 1.9 | 1.9 | 1.3 | 1.3 |

Notes:

[1]All concentrations include 2025 one- and eight-hour ambient concentrations of 1.5 ppm and 1.1 ppm, respectively.

[2]During the preparation of the air quality analysis, a housing development was under construction at the corner of Broadway and West Grand Avenue.

Source: Terry A. Hayes Associates LLC, 2005.

### Build Alternatives

The same Van Hool buses are assumed for No-Build and all Build Alternatives in the years 2010 and 2025 and therefore emission factors for buses would be the same under both the No-Build and Build Alternatives.[9] As shown in Table 4.12-7, criteria pollutant emissions for the Build Alternatives in year 2010 are anticipated to incrementally decrease by approximately 130 pounds per day (ppd) for CO, 15 ppd for ROG, 29 ppd for $NO_X$, 2 ppd for $PM_{2.5}$, and 2 ppd for $PM_{10}$ compared to the No-Build Alternative. In year 2025, criteria pollutant emissions are anticipated to incrementally decrease by approximately 42 ppd for CO, 6 ppd for ROG, 10 ppd for $NO_X$, 1 ppd for $PM_{2.5}$,and 1 ppd for $PM_{10}$ compared to the No-Build Alternative. $SO_X$ emissions are not anticipated to change in years 2010 and 2025. The decrease in pollutant emissions would be considered a beneficial impact.

**Carbon Monoxide Concentrations.** Carbon monoxide concentrations were calculated as described in Sections 4.12.1.5, Existing Conditions, and 4.12.2.1, Methodology. Table 4.12-8, 2010 Carbon Monoxide Concentrations, and Table 4.12-9, 2025 Carbon Monoxide Concentrations, present the one- and eight-hour CO concentrations at the ten study intersections. The state and federal one- and eight-hour standards would not be exceeded at worst-case sidewalk receptor locations and at the closest sensitive receptor to the roadway intersections in year 2010 or 2025. Thus, no adverse impact is anticipated for the Build Alternatives.

**$PM_{10}$ Concentrations.** The Build Alternatives are anticipated to introduce 250 additional buses (i.e. stops) per day to each transit station. Buses idling as passengers board or leave the buses would likely increase $PM_{10}$ concentration in the area surrounding the transit stations. In 2010, the idling of buses would incrementally increase the 24-hour $PM_{10}$ concentration at sidewalks adjacent to the transit station by approximately 0.8 $\mu g/m^3$ over the 2010 ambient $PM_{10}$ concentration. In 2025, the idling of buses under the Build Alternatives would incrementally increase the 24-hour $PM_{10}$ concentration at sidewalks adjacent to the transit station by approximately 0.5 $\mu g/m^3$ over the 2025 ambient $PM_{10}$ concentration. Ambient $PM_{10}$ concentrations in year 2010 and 2025 are 60.5 $\mu g/m^3$ and 60.3 $\mu g/m^3$, respectively. Ambient $PM_{10}$ concentrations in 2010 and 2025 would not exceed the federal 24-hour standard, and $PM_{10}$ contributions from the Build Alternatives, when added to the ambient $PM_{10}$ concentrations, would not exceed the federal 24-hour standard.

Ambient $PM_{10}$ concentrations would exceed the state 24-hour standard of 50 $\mu g/m^3$. If ambient $PM_{10}$ concentrations exceed the state $PM_{10}$ standard, an adverse impact would occur if the Build Alternatives cause $PM_{10}$ concentrations to incrementally increase by 2.5 $\mu g/m^3$ or more. The incremental increase of 0.8 $\mu g/m^3$ in 2010 and 0.5 $\mu g/m^3$ in 2025 would not exceed the threshold. Thus, no adverse impacts are anticipated for the Build Alternatives.

**$PM_{2.5}$ Concentrations**. The additional bus stops per day proposed under the Build Alternatives would likely increase $PM_{2.5}$ concentrations in the areas surrounding BRT stations. As for $PM_{10}$, idling buses while stopped for passenger loading and unloading would increase the $PM_{2.5}$ concentration at stations and at sidewalks adjacent to the station by approximately 0.8 $\mu g/m^3$ in 2010 and by 0.5 $\mu g/m^3$ in

[9] Available emissions data on the Van Hool AG 300 bus, 2006 model year, are as follows:
- 2.5 grams $NO_x$ and 0.01 grams $PM_{10}$ per brake-horsepower (Cummins ISL engine).

2025. Total concentrations would be 39.9 µg/m$^3$ in 2010 and 26.3 µg/m$^3$ in 2025. The 2010 concentration would exceed the federal 24-hour standard while the 2025 would be below the federal standard. An adverse impact would occur if the projected 2010 increase in $PM_{2.5}$ concentrations attributable to the Build Alternatives exceeds 5 percent of the federal standard, or 1.75 µg/m$^3$. In 2010, the increase of 0.8 µg/m$^3$ would be less than the threshold for adverse impact. Thus, no adverse impacts are anticipated for the Build Alternatives in either 2010 or 2025.

NOX emissions. In 2025, under any of the proposed Build Alternatives, vehicle miles traveled per day and the speed of the buses would be higher than that under the No-Build Alternative. Consequently, NOX emissions from buses would be higher under the Build Alternatives than the emissions from buses under the No-Build Alternative. This increase in bus emissions would be offset by the decrease in emissions from fewer automobiles in the corridor under the Build Alternatives. Hence, as shown in Table 4.12-7, NOx emissions under any of the Build Alternatives would be slightly lower than those under the No-Build Alternative. Thus, no adverse impacts are anticipated under any of the Build Alternatives.

### 4.12.3 Avoidance, Minimization, and/or Mitigation Measures

Under the build alternatives, AC Transit would meet the CARB exhaust emissions standards for 2007-2009 model-year heavy duty urban bus engines and the Fleet Rule for Transit Agencies Urban Bus Requirements (pursuant to Title 13 CCR sections 1956.1, 2020, 2023, 2023.1, and 2023.4).

No adverse impacts to air quality are anticipated, and therefore, no minimization or mitigation measures are recommended.

### 4.12.4 Transportation Conformity Analysis

FTA cannot approve funding for project activities beyond preliminary engineering unless the project is in conformity with USEPA transportation conformity regulations (40 CFR Part 93). The criteria that the Build Alternatives must satisfy are discussed below. In addition to an operations analysis, a conformity analysis of construction emissions is required under certain scenarios (see Section 4.16.9). Project-related construction activity would not last more than five years at any single construction site. As such, consideration of a construction hotspots is not required as part of the federal conformity analysis.

§93.110 The conformity determination must be based on the latest planning assumptions.

The Association of Bay Area Governments (ABAG) is the Metropolitan Planning Organization responsible for determining areawide population and employment forecasts. Traffic forecasts for the proposed project were developed using the Alameda Countywide Travel Model (Alameda Model). The Alameda Model uses Projection 2002 information, which are ABAG's population and employment projections for the region. AC Transit also worked with the cities of Berkeley, Oakland, and San Leandro to ensure that the ABAG data were consistent with city and countywide totals.

§93.111 The conformity determination must be based on the latest emission estimation model available.

Emission estimates are based on CARB EMFAC 2002 model. USEPA CAL3QHC model was used for CO modeling. EMFAC2002 and CAL3QHC models are the most recent models approved by USEPA.

§93.112 Conformity determination must be made according to the consultation procedures of this rule and in the applicable implementation plan, and according to the public involvement procedures established in compliance with 23 CFR Part 450. The conformity determination must be made according to §93.105(a)(2) and (e) and the requirements of 23 CFR Part 450.

Consultation procedures in 20 CFR Part 450, 40 CFR Part 51, and 40 CFR Part 93 (§93.105(a)(2) and (e)) would be followed before making the final conformity determination for the proposed project. The environmental document for the proposed project would be available for public review and comment prior to adoption.

§93.114 There must be a currently conforming transportation plan and TIP at the time of project approval.

The most recent transportation plan in the project area is the Transportation 2030 Plan. The most recent TIP is the 2007 TIP. The Transportation 2030 Plan was adopted MTC on February 23, 2005. The 2007 TIP was adopted by MTC on October 2, 2006. FHWA and FTA made a conformity determination for the Transportation 2030 Plan on March 17, 2005 and for the 2007 TIP on October 2, 2006.

§93.115 The proposed project must come from a conforming transportation plan and TIP.

The proposed project is included in the Transportation 2030 Plan and 2007 TIP.

§93.116 The proposed project would not cause or contribute to any new localized CO, $PM_{2.5}$, or $PM_{10}$ violations or increase the frequency or severity of any existing CO, $PM_{2.5}$ or $PM_{10}$ violations in CO, $PM_{2.5}$, and $PM_{10}$ non-attainment and maintenance areas.

The violations this criterion refers to are the NAAQS. Operations of the Build Alternatives would decrease vehicle miles traveled in the region. No CO violations would result from operations of the proposed project. As discussed previously, the proposed project would not contribute to any new federal $PM_{2.5}$ or $PM_{10}$ violations.

§93.117 The proposed project must comply with $PM_{10}$ and $PM_{2.5}$ control measures that are contained in the applicable implementation plan.

$PM_{10}$ and $PM_{2.5}$ control measures are not available for the San Francisco Bay Area since BAAQMD does not have a SIP for $PM_{10}$ and $PM_{2.5}$. Build Alternatives would decrease VMT in the region, which would result in lower $PM_{10}$ and $PM_{2.5}$ concentrations. If a federal $PM_{10}$ or $PM_{2.5}$ attainment plans were required in the future, AC Transit would identify appropriate control measures for $PM_{10}$ and $PM_{2.5}$ emissions.

Based on the above, the proposed project satisfies USEPA's project-level conformity requirements (40 CFR Part 93).

# 4.13 Noise and Vibration

## 4.13.1 Methodology and Criteria

### 4.13.1.1 Noise Methodology and Criteria

Noise is typically defined as unwanted or undesirable sound. The loudness of sound is associated with its sound pressure level, most commonly measured in decibels (dB). Through a process known as "A-weighting," the measurement of loudness is adjusted to provide a single numerical descriptor that correlates with human subjective response. Sound levels measured using this weighting system are called "A-weighted" sound levels, and are expressed in decibel notation as "dBA." The A-weighted sound level is widely accepted by acousticians as a proper unit for describing environmental noise. Figure 4.13-1 illustrates typical A-weighted sound pressure levels for various noise sources.

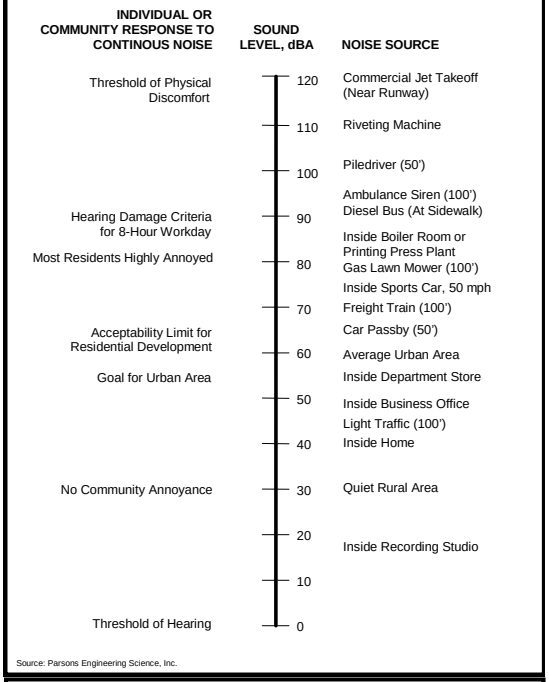


**Figure 4.13-1: Typical Ldn Sound**

#### Noise Metrics

Because environmental noise fluctuates from moment to moment, it is common practice to condense the wide fluctuations recorded over time into a single number, called the "equivalent" sound level

(Leq). Leq can be thought of as the steady sound level that represents the same sound energy as the varying sound levels over a specified time period (typically 1 hour or 24 hours). Noise in residential areas is characterized by measuring changes in day-night sound level (Ldn). Ldn is the A-weighted Leq for a 24-hour period with an added 10-decibel penalty imposed on noise that occurs during the nighttime hours (between 10 p.m. and 7 a.m.). Many surveys have shown that Ldn is well correlated with human annoyance, and therefore this descriptor is widely used for environmental noise impact assessment. The A-weighted decibel levels (dBA levels) given for the examples in Figure 4.13-1 represent the Ldn for typical noise environments.

### Noise Impact Criteria

Noise impact for this project is based on the criteria defined in the U. S. Federal Transit Administration (FTA) guidance manual *Transit Noise and Vibration Impact Assessment* (FTA Report DOT-T-95-16, April 1995). The FTA noise impact criteria are founded on well-documented research on community reaction to noise and are based on change in noise exposure using a sliding scale. Although more transit noise is allowed in neighborhoods with high levels of existing noise, smaller increases in total noise exposure are allowed with increasing levels of existing noise.

The FTA Noise Impact Criteria group noise sensitive land uses into the following three categories:

**Category 1:** Buildings or parks where quiet is an essential element of their purpose.

**Category 2:** Residences and buildings where people normally sleep. This includes residences, hospitals, and hotels where nighttime sensitivity is assumed to be of utmost importance.

**Category 3:** Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, churches and active parks.

Ldn is used to characterize noise exposure for residential areas and hotels (Category 2). For other noise sensitive land uses, such as outdoor amphitheaters and school buildings (Categories 1 and 3), the maximum 1-hour Leq during the facility's operating period is used.

There are two levels of impact included in the FTA criteria, as summarized below:

**Severe Impact:** Severe noise impacts are considered "significant" as this term is used in the National Environmental Policy Act (NEPA) and implementing regulations. Noise mitigation will normally be specified for severe impact areas unless there is no practical method of mitigating the noise.

**Impact (Moderate Impact):** In this range of noise impact, other project-specific factors must be considered to determine the magnitude of the impact and the need for mitigation. These other factors can include the predicted increase over existing noise levels, the types and number of noise-sensitive land uses affected, existing outdoor-indoor sound insulation, and the cost effectiveness of mitigating noise to more acceptable levels. In this environmental document, noise impacts within the Impact range of the FTA criteria will be referred to as moderate impacts to clearly differentiate them from impacts within the Severe range.

Impact levels are based on the increase in the cumulative noise when the project noise is added to existing noise. More transit noise is allowed in neighborhoods were existing noise levels are already high, but the allowed level of noise increase is smaller than that permitted where existing noise levels are lower. The third column in Table 4.13-1 shows the allowable noise increases for Category 1 and 2 land uses, based on existing noise exposure. As shown in Table 4.13-1, an existing noise exposure of 45 dBA allows an increase of 7 dBA under Build conditions. At an existing noise exposure of 75 dBA, however, any noise increase under the project would constitute an impact. As the existing level of ambient noise increases, the allowable level of project noise increases, but the total allowable increase in community noise exposure is reduced. This reduction accounts for the unexpected result for project noise exposure levels that are less than the existing noise exposure and still cause impact. The project noise criteria for Category 3 land uses are 5 dBA higher than those shown in Table 4.13-1.

**Table 4.13-1: Noise Impact Criteria: Effect on Cumulative Noise Exposure**

| $L_{dn}$ or $L_{eq}$ in dBA (rounded to nearest whole decibel) | | | |
|---|---|---|---|
| **Existing Noise Exposure** | **Allowable Project Noise Exposure** | **Allowable Combined Total Noise Exposure** | **Allowable Noise Exposure Increase** |
| 45 | 51 | 52 | 7 |
| 50 | 53 | 55 | 5 |
| 55 | 55 | 58 | 3 |
| 60 | 57 | 62 | 2 |
| 65 | 60 | 66 | 1 |
| 70 | 64 | 71 | 1 |
| 75 | 65 | 75 | 0 |

Source: USDOT 1995

#### 4.13.1.2 VIBRATION METHODOLOGY AND CRITERIA

Vibration is an oscillatory motion, which can be described in terms of displacement, velocity, or acceleration. Displacement, in the case of a vibrating floor, is simply the distance that a point on the floor moves away from its static position. The velocity represents the instantaneous speed of the floor movement and acceleration is the rate of change of the speed. The response of humans, buildings, and equipment to vibration is normally described using velocity or acceleration.

##### Vibration Impact Criteria

The FTA *Transit Noise and Vibration Impact Assessment* (USDOT 1995) provides a procedure to determine whether or not a transit project requires a vibration analysis. Transit projects that involve rubber-tire vehicles rarely show potential for vibration impacts and therefore do not require vibration analysis. Three factors are checked to determine if there is potential for vibration impacts from bus projects:

1. Will there be expansion joints, speed bumps, or other design features that result in unevenness in the road surface near vibration-sensitive buildings? Such irregularities can result in perceptible ground-borne vibration at distances up to 75 feet away.
2. Will buses, trucks, or other heavy vehicles be operating close to a sensitive building? Research using electron microscopes and manufacturing of computer chips are examples of vibration sensitive activities.
3. Does the project include operation of vehicles inside or directly underneath buildings that are vibration-sensitive? Special considerations are often required for shared use facilities such as bus stations located inside an office building complex.

Projects that do not include any of those three conditions are exempt from vibration analysis. Projects that do include one of the factors are then screened for distances from vibration-sensitive land uses. For bus projects, the vibration source must be a minimum of 100 feet from Category 1 land uses and 50 feet from Category 2 land uses. No distances are specified for Category 3.

## 4.13.2 Existing Conditions

### 4.13.2.1 Existing Noise

Sensitive receptors were selected by their proximity to the alignment and by land usage. Different categories of land uses are located along the East Bay BRT alignment. In general, the northern segment of the East Bay BRT Project, which includes Downtown Berkeley and University of California at Berkeley, has a higher concentration of school zones. The central segment consisting of Downtown Oakland is more commercial. The southern segment from Downtown Oakland to San Leandro contains stretches of commercial and residential areas, and school zones.

Noise measurements were conducted nearby sensitive receptors along the alignment between November 29 and December 3, 2004. A total of 18 short-term (typically 20-minute) and five long-term measurements (typically 24-hour) were taken along the East Bay BRT alignment. Tables 4.13-2 and 4.13-3 present the results of the long-term and short-term noise measurements, respectively. The long term measurements were used to adjust short term measurements to peak hour levels and to determine the time of peak traffic noise along East Bay BRT alignment. Once peak hours were determined for an area, short-term measurements could be taken without the need to be adjusted to peak hour levels.

### 4.13.2.2 Existing Vibration

The AC Transit East Bay BRT Project was screened for vibration impacts in accordance with the *FTA Transit Noise and Vibration Impact Assessment Manual*. Because buses have rubber tires and suspension systems that isolate vibrations from the ground, vibration impact assessment was not warranted (US DOT, 1995).

## 4.13.3 Environmental Consequences

### 4.13.3.1 NOISE IMPACTS

Noise levels were calculated for the following conditions:

- Existing traffic conditions along the East Bay BRT alignment,
- Traffic conditions in 2025 for the No-Build Alternative,
- Traffic conditions in 2025 for each of the four Build Alternatives.

BRT noise levels were projected based on field measurements of the Van Hool buses currently used by AC Transit. The operating times, headways, and other aspects of BRT and local bus operations are based on the operating plan described in Chapter 2.

This analysis considers two types of receptors for noise impacts: Category 2 (receptors that are sensitive to noise in both the day and night such as residences), and Category 3 (receptors that are not sensitive to noise at night such as schools and churches). There are no Category 1 receptors on the project alignment. Table 4.13-4 presents impacts for Category 2 receptors, and Table 4.13-5 presents impacts for Category 3 receptors. These tables indicate the existing noise level, the noise impact criteria, and the noise level generated by existing condition, the East Bay BRT future build alternatives, and the future no-build scenario. Tables also provide the distance from the outer traffic lane to the property line and the BRT maximum operating speed, which is equal to the speed limit for each segment with some of the segments having two posted limits due to school zones. The tables list predicted impacts by location, noise level (dBA), and FTA impact category of "none," "impact" (referred to as "moderate impact" in this environmental document), or "severe impact." The number of impacts was determined by plotting the impact contour lines on the East Bay BRT project layout aerials. An impact occurs if the impact contour line overlaps a noise sensitive property line.

Generally, the project would reduce noise levels along the alignment because future traffic volumes with the project are lower than existing traffic volumes and considerably lower than future traffic volumes without the project. (See Chapter 3, Traffic and Transportation.) Impacts would occur, however, in Berkeley with the *Two-Way Transitway via Bancroft Way* alignment variation, where bus dedicated center lanes would displace car traffic to other streets parallel to the alignment.

**Table 4.13-2: Long-Term Noise Measurement Results**

| Site No. | Street Address, City | Land Use[1] | Meter Location | Measurement Dates | Start Time | Duration, No. of Hours | Measured Peak Hour Leq, dBA[2] | Peak-Hour Time |
|---|---|---|---|---|---|---|---|---|
| LT01 | 2330 Durant Ave (Durant House), Berkeley | Church | Front Yard | 12/01 – 12/02 | 11:30 a.m. | 26 | 65 | 11 a.m., 2 p.m. |
| LT02 | 5810 Telegraph Ave, Oakland | SFR | Front Yard | 11/30 – 12/01 | 4:20 p.m. | 24 | 67 | 8 a.m., 9 a.m. |
| LT03 | Marriott Courtyard Downtown, Oakland | HOT | Room | 12/02 – 12/03 | 3:10 p.m. | 20[3] | 65 | 8 a.m., 9 a.m. |
| LT04 | 328 East 14th St, San Leandro | SFR | Side Yard | 11/29 – 11/30 | 3:23 p.m. | 26 | 61 | 9 a.m. |
| LT05 | 1408 148th St, San Leandro | SFR | Side Yard | 12/01 – 12/02 | 4:41 p.m. | 24 | 62 | 5 p.m., 8 a.m., 9 a.m. to 11 a.m., 1 p.m. to 3 p.m. |

Notes:
1. SFR = Single Family Residential; MFR = Multi-Family Residential, HOT = Hotel.
2. The highest measured hourly noise level recorded during the long-term measurement period.
3. Measurement ended early due to a time constraint.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006.

## Table 4.13-3: Short-Term Noise Measurement Results

| Site No. | Street Address, City | Land Use[1] | Meter Location[2] | Measurement Date | Start Time | Measured Leq, dBA[3] | Adjusted Peak-Hour Leq, dBA[4] | Adjusted to Long-Term Site |
|---|---|---|---|---|---|---|---|---|
| ST01 | Bancroft Way and Dana St, Berkeley | MFR | Sidewalk | 12/02 | 1:28 p.m. | 66.8 | 69 | LT01 |
| ST02 | 2330 Durant Ave (Durant House), Berkeley | Church | Front Yard | 12/02 | 1:52 p.m. | 65.2 | 67 | LT01 |
| ST03 | Telegraph Ave and Downing Ave, Berkeley | MFR | Sidewalk | 12/02 | 12:37 p.m. | 68.3 | 68 | NLT |
| ST04 | 5810 Telegraph Ave, Berkeley | SFR | Side Yard | 12/01 | 8:40 a.m. | 66.9 | 67 | LT02 |
| ST05 | 5683 Telegraph Ave, Oakland | SFR | Sidewalk | 11/30 | 2:06 p.m. | 70.4 | 71 | LT02 |
| ST06 | 3139 Telegraph Ave, Oakland | SFR | Front Yard | 12/01 | 12:40 p.m. | 70.2 | 70 | NLT |
| ST07 | 2800 Telegraph Ave, Oakland | COM | Sidewalk | 12/02 | 7:51 a.m. | 70.3 | 70 | NLT |
| ST08 | Telegraph Ave and 17th Street, Oakland | COM | Sidewalk | 12/02 | 7:21 a.m. | 69.9 | 70 | NLT |
| ST09 | Jackson Street and 12th Street, Oakland | COM | Sidewalk | 12/01 | 6:25 p.m. | 66.0 | 66 | NLT |
| ST10 | Franklin Street and 12th Street, Oakland | COM | Sidewalk | 12/02 | 8:25 a.m. | 70.0 | 70 | NLT |
| ST11 | Marriott Courtyard Downtown, Oakland | HOT | Sidewalk | 12/03 | 10:01 a.m. | 70.7 | 72 | LT03 |
| ST12 | 1327 International Blvd, Oakland | COM | Sidewalk | 12/03 | 8:55 a.m. | 69.4 | 69 | NLT |
| ST13 | 6220 International Blvd, Oakland | COM | Sidewalk | 12/01 | 5:40 p.m. | 70.8 | 71 | NLT |
| ST14 | 8102 East 14th Street, Oakland | COM | Sidewalk | 12/01 | 5:11 p.m. | 71.3 | 71 | NLT |
| ST15 | 1471 Tucker Street, San Leandro | MFR | Front Yard | 11/30 | 12:25 p.m. | 61.4 | 64 | LT04 |
| ST16 | 645 East 14th Street, San Leandro | COM | Sidewalk | 11/30 | 3:35 p.m. | 73.0 | 76 | LT04 |
| ST17 | 1699 East 14th Street, San Leandro | COM | Sidewalk | 12/02 | 10:08 a.m. | 70.2 | 70 | LT05 |
| ST18 | Bayfair Center, San Leandro | COM | Sidewalk | 12/02 | 11:17 a.m. | 71.3 | 71 | LT05 |

Notes:
1. SFR = Single Family Residential; MFR = Multi-Family Residential; HOT = Hotel: COM = Commercial Building; NLT = Short-term measurement peak hour was not adjusted to a long-term measurement.
2. Some of the noise measurements were conducted on sidewalks due to outdoor use area access.
3. All short-term measured noise levels are a 20-minute Leq.
4. Measurements conducted during off-peak hours were adjusted to the peak-hour Leq based on a comparison with long-term noise levels which were measured at a nearby measurement site, listed in the last column.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

## Table 4.13-4: Summary of Noise Impacts for Category 2 Land Uses

| Description | Side[1] | Distance from outer traffic lane to property line, feet | BRT Operation Speed mph | Existing Traffic Noise Levels, $L_{dn}$, dBA | Overall Future No Build Noise Levels[3], $L_{dn}$, dBA | Overall Future Build Levels[3] Alternatives 3 and 4, $L_{dn}$, dBA | Overall Future Build Levels[3] Alternatives 1 and 2, $L_{dn}$, dBA | Criteria, ( Impact / Severe) dBA | Distance from Outer Lane to Noise Impact Contours, feet[2] | | Degree of Impact[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Moderate | Severe | |
| **Berkeley[5]** | | | | | | | | | | | |
| Center St and Bancroft Way | East | 44 (Existing and No Build) 31 (Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| | West | 44 (Existing and No Build) 31 (Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| Durant St Between Shattuck Ave and Telegraph Ave | North | 25 | 25 | 68 | 69 | 70 | 70 | 70/72 | 25 | 16 | Moderate |
| | South | 25 | 25 | 68 | 69 | 70 | 70 | 70/72 | 25 | 16 | Moderate |
| Telegraph Ave Between Parker and Prince St | East | 25 | 25 | 70 | 71 | 69 | 69 | 72/74 | 13 | 8 | None |
| | West | 25 | 25 | 70 | 71 | 69 | 69 | 72/74 | 13 | 8 | None |
| **Berkeley[6]** | | | | | | | | | | | |
| Shattuck Ave Between Center St and Bancroft Way | East | 44 (Existing and No Build) 31 (Build) | 25 | 69 | 70 | 70 | 71 | 71/73 | - | - | None |
| | West | 44 (Existing and No Build) 31 (Build) | 25 | 69 | 70 | 69 | 69 | 71/73 | - | - | None |
| Bancroft Way Between Shattuck Ave and Telegraph Ave | North | 25 | 25 | 68 | 70 | 70 | 70 | 71/73 | 22 | 17 | None |
| | South | 25 | 25 | 68 | 70 | 69 | 69 | 71/73 | 17 | 14 | None |
| Durant St Between Shattuck Ave and Telegraph Ave | North | 25 | 25 | 68 | 69 | 68 | 67 | 70/72 | 14 | 9 | None |
| | South | 25 | 25 | 68 | 69 | 69 | 69 | 70/72 | 18 | 11 | None |
| Telegraph Ave Between Parker and Prince St | East | 25 | 25 | 70 | 71 | 69 | 69 | 72/74 | 13 | 8 | None |
| | West | 25 | 25 | 70 | 71 | 69 | 69 | 72/74 | 13 | 8 | None |
| **North Oakland** | | | | | | | | | | | |
| Telegraph Ave Between Alcatraz Ave and 52nd St | East | 25 | 30 | 72 | 72 | 70 | 70 | 73/75 | 13 | 8 | None |
| | West | 25 | 30 | 72 | 73 | 71 | 71 | 73/75 | 14 | 9 | None |
| Telegraph Ave Between 51st and 40th St | East | 25 | 30 & 25 | 70 | 71 | 69 | 69 | 71/73 | 17 | 11 | None |
| | West | 25 | 30 & 25 | 70 | 71 | 69 | 69 | 71/73 | 17 | 10 | None |
| Telegraph Ave Between 40th and 27th St | East | 25 | 25 | 70 | 70 | 69 | 69 | 71/73 | 15 | 10 | None |
| | West | 25 | 25 | 69 | 70 | 69 | 69 | 70/72 | 18 | 11 | None |
| Telegraph Ave Between 27th and 20th St | East | 25 | 25 | 68 | 69 | 68 | 68 | 69/71 | 18 | 11 | None |
| | West | 25 | 25 | 68 | 69 | 68 | 68 | 69/71 | 18 | 11 | None |

Notes:
1. The direction shown indicates on which side of the alignment the receptor is located. East/North corresponds to northbound BRT and West//South to southbound BRT.
2. The distances shown in the Moderate Impact and Severe Impact columns represent how far the noise impact contour extends away from the outer traffic lane.
3. Overall noise levels in this column represent the combined noise sources (BRT, Rapid Bus and local traffic).
4. Degree of Impact, as defined by the FTA in its criteria for impacts can include None (No Impact), Impact, and Severe. The FTA "Impact" level of impact is referred to as "Moderate Impact" in this environmental document.
5. Berkeley alignment follows the *Two-Way Transitway via Shattuck Avenue*, *Two-Way Transitway via Bancroft Way*, and *Two-Way Transitway via Telegraph Avenue* alignment variations.
6. Berkeley alignment follows the *One-Way Transitway via Shattuck Avenue–Oxford Street Loop*, *One-Way Transitway via Bancroft Way–Durant Avenue Couplet*, and *One-Way Transitway via Telegraph Avenue–Dana Street One-Way Couplet* alignment variations.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

## Table 4.13-4: Summary of Noise Impacts Category 2 Land Uses (Continued)

| Description | Side[1] | Distance from outer traffic lane to property line, feet | BRT Operation Speed mph | Existing Traffic Noise Levels, $L_{dn}$, dBA | Overall Future No Build Noise Levels[3], $L_{dn}$, dBA | Overall Future Build Levels[3] Alternatives 3 and 4, $L_{dn}$, dBA | Overall Future Build Levels[3] Alternatives 1 and 2, $L_{dn}$, dBA | Criteria, ( Impact / Severe) dBA | Distance from Outer Lane to Noise Impact Contours, feet[2] Moderate | Severe | Degree of Impact[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Downtown Oakland** | | | | | | | | | | | |
| Broadway Between | East | 25 | 25 | 67 | 68 | 68 | 69 | 69/71 | 22 | 14 | None |
| 20th and 11th St | West | 25 | 25 | 67 | 69 | 69 | 69 | 70/72 | 18 | 11 | None |
| 12th St Between | North | 25 | 25 | 68 | 70 | 68 | 68 | 69/71 | 18 | 11 | None |
| Broadway and Oak St | South | 25 | 25 | 68 | 69 | 69 | 69 | 70/72 | 19 | 12 | None |
| 11th St Between | North | 25 | 25 | 66 | 67 | 66 | 66 | 67/69 | 21 | 13 | None |
| Broadway and Oak St | South | 25 | 25 | 66 | 67 | 65 | 65 | 67/69 | 17 | 11 | None |
| **South Oakland** | | | | | | | | | | | |
| International Blvd Between | East | 25 | 30 | 68 | 69 | 67 | 67 | 69/71 | 15 | 10 | None |
| 2nd and 14th Ave | West | 25 | 30 | 68 | 69 | 67 | 67 | 69/71 | 15 | 9 | None |
| 12th St Between | East | 25 | 30 | 68 | 69 | 67 | 67 | 69/71 | 15 | 10 | None |
| 2nd and 14th Ave | West | 25 | 30 | 68 | 69 | 67 | 67 | 69/71 | 15 | 9 | None |
| International Blvd Between | East | 25 | 30 & 25 | 70 | 71 | 69 | 69 | 71/73 | 17 | 11 | None |
| 15th and Fruitvale Ave | West | 25 | 30 & 25 | 70 | 71 | 69 | 69 | 71/73 | 17 | 11 | None |
| International Blvd Between | East | 25 | 30 & 25 | 71 | 72 | 71 | 71 | 72/74 | 18 | 11 | None |
| 35th and 59th Ave | West | 25 | 30 & 25 | 71 | 72 | 71 | 71 | 72/74 | 18 | 11 | None |
| International Blvd Between | East | 25 | 30 & 25 | 71 | 72 | 71 | 71 | 72/74 | 18 | 11 | None |
| 66th and 82nd Ave | West | 25 | 30 & 25 | 71 | 72 | 71 | 71 | 72/74 | 18 | 11 | None |
| International Blvd Between | East | 25 | 30 & 25 | 71 | 72 | 71 | 71 | 72/74 | 21 | 13 | None |
| 82nd and 98th Ave | West | 25 | 30 & 25 | 71 | 72 | 71 | 71 | 72/74 | 21 | 13 | None |

Notes:
1. The direction shown indicates on which side of the alignment the receptor is located. East/North corresponds to northbound BRT and West//South to southbound BRT.
2. The distances shown in the Moderate and Severe columns represent how far the noise impact contour extends away from the outer traffic lane.
3. Overall noise levels in this column represent the combined noise sources (BRT, Rapid Bus and local traffic).
4. Degree of Impact, as defined by the FTA in its criteria for impacts can include None (No Impact), Impact, and Severe. The FTA "Impact" level of impact is referred to as Moderate Impact in this environmental document.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

## Table 4.13-4: Summary of Noise for Category 2 Land Uses (Continued)

| Description | Side[1] | Distance from outer traffic lane to property line, feet | BRT Operation Speed mph | Existing Traffic Noise Levels, $L_{dn}$, dBA | Overall Future No Build Noise Levels[3], $L_{dn}$, dBA | Overall Future Build Levels[3] Alternatives 3 and 4, $L_{dn}$, dBA | Overall Future Build Levels[3] Alternatives 1 and 2, $L_{dn}$, dBA | Criteria, ( Impact / Severe) dBA | Distance from Outer Lane to Noise Impact Contours, feet[2] Moderate | Severe | Degree of Impact[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **San Leandro** | | | | | | | | | | | |
| East 14th St Between Durant and Davis Ave | East | 25 | 30 | 70 | 71 | 70 | 70 | 71/73 | 20 | 13 | None |
| | West | 25 | 30 | 70 | 70 | 70 | 70 | 71/73 | 19 | 12 | None |
| **San Leandro – Alternatives 1 and 3 Only** | | | | | | | | | | | |
| East 14th St Between San Leandro and Hesperian Blvd | East | 20 | 35 | 71 | 72 | 71 | 71 | 72/74 | 17 | 11 | None |
| | West | 20 | 35 | 71 | 73 | 72 | 72 | 74/76 | 11 | 7 | None |
| East 14th St Between 150th Ave and Fairmont Dr | East | 20 | 35 | 71 | 72 | 72 | 72 | 72/74 | 19 | 12 | None |
| | West | 20 | 35 | 72 | 72 | 72 | 72 | 73/75 | 15 | 10 | None |

Notes:
1. The direction shown indicates on which side of the alignment the receptor is located. East/North corresponds to northbound BRT and West//South to southbound BRT.
2. The distances shown in the Moderate and Severe columns represent how far the noise impact contour extends away from the outer traffic lane.
3. Overall noise levels in this column represent the combined noise sources (BRT, Rapid Bus and local traffic).
4. Degree of Impact, as defined by the FTA in its criteria for impacts can include None (No Impact), Impact, and Severe. The FTA "Impact" level of impact is referred to as Moderate Impact in this environmental document.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

## Table 4.13-5: Summary of Noise Impact for Category 3 Land Uses

| Description | Side[1] | Distance from outer traffic lane to property line, feet | BRT Operation Speed mph | Existing Traffic Noise Levels, $L_{eq}$, dBA | Overall Future No Build Noise Levels[3], $L_{eq}$, dBA | Overall Future Build Levels[3] Alternatives 3 and 4, $L_{eq}$, dBA | Overall Future Build Levels[3] Alternatives 1 and 2, $L_{eq}$, dBA | Criteria, (Impact / Severe) dBA | Distance from Outer Lane to Noise Impact Contours, feet[2] Moderate | Distance from Outer Lane to Noise Impact Contours, feet[2] Severe | Degree of Impact[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Berkeley** | | | | | | | | | | | |
| Shattuck Ave and | East | 44 (Existing and No Build) 31 (Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| Addison St | West | 44 (Existing and No Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| Shattuck Ave and | East | 31 (Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| Center St | West | 44 (Existing and No Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| Shattuck Ave and | East | 31 (Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| Allston Way | West | 44 (Existing and No Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| Shattuck Ave and | East | 31 (Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |
| Kittredge | West | 44 (Existing and No Build) | 25 | 69 | 70 | 71 | 71 | 71/73 | - | - | None |

Notes:
1. The direction shown indicates on which side of the alignment the receptor is located. East/North corresponds to northbound BRT and West//South to southbound BRT.
2. The distances shown in the Moderate and Severe columns represent how far the noise impact contour extends away from the outer traffic lane.
3. Overall noise levels in this column represent the combined noise sources (BRT, Rapid Bus and local traffic).
4. Degree of Impact, as defined by the FTA in its criteria for impacts can include None (No Impact), Impact, and Severe. The FTA "Impact" level of impact is referred to as Moderate Impact in this environmental document.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

## Table 4.13-5: Summary of Noise Impact for Category 3 Land Uses (Continued)

| Description | Side[1] | Distance from outer traffic lane to property line, feet | BRT Operation Speed mph | Existing Traffic Noise Levels, $L_{eq}$, dBA | Overall Future No Build Noise Levels[3], $L_{eq}$, dBA | Overall Future Build Levels[3] Alternatives 3 and 4, $L_{eq}$, dBA | Overall Future Build Levels[3] Alternatives 1 and 2, $L_{eq}$, dBA | Criteria, ( Impact / Severe) dBA | Distance from Outer Lane to Noise Impact Contours, feet[2] Moderate | Severe | Degree of Impact[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Berkeley** | | | | | | | | | | | |
| Bancroft Way and Shattuck Ave | North | 13 | 25 | 68 | 69 | 66 | 65 | 69/71 | 6 | 4 | None |
| | South | 25 | 25 | 65 | 66 | 65 | 65 | 66/68 | 21 | 13 | None |
| Bancroft Way and Fulton | North | 13 | 25 | 71 | 72 | 68 | 67 | 72/74 | 5 | 3 | None |
| | South | 25 | 25 | 69 | 70 | 68 | 68 | 70/72 | 17 | 11 | None |
| Bancroft Way and Dana St | North | 13 | 25 | 69 | 69 | 65 | 64 | 70/72 | 4 | 3 | None |
| | South | 25 | 25 | 66 | 67 | 65 | 64 | 70/72 | 7 | 4 | None |
| Bancroft Way and Telegraph Ave | North | 13 | 25 | 67 | 68 | 65 | 64 | 68/70 | 7 | 4 | None |
| | South | 25 | 25 | 65 | 65 | 64 | 64 | 66/69 | 17 | 8 | None |
| Durant Ave and Shattuck Ave | North | 25 | 25 | 61 | 61 | 64 | 64 | 62/64 | - | - | None |
| | South | 25 | 25 | 62 | 63 | 64 | 65 | 64/66 | - | - | None |
| Durant Ave and Dana St | North | 25 | 25 | 67 | 67 | 67 | 67 | 68/70 | 19 | 12 | None |
| | South | 25 | 25 | 67 | 67 | 67 | 67 | 68/70 | 19 | 12 | None |
| Durant Ave and Telegraph Ave | North | 25 | 25 | 66 | 67 | 67 | 67 | 68/70 | 19 | 12 | None |
| | South | 25 | 25 | 66 | 67 | 67 | 67 | 68/70 | 19 | 12 | None |
| Telegraph Ave and Bancroft Way | East | 19 | 25 | 66 | 66 | 62 | 62 | 67/69 | 6 | 4 | None |
| | West | 19 | 25 | 65 | 66 | 62 | 62 | 67/69 | 6 | 4 | None |
| Telegraph Ave and Durant Ave | East | 19 | 25 | 66 | 66 | 62 | 62 | 67/69 | 6 | 4 | None |
| | West | 19 | 25 | 65 | 66 | 62 | 62 | 67/69 | 6 | 4 | None |
| Telegraph Ave and Channing Way | East | 19 | 25 | 66 | 66 | 62 | 62 | 67/69 | 6 | 4 | None |
| | West | 19 | 25 | 66 | 66 | 62 | 62 | 67/69 | 6 | 4 | None |
| Telegraph Ave and Derby St | East | 25 | 25 | 69 | 70 | 69 | 69 | 70/72 | 20 | 13 | None |
| | West | - | - | - | - | - | - | - | - | - | - |

Notes:
1. The direction shown indicates on which side of the alignment the receptor is located. East/North corresponds to northbound BRT and West//South to southbound BRT.
2. The distances shown in the Moderate and Severe columns represent how far the noise impact contour extends away from the outer traffic lane.
3. Overall noise levels in this column represent the combined noise sources (BRT, Rapid Bus and local traffic).
4. Degree of Impact, as defined by the FTA in its criteria for impacts can include None (No Impact), Impact, and Severe. The FTA "Impact" level of impact is referred to as Moderate Impact in this environmental document.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

## Table 4.13-5: Summary of Noise Impacts for Category 3 Land Uses (Continued)

| Description | Side[1] | Distance from outer traffic lane to property line, feet | BRT Operation Speed mph | Existing Traffic Noise Levels, $L_{eq}$, dBA | Overall Future No Build Noise Levels[3], $L_{eq}$, dBA | Overall Future Build Levels[3] Alternatives 3 and 4, $L_{eq}$, dBA | Overall Future Build Levels[3] Alternatives 1 and 2, $L_{eq}$, dBA | Criteria, ( Impact / Severe) dBA | Distance from Outer Lane to Noise Impact Contours, feet[2] Moderate | Severe | Degree of Impact[4] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **North Oakland** | | | | | | | | | | | |
| Telegraph Ave and | East | 25 | 25 | 69 | 71 | 69 | 69 | 70/72 | 20 | 13 | None |
| 50th St | West | - | - | - | - | - | - | - | - | - | - |
| **South Oakland** | | | | | | | | | | | |
| International Blvd and | East | - | - | - | - | - | - | - | - | - | - |
| 23rd Ave | West | 25 | 25 | 69 | 70 | 69 | 69 | 70/72 | 20 | 13 | None |
| International Blvd and | East | - | - | - | - | - | - | - | | | - |
| 29th Ave | West | 25 | 25 | 69 | 70 | 69 | 69 | 70/72 | 20 | 13 | None |
| International Blvd and | East | 25 | 25 | 70 | 72 | 70 | 70 | 71/73 | 20 | 13 | None |
| Seminary Ave | West | - | - | - | - | - | - | - | - | - | - |
| International Blvd and | East | - | - | - | - | - | - | - | - | - | - |
| 66th Ave | West | 25 | 25 | 70 | 71 | 70 | 70 | 71/73 | 20 | 13 | None |
| International Blvd and | East | 25 | 25 | 70 | 71 | 70 | 70 | 71/73 | 20 | 13 | None |
| 82nd Ave | West | 25 | 25 | 70 | 71 | 70 | 70 | 71/73 | 20 | 13 | None |
| International Blvd and | East | 25 | 25 | 70 | 71 | 70 | 70 | 71/73 | 20 | 13 | None |
| 98th Ave | West | 25 | 25 | 70 | 71 | 70 | 70 | 71/73 | 20 | 13 | None |

Notes:
1. The direction shown indicates on which side of the alignment the receptor is located. East/North corresponds to northbound BRT and West//South to southbound BRT.
2. The distances shown in the Moderate and Severe columns represent how far the noise impact contour extends away from the outer traffic lane.
3. Overall noise levels in this column represent the combined noise sources (BRT, Rapid Bus and local traffic).
4. Degree of Impact, as defined by the FTA in its criteria for impacts can include None (No Impact), Impact, and Severe. The FTA "Impact" level of impact is referred to as Moderate Impact in this environmental document.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

Table 4.13-6 presents a summary of the traffic noise impacts from the AC Transit East Bay BRT Project in the year 2025. As shown in Table 4.13-6, project noise levels under the *Two-Way Transitway via Bancroft Way* alignment variation are predicted to exceed the FTA Category 2 Land Use moderate impact criteria at 23 buildings consisting of three single-family residences and 68 multi-family residences. Other alignment variations in Berkeley are not predicted to exceed Category 2 moderate impact criteria. The Category 2 severe impact criteria are not exceeded at any location. There are no moderate or severe impacts for Category 3 land uses with the project.

**Table 4.13-6: Summary of Noise Impact Areas from East Bay BRT Operations (Year 2025)**

| Segment/Alternative | Type and Number of Sensitive Structures/Land Use Impacted[1] | |
|---|---|---|
| **Berkeley to North Oakland** | | |
| East Bay BRT Build Alternatives: | Cat. 2 | Cat. 3 |
| No. of Moderately Impacted Buildings | 3 SFR, 68 MFR (23 Buildings)[2] | 0 SCH, 0 CH |
| No. of Severely Impacted Buildings | 0 SFR, 0 MFR | 0 SCH, 0 CH |

Note:
[1] SFR: Single Family Residence; MFR: Multi Family Residence; SCH: School; CH: Church.
[2] Impacts would occur under the Two-Way via Bancroft Way alignment variation only.
Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

#### 4.13.3.2 VIBRATION IMPACTS

The East Bay BRT Project was screened for vibration impacts in accordance with the *FTA Transit Noise and Vibration Impact Assessment Manual*. Because buses have rubber tires and suspension systems that isolate vibrations from the ground, vibration impact assessment was not warranted (US DOT, 1995).

### 4.13.4 Avoidance, Minimization, and/or Mitigation Measures

#### 4.13.4.1 NOISE

The East Bay BRT would use Van Hool buses, which are substantially quieter than conventional buses. Only one area along the alignment (Durant Avenue between Shattuck Avenue and Telegraph Avenue) would be affected by noise levels at the moderate level (FTA Impact level). This moderate impact would occur with the *Two-Way Transitway via Bancroft Way* alignment variation only, because bus-designated center lanes on Bancroft Way would displace car traffic to streets parallel to the alignment such as Durant Avenue. The increased traffic volume would increase noise levels. Because the affected streets are in an urban environment, using noise barriers to reduce noise is not a reasonable solution. Furthermore, the required noise reduction is minimal (less than 1 dB). The impact does not meet or exceed the FTA threshold for severe impacts.

#### 4.13.4.2 VIBRATION

No vibration impacts are anticipated under the East Bay BRT Project, and therefore, no avoidance, minimization, and/or mitigation measures are proposed.

# 4.14 Energy

## 4.14.1 Energy Consumption

This section compares energy use under the No-Build and Build Alternatives to determine the effect of the proposed project on energy consumption as a result of anticipated changes in travel patterns within the project corridor. The focus is on direct energy use, which refers to the energy consumed in the operation of vehicles, including autos, buses, trains, and trucks.

## 4.14.2 Environmental Consequences

Direct energy impacts of the No-Build and Build Alternatives were estimated in terms of anticipated changes to auto and bus vehicle miles of travel (VMT) under 2025 conditions. VMT estimates were obtained from travel demand model forecasts for Alameda County, which offers a geographic area large enough to capture travel changes resulting from the No-Build and Build Alternatives. The difference in VMT under No-Build and Build conditions can be translated into a difference in energy use by applying factors for fuel efficiency.[10]

Travel forecasts indicate that auto VMT in Alameda County would decrease under the Build Alternatives as compared to the No-Build Alternative, since some individuals would switch travel modes from automobiles to BRT vehicles. As shown in Table 4.14-1, when compared to the No-Build Alternative, annual auto VMT under 2025 conditions is expected to be approximately four million less under Alternatives 1 and 2, seven million less under Alternative 3, and six million less under Alternative 4. By contrast, bus VMT under any of the Build Alternatives is expected to be approximately one million more than under the No-Build Alternative, due to the higher frequency of bus service in the project corridor.

Under build conditions, auto VMT would decrease more than bus VMT would increase. However, buses are not as energy efficient as autos; thus, the net effect of these changes on direct energy use within the project corridor would be modest. (Alternative fuel buses may be procured and designated for BRT service in the future. These vehicles are more energy efficient and would therefore have a positive effect on reducing energy use in the corridor. However, to be conservative, the impacts analysis was based on the current fuel economy of articulated buses.)

Table 4.14-1 compares energy consumption under the 2025 No-Build and Build Alternatives. Consumption is expressed in British Thermal Units (BTUs), a standardized measure of energy

[10] For energy calculations, the fuel efficiency of automobiles in 2025 was assumed to be 22.6 miles per gallon of gasoline, based on the assumption in the air quality model for auto fuel efficiency in 2025 for Alameda County. The fuel efficiency of articulated buses was assumed to be 4.5 miles per gallon. Generally, a 60-foot Van Hool bus has a fuel-efficiency of approximately four miles per gallon. On the other hand, fuel cell buses are more fuel-efficient at eight miles per gallon. By 2025, if the BRT fleet becomes more fuel efficient than what has been assumed in this study (for example, by acquiring more fuel cell buses), then the energy savings under the Build Alternatives would be greater.

content of the various fuels consumes by autos and buses.[11] The energy equivalent in gallons of gasoline is also shown.

**Table 4.14-1: Estimated Energy Usage for Alameda County, No-Build and Build Alternatives (2025)**

| Alternative | Annual Auto VMT* (in millions) | Annual Bus VMT* (in millions) | Total BTUs* (in trillions) | Equivalent in Gallons of Gasoline* (in millions) |
|---|---|---|---|---|
| No-Project | 11,136.5 | 2.3 | 54.5 | 493.3 |
| Alternative 1 | 11,133.0 | 3.0 | 54.5 | 493.4 |
| Alternative 2 | 11,133.4 | 3.0 | 54.5 | 493.4 |
| Alternative 3 | 11,130.3 | 2.9 | 54.5 | 493.2 |
| Alternative 4 | 11,131.2 | 2.9 | 54.5 | 493.3 |

Notes:
VMT = Vehicle miles of travel
BTU = British thermal unit, a measure of energy consumption.

Source: *Operating Plan and Cost Analysis, Technical Memorandum – East Bay BRT EIR/EIS* (Nelson Nygaard, 2005). Travel forecasts provided by Cambridge Systematics.

The energy impacts of the Build Alternatives as compared to the No-Build Alternative would be negligible. Total energy consumption under each Build Alternatives would be similar, about 54 trillion BTUs, which translates to about 493 million gallons of gasoline. Because energy consumption would be comparable under both No-Build and Build conditions, the proposed project is anticipated to have no adverse effect on direct energy use. No mitigation of impacts is warranted.

# 4.15 Biological Environment

## 4.15.1 Regulatory Setting

The following laws and regulations apply to biological resources:

### 4.15.1.1 FEDERAL

National Environmental Policy Act
Migratory Bird Treaty Act
Fish and Wildlife Coordination Act
Clean Water Act (33 U.S.C. 1344), Sections 401 and 404
Executive Order 11990 – Protection of Wetlands
Executive Order 13112 of February 3, 1999 – Invasive Species
Federal Endangered Species Act (FESA). See United States Code 16 (USC), Section 1531, et. seq. See also 50 CFR Part 402

[11] BTU, British thermal unit, is a standard English system unit of energy. One BTU is the amount of energy required to raise the temperature of one pound of water by one degree Fahrenheit.

#### 4.15.1.2 STATE

California Environmental Quality Act, Public Resources Code, Sections 2100-21177
Department of Fish and Game (CDFG) Code Sections 1600-1607 and 4150-4152
California Endangered Species Act (CESA). See California Fish and Game Code, Section 2050
Native Plant Protection Act. See Fish and Game Code, Section 1900-1913

### 4.15.2 Affected Environment

The vicinity of the proposed project is fully developed and generally paved with concrete and asphalt. No sizable natural habitat for plant, animal, or bird species remains. Most creeks in the project area have been intercepted upstream of the project area and cross the proposed alignment in culverts underneath the pavement.

The San Leandro Creek flows under East 14th Street in an open unlined channel on the east and west sides of the street. The creek is the outflow channel for Lake Chabot and is highly vegetated. The structure over the creek would not be widened for the proposed project; alterations would be restricted to restriping of traffic lanes on the bridge.

The Estudillo Canal is at the southernmost portion of the alignment for Alternatives 1 and 3, routing storm drain and surface runoff westerly toward the bay. The proposed project would use a previously paved area adjacent to the canal, but would not otherwise cross or enter the canal itself.

No wetlands are present within the construction area.

### 4.15.3 Environmental Consequences

No impacts to biological resources are anticipated.

### 4.15.4 Avoidance, Minimization, and/or Mitigation Measures

None proposed. BMPs would be followed as described in Section 4.16.7, Construction Impacts (Hydrology and Water Quality), to avoid effects to surface water.

In compliance with the Executive Order on Invasive Species, E.O. 13112, the landscaping included in the proposed project would not use species listed as noxious weeds.

## 4.16 Construction Impacts

### 4.16.1 Construction Stages, Schedule, and Work Hours

Construction would remove existing street pavement, curbs, and sidewalks along the transitway and relocate some utilities at station locations. Transitway pavement, curbs, and medians would be constructed. Station construction would include platform slabs, walkways, utility feeds, platform shelters, and station amenities. Sidewalks and curbs removed along the alignment would be replaced as necessary. Signs, traffic signals, and pavement markings would be added along the alignment.

Construction would start with the advanced utility relocation in the identified station areas. (See Section 4.5-1, Utilities Located in the Vicinity of Proposed Station Areas.) Relocation of utilities

under the BRT transitway would not be necessary. Utility relocation in the station areas would consist of valves, fire hydrants, electric poles, utility boxes and vaults. Utility lines running under station platforms for which access is required would be relocated. This is localized work which would be completed within a few weeks at each station. During this time traffic would be restricted around the station area by closing one or two lanes.

BRT transitway construction would be accomplished by closing two lanes of traffic and maintaining traffic in the remaining lanes. Most work would be accomplished during day time hours; however, some night time work may be necessary.

To minimize the impacts and shorten the duration of the BRT transitway construction, several non-contiguous areas could be constructed at the same time. Within each area work would be sequenced so that no more than two or three contiguous blocks are under construction at any time. Consecutive intersections would not be closed at the same time. Access to driveways would be maintained except for short durations with agreement of the property owner and/or tenant. Pedestrian access, including wheelchair ramps and temporary sidewalks, would be maintained at all times.

The stages of the construction would begin with demolition of existing curb, gutter and sidewalk where necessary and reconstructing those facilities. Storm drain inlets would be reconstructed at the same time as the curbs. In these instances the demolished and excavated materials would be hauled away in trucks. New backfill materials and concrete would be delivered to the site.

Next, existing pavement in the BRT transitway would be saw cut along the outer edges, removed by impact hammers and front-end loaders and hauled away in trucks. Aggregate base delivered by trucks would be spread by machine and hand and watered to control dust. New Portland Cement Concrete pavement would be delivered to the site by mixer truck backing to the work area in the transitway from the nearest intersection.

Station platform areas would be similarly constructed with most of the work area accessed from the BRT transitway. Most of the other station work is to be done by hand or with assistance of small rubber tires cranes for heavy objects.

Traffic signals, signage and pavement markings constitute the final stage of the construction.

### 4.16.2 Traffic and Transportation/Pedestrian and Bicycle Facilities

During the construction of the BRT project, both the transitway and stations, there would be traffic disruption primarily due to the closure of two lanes of existing traffic. This is a condition, however, that would continue post construction as the BRT transitway permanently replaces the two existing traffic lanes. During construction and afterwards, two lanes (one in each direction) would remain open for vehicular traffic. This would allow motorists to adjust to lane availability after construction has been completed. Construction may require removal of curbside parking and closures of streets and intersections, but these measures would be temporary and of limited duration.

Pedestrian access including wheelchair accessible ramps and temporary sidewalks where needed would be maintained during construction. A separate bicycle project may be developed by others, but is not a part of this project.

## 4.16.3 Community Impacts

### 4.16.3.1 Effects on Local Access

Construction of the AC Transit BRT Project would involve temporary lane closures or detours in the vicinity of the project. However, auto access to public services and facilities and to businesses would be maintained during normal business hours either by maintaining one or more traffic lanes open or providing an alternate travel route. Similarly, pedestrian access to services and businesses affected by construction would be maintained by ensuring safe pathways are available.

In addition, AC Transit would undertake the following steps to mitigate the inconvenience of construction:

- Motorized and non-motorized traffic management plans would be prepared by the contractor and would need to be approved by AC Transit prior to beginning construction. The plans would demonstrate how safe access would be provided during business hours. Complete closures of roadways would be the exception, with times and locations to be identified in the traffic management plan and approval of closures required by AC Transit and the appropriate city in which the work is proposed.
- AC Transit would conduct public outreach in areas of construction to advise individuals and businesses of planned activities. Construction activity schedules would be publicly available and posted on a project status web site maintained by AC Transit.
- AC Transit would establish a database of property owners along the project corridor and of other individuals or agencies expressing interest in notification of construction activity. The database would allow AC Transit to contact property owners directly, by mail or phone, in advance of construction.
- AC Transit would provide signage in construction zones identifying travel routes and times and specific zones of construction activity. Community facilities and businesses would be provided signs indicating points of access, parking areas as appropriate, and hours of operation.

### 4.16.3.2 Effects of Construction Staging

During the construction period, sites along the project corridor would be acquired for equipment and materials storage. These types of sites are designated staging areas. Temporary easements would likely need to be acquired by the contractor or by AC Transit on behalf of the contractor. Wherever possible, such staging areas would be vacant or underutilized parcels along the BRT alignment. Some sites might be temporarily converted from other uses, for example parking, to construction staging activities. AC Transit does not anticipate acquiring or removing existing structures (unless already planned for demolition by others) to establish staging areas. Any property owners providing a staging area would be financially compensated by AC Transit for temporary use of the property.

### 4.16.4 Utilities/Service Systems

Utilities would be relocated in advance of construction and would be localized to the area near each proposed station location. Relocation of parallel utilities under the BRT transitway is not planned. Valves, fire hydrants, electrical poles, utility boxes, and vaults would be relocated for gas, electric, telephone, wastewater, and fiber optic/cable TV facilities. Disruption at each area should be no more than a few weeks. Either the individual utility owners or AC Transit would relocate the utility. Responsibility for each relocation would be established during final design of the project.[12]

### 4.16.5 Visual/Aesthetics

Construction activity for the BRT project would involve the typical use of a variety of construction equipment and workers. It would be obvious that construction activity is underway. The project corridor is primarily urban in development and the construction would take place within the existing roadway. Materials would be temporarily stockpiled on site. The contractor would be required to maintain the site in an orderly manner and daily clear away any debris created by construction workers or activity.

To the degree possible, avoidance and minimization measures would be used to protect mature trees, other vegetation and existing streetscape. In some cases where the BRT transitway would be located in existing median, this may not always be possible and some streetscape and trees would be removed.

No major adverse impacts are anticipated; therefore, no mitigation would be necessary beyond the use of BMPs. Re-landscaping or replanting of trees would be undertaken where appropriate.

### 4.16.6 Cultural Resources

As described in Section 4.7, Cultural Resources, no historic structures would be disturbed during construction activities. Furthermore, it is not anticipated that construction activities would encounter or disturb buried cultural resources. In the unlikely event that cultural materials are unearthed during construction, AC Transit and FTA would comply with 36 CFR 800.13 regarding late discoveries. The following measures would be taken, as described in the *Site Treatment Plan for the Alameda–Contra Costa Transit District's East Bay Rapid Transit Project in Berkeley, Oakland, and San Leandro* (Archaeological/Historical Consultants, November 2005):

1. An archaeologist would monitor any construction work within the project alignment in sensitive locations (identified in the *Site Treatment Plan*).
2. If buried cultural materials (either prehistoric or historic) are encountered during construction, work would stop in that area until a qualified archaeologist can evaluate the nature and significance of the find. Depending on the type of feature, the archaeologist may recommend archaeological excavation to either evaluate, record, or remove the feature.

[12] The capital cost estimate for the proposed project assumes that AC Transit would fund utilities relocations and adjustments resulting from conflicts with the project. However, utility upgrades would be the responsibility of individual utilities. In addition, depending upon franchise agreements that utilities may have entered into with individual cities, private utilities may be responsible for funding relocation costs.

3. If human remains are encountered, construction work in the area would be halted and the Alameda County Coroner contacted. In addition, if the remains are Native American, the California Native American Heritage Commission (NAHC) would be immediately contacted. The NAHC would identify the most likely descendants who would be consulted on the disposition of Native American human remains and associated artifacts.
4. Arrangements would be made with an authorized facility for permanent curation of any recovered artifactual materials.
5. The archaeological monitor would inform construction crews, prior to construction work, of material types that might be encountered under the street. Prior to construction, contractors and workers would be informed of reporting requirements in the event that buried cultural materials or human remains were found, whether in monitored areas or not.

## 4.16.7 Hydrology and Water Quality

### 4.16.7.1 Environmental Consequences

Construction activity that disturbs ground conditions would potentially result in increased erosion and sedimentation. The No-Build Alternative would not substantially disturb existing ground conditions and would not impact water resources, including storm water runoff. The Build Alternatives would remove roadway pavement and excavate and grade along the transitway and in station areas. Excavated materials would be temporarily stored at various locations along the alignment. Exposure and loosening of soils and subsurface materials have the potential to affect the quality of water runoff into storm drains along the project alignment during the San Francisco Bay Area's rainy season if the materials are not contained.

### 4.16.7.2 Avoidance, Minimization, and/or Mitigation

Under the Build Alternatives, construction sites where subsurface materials are exposed would be controlled to prevent dust, debris, and sediment from entering runoff. Drain basins would be protected by devices to stop and collect any sediment and debris that does enter runoff.

AC Transit would require the contractor to develop and implement a Storm Water Pollution Prevention Plan (SWPPP). The plan would be prepared prior to beginning construction activities and detail the contractor's plan for controlling runoff. The SWPPP would specify the major storage locations for excavated materials and for any delivered materials not immediately set in place. Water quality control measures for these sites would be described.

The SWPPP would outline control measures to be taken as well as BMPs to be implemented to control and prevent to the maximum extent practicable the discharge of pollutants to surface waters and groundwater. Treatment BMPs that would be implemented for the project would mainly consist of mechanical devices such as catch basin inserts or other in-line filtering devices during construction. In addition, the SWPPP would include a plan for responding to and managing accidental spills during construction and a plan for the management and disposal of pumped ponded water or groundwater. The SWPPP would address overall management of the construction project, such as designating areas for equipment fueling, concrete washout, and stockpiles.

In support of or in addition to the above, AC Transit would implement the following measures to address drainage and runoff related impacts of East Bay BRT Project construction:

- AC Transit would require the contractor to submit and implement an approved Erosion and Sediment Control Plan (ESCP). The plan would emphasize standard temporary erosion control measures to reduce sedimentation and turbidity of surface runoff from disturbed areas during each rainy season (October 1 to May 1).
- AC Transit would require the contractor to submit a Spill Prevention, Contaminant and Clean-up (SPCC) plan for fuels, oils, lubricants, and other hazardous materials that may be used during construction.

No construction would be performed until both the ESCP and SPCC are accepted by AC Transit.

## 4.16.8 Hazardous Materials

### 4.16.8.1 Environmental Consequences

The potential for encountering pre-existing hazardous materials is present in the types of construction proposed for the project corridor. As described in Section 4.11, Hazardous Wastes/Materials, there are a number of environmental risk sites, primarily LUST sites, which potentially have resulted in contamination of soils along the proposed East Bay BRT alignment. Known potential contaminants include petroleum hydrocarbons (from gasoline and diesel fuels) and, at a few locations, heavy metals. There is also the potential to encounter unknown sources of contamination.

No impact would occur under the No-Build Alternative because of the very limited construction, almost entirely above ground, proposed to implement station and traffic signal improvements.

Construction of the Build Alternatives would remove the roadway pavement and subgrade materials in various locations. In most locations, the depth of construction would be shallow and not expose substantial subsurface areas, including previously undisturbed materials. In some locations, mainly stations, construction would be to greater depths to provide for the foundations of major above-ground facilities. The amounts of materials disturbed at these locations and removed to disposal sites would be greater. The potential for encountering hazardous materials is also greater as a result. The locations where hazardous materials have been previously identified along the East Bay BRT Project alignment are listed in Tables 4.11-1 and 4.11-2.

Hazardous materials impacts would occur if construction workers or members of the public were exposed to hazardous materials during excavation, grading and related construction activities or if the likelihood of hazardous waste migration were increased by construction activities.

### 4.16.8.2 Avoidance, Minimization, and/or Mitigation Measures

Impacts of the Build Alternatives would be mitigated by implementing the following measures:

**Ongoing Reconnaissance**. Walk-through level site reconnaissance would be conducted by the contractor and AC Transit construction engineers at sites where contamination is possible in order to determine if contamination is present or likely.

**Site Evaluation**. A site evaluation would be made of any known or suspected contaminated sites before soil is removed using the following procedure: 1) preparation of a health and safety plan; 2) preparation of a site specific work plan specifying the proposed locations for subsurface samples or borings or trenches; 3) soil boring or trenching and sample collection; 4) laboratory analysis of samples; and 5) preparation of a findings and recommendations report. If site-specific evaluations determine that contaminants are present, AC Transit would identify the type and extent of contamination and prepare and implement a remediation plan to avoid risks to public health and safety.

For contaminated groundwater, remediation would include measures such as the following:

- Extraction and disposal.
- In-situ treatment (bioremediation, chemical alteration, etc.).
- Leave in place (cap or contain with slurry walls, if necessary).

## 4.16.9 Air Quality

### 4.16.9.1 IMPACTS

The Bay Area Air Quality Management District's (BAAQMD's) approach to the analysis of construction impacts is to emphasize the implementation of effective and comprehensive control measures. According to the BAAQMD, if the appropriate construction controls are implemented, air pollutant emissions for construction activities would not be considered adverse.

$PM_{10}$, which is primarily emitted from earthmoving activities, is the pollutant of greatest concern with respect to construction activities. The BAAQMD Guidelines provide feasible control measures for construction emissions of $PM_{10}$. These control measures are listed in Section 4.16.9.2, Avoidance, Minimization, and/or Mitigation Measures, as are measures to reduce emissions from construction equipment. $PM_{10}$ control measures would also limit $PM_{2.5}$ fugitive dust emissions. Under appropriate construction controls, there would be no adverse impacts from air pollutant emissions for construction activities.

#### No-Build Alternative

The No-Build Alternative would improve the bus fleet and enhance the current bus system. Selected bus stops (benches, shelters, maps/signs, and bus arrival information) would be improved. Although no major construction would occur, some construction would be necessary to make the improvements. Construction activities that would occur for the No-Build Alternative would implement feasible BAAQMD control measures as listed in Section 4.16.9.2, Avoidance, Minimization, and/or Mitigation Measures. Under these construction controls, there would be no adverse impacts from air pollutant emissions associated with construction activities.

### Build Alternatives

Construction of the Build Alternatives includes utility relocation; removal of existing pavement for the width of the BRT transitway and curbs; construction of the BRT curbs, medians, and pavement; reconstruction of existing curbs and sidewalks; construction of platforms slabs and walkways; construction of station utility feeds; construction of platform shelters and amenities; and construction or modification of traffic signals, signing and pavement markings. The following construction activities would temporarily create emissions of dusts, fumes, equipment exhaust, and other air contaminants:

1. Removal of existing pavement,
2. Construction workers traveling to and from project sites,
3. Delivery and hauling of construction supplies and debris to and from project sites, and
4. Fuel combustion by on-site construction equipment.

To shorten the overall duration of construction, it is possible that two or three areas would be constructed simultaneously. Within each area, work would be sequenced so that only two or three contiguous blocks would be under construction at any one time. It is estimated, therefore, that approximately 1.65 acres would be under construction at one time, with the potential for approximately 84 pounds of $PM_{10}$ emissions per day.

In addition to $PM_{10}$ emissions, exhaust from construction equipment also contributes to pollutant emissions. Table 4.16.9-1 shows unmitigated and mitigated equipment exhaust emissions associated with construction of the Build Alternatives. The mitigated equipment exhaust emissions assume implementation of the emissions control measures listed in Section 4.16.9.2, Avoidance Minimization, and/or Mitigation Measures.

**Table 4.16.9-1: Estimated Daily Construction Equipment Exhaust Emissions**

| Pollutants | Pounds per Day | |
|---|---|---|
| | Daily Emissions (unmitigated) | Daily Emissions (mitigated) |
| $PM_{10}$ | 9 | <1 |
| $PM_{2.5}$[1] | 8 | <1 |
| CO | 541 | 54 |
| ROG | 36 | 4 |
| $NO_X$ | 166 | 76 |
| $SO_X$ | 18 | 18 |

Notes:
[1] Construction exhaust $PM_{2.5}$ emissions were calculated as 89 percent of $PM_{10}$ emissions.
Source: Terry A. Hayes Associates LLC

#### 4.16.9.2 AVOIDANCE MINIMIZATION, AND/OR MITIGATION MEASURES

Emissions control measures, such as the following, would ensure that there would be no adverse air quality impacts during construction:

- All active construction areas shall be watered at least twice daily.
- All trucks hauling soil, sand, and other loose materials shall be covered and shall maintain at least two feet of freeboard.
- All unpaved access roads, parking areas, and staging areas in the construction area shall be watered at least three times daily or shall be applied with non-toxic soil stabilizers.
- All paved access roads, parking areas, and staging areas in the construction area shall be swept daily with water sweepers.
- Streets shall be swept daily with water sweepers if visible soil material is carried onto adjacent public streets.
- Non-toxic soil stabilizers shall be applied to inactive construction areas (previously graded areas that are inactive for ten days or more).
- Exposed stockpiles of dirt, sand, or debris shall be enclosed, covered, watered at least twice daily, or applied with non-toxic soil binders.
- Traffic speeds on unpaved roads shall be limited to 15 miles per hour.
- Wheel washers shall be installed on all trucks or tires/tracks of all trucks, and equipment leaving the construction area shall be washed.
- Excavation and grading activities shall be suspended when winds exceed 25 miles per hour.
- Construction equipment shall use cool exhaust gas recirculation.
- Construction equipment shall use aqueous diesel fuel.
- Construction contracts shall explicitly stipulate that all construction equipment shall be properly tuned and maintained.

### 4.16.10 Noise and Vibration

#### 4.16.10.1 NOISE

Construction noise varies greatly depending on the construction process, type, and condition of equipment used, and layout of the construction site. Many of these factors are traditionally left to the contractor's discretion, which makes it difficult to accurately forecast levels of construction noise. Overall, construction noise levels are governed primarily by the noisiest pieces of equipment. For most construction equipment, the engine, which is usually diesel, is the dominant noise source. This is particularly true of engines without sufficient muffling. For special activities such as impact pile driving and pavement breaking, noise generated by the actual process dominates.

##### Construction Noise Ordinances

Local jurisdictions typically have noise ordinances that set limits on construction and other nuisance noises. The cities of Berkeley and Oakland have such ordinances, which are summarized in Table 4.16.10-1.

**Table 4.16.10-1: Summary of Local Noise Ordinances**

| Jurisdiction | Maximum Allowable Levels or Exemption | | | |
|---|---|---|---|---|
| | Time | Single Family Residences | Multi-Family Residences | Commercial |
| **Berkeley** | Weekdays, 7:00 a.m. to 7:00 p.m. | 75 dBA | 80 dBA | 85 dBA |
| | Weekends and legal holidays, 9:00 a.m. to 8:00 p.m. | 60 dBA | 65 dBA | 70 dBA |
| | [It is prohibited to operate or cause] the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of 7 p.m. and 7 a.m., or 8 p.m. and 9 a.m. on weekends or holidays such that the sound therefrom creates a noise disturbance across a residential or commercial real property line. | | | |
| **Oakland** | The persistent maintenance or emission of any noise or sound produced by human, animal or mechanical means, between the hours of 9 p.m. and 7 a.m. that, by reason of its raucous or nerve-racking nature, disturbs the peace or comfort or be injurious to the health of any person shall constitute a nuisance.<br>Construction Noise provisions.<br>A. All construction equipment powered by internal combustion engines shall be properly muffled and maintained.<br>B. Unnecessary idling of internal combustion engines is prohibited.<br>C. All stationary noise-generating construction equipment are to be located as far as is practical from existing residences.<br>D. Quiet construction equipment, particularly air compressors, are to be selected whenever possible.<br>E. Use of pile drivers and jack hammers shall be prohibited on Sundays and holidays, except for emergencies and as approved in advance by the Building Official. | | | |

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

The City of San Leandro does not have specific limitations for their construction noise ordinance other than construction work should be limited to daytime hours. The recommended FTA construction noise limits will be used instead to assess construction noise impacts. Table 4.16.10-2 presents the recommended FTA noise limits for 8-hour average noise levels (Leq) at the property line of the nearest location to the construction site.

**Table 4.16.10-2: FTA Allowable Construction Noise Levels**

| Land Use | Daytime (7 a.m. to 10 p.m.) Leq[1], dBA | Nighttime (10 p.m. to 7 a.m.) Leq[1], dBA |
|---|---|---|
| Residential | 80 | 70 |
| Commercial | 85 | 85 |
| Industrial | 90 | 90 |

Notes:
[1] Leq for 8 hours.
Source: USDOT, 1995.

#### Impacts

Table 4.16.10-3 summarizes typical construction noise emission levels (Lmax) of construction equipment operating at full power at a reference distance of 50 feet, and an estimated equipment usage factor (UF) based on experience with other similar construction projects.[13] The noise levels in the table represent typical values. Distance and operating conditions are considered as they cause wide fluctuations in the noise emissions of similar equipment. In all areas between the roadway and sensitive receptors, a ground factor (G) of 0.0 was used, as most of the ground cover along the alignment is acoustically hard. This factor represents an acoustically hard ground cover, which represents the ground effect as the sound propagates from the source to the receptor. This ground factor is representative of the majority of the areas along the East Bay project alignment.

Noise impacts from construction activities are anticipated at any residential location within 25 to 90 feet of the construction activity, depending on the construction phase. Most of the construction would consist of site preparation and paving and would occur only during daytime hours. Construction activities conducted during daytime hours will have a lesser noise impact than nighttime construction, due to the higher background noise levels present during the day. There may be locations, however, where nighttime construction would be unobtrusive, such as commercial areas where the land use is unoccupied during nighttime hours, or industrial districts which are generally not sensitive to noise.

Noise impacts could also occur at sensitive land uses that are adjacent to construction lay-down or staging areas, where construction equipment and materials are stored and accessed during the construction period. At the time of the noise analysis, specific locations and details of the lay-down areas were undetermined. If a lay-down area is selected that is within 90 feet of a residential area, it is possible that noise impacts could occur, and mitigation would be required.

### 4.16.10.2 VIBRATION

#### Vibration Methodology and Criteria

Ground-borne vibration can be described in terms of displacement, velocity or acceleration. Velocity is the preferred measure for evaluating ground-borne vibration from transit projects, because sensitivity to vibration typically corresponds to the amplitude of vibration velocity within the low-frequency range of most concern for environmental vibration (roughly 5-100 Hz). Peak particle velocity (PPV) is the measure typically used in monitoring blasting and other types of construction-generated vibration, since it is related to the stresses experienced by building components. Human response is better correlated to the average amplitude of the vibration velocity level. This measure is expressed as Vdb. The threshold at which humans perceive vibration is approximately 65 VdB. The threshold at which vibration is annoying to humans is approximately 70 VdB.

[13] The usage factor is a fraction that accounts for the total time during an eight-hour day in which a piece of construction equipment is producing noise under full power.

## Table 4.16.10-3: Typical Construction Noise Levels

| No. of Items | Equipment Type | Maximum Equipment Noise Level at 50 ft, dBA | Hourly Equivalent Noise Levels at 50 ft, dBA [1] | Hourly Equivalent Noise Levels at 100 ft, dBA [1] |
|---|---|---|---|---|
| **Clear and Grub** | | | | |
| 1 | Excavator | 83 | 80 | 74 |
| 1 | Backhoe | 75 | 72 | 66 |
| 1 | Medium Duty Dump Truck | 77 | 74 | 68 |
| | **Combined $L_{eq}(h)$** | | 82 | 76 |
| **Earthwork** | | | | |
| 1 | Excavator | 83 | 80 | 74 |
| 1 | Backhoe | 75 | 72 | 66 |
| 1 | Front Loader | 74 | 71 | 65 |
| 1 | Blade | 77 | 74 | 68 |
| 1 | Asphalt Cutter | 81 | 78 | 72 |
| 2 | Heavy Duty Dump Trucks | 82 | 79 | 73 |
| | **Combined $L_{eq}(h)$** | | 86 | 80 |
| **Base Core** | | | | |
| 1 | Front Loader | 74 | 71 | 65 |
| 1 | Scraper | 80 | 77 | 71 |
| 1 | Blade | 77 | 74 | 68 |
| 1 | Smooth Drum Roller | 76 | 73 | 67 |
| 1 | Water Truck | 73 | 70 | 64 |
| 2 | Heavy Duty Dump Trucks | 82 | 79 | 73 |
| | **Combined $L_{eq}(h)$** | | 85 | 79 |
| **Paving** | | | | |
| 1 | Smooth Drum Roller | 76 | 73 | 67 |
| 1 | Backhoe | 75 | 72 | 66 |
| 1 | Asphalt Paver | 74 | 71 | 65 |
| 1 | Ready Mix Trucks | 81 | 78 | 72 |
| 2 | Heavy Duty Dump Trucks | 82 | 79 | 73 |
| 1 | Flatbed Truck | 75 | 72 | 66 |
| | **Combined $L_{eq}(h)$** | | 85 | 79 |
| **Curb and Gutter** | | | | |
| 1 | Excavator | 83 | 80 | 74 |
| 1 | Front Loader | 77 | 74 | 68 |
| 2 | Heavy Duty Dump Trucks | 82 | 79 | 73 |
| | **Combined $L_{eq}(h)$** | | 85 | 79 |

Notes: Calculated construction noise levels assume that all equipment operate for six hours out of an eight hour day. Calculations also assume that all equipment are operated at full load 70 % of the time.

1 - Predicted noise levels are from the center of the construction activity.

Source: Parsons 2005

### Impacts

Two types of construction vibration impacts were analyzed: human annoyance and building damage. Human annoyance occurs when construction vibration rises significantly above the threshold of human perception for extended periods of time. Building damage can be cosmetic or structural. Fragile buildings such as historical structures or ancient ruins are generally more susceptible to damage from ground vibration. Buildings that are not particularly fragile would not experience any cosmetic damage (e.g., plaster cracks) at distances beyond 30 feet based on typical construction equipment vibration levels. This distance can vary substantially depending on the soil composition and underground geological layer between vibration source and receiver. In addition, not all buildings respond similarly to vibration generated by construction equipment.

The vibration produced by construction equipment was obtained from FTA's *Transit Noise and Vibration Impact Assessment* (USDOT, 1995) and from field measurements, and is shown in Table 4.16.10-4. The distances shown in Table 4.16.10-5 are the minimum distances at which short-term construction vibration impacts may occur. Mitigation would be required if construction equipment were to operate within the distances shown in Table 4.16.10-5 from wood-framed buildings, such as single family residences, located along the project alignment.

**Table 4.16.10-4: Vibration Source Levels for Construction Equipment**

| Equipment | PPV [1] at 25 feet (in./sec) | Approximate Velocity Level [2] at 25 ft (VdB) |
|---|---|---|
| Large bulldozer | 0.089 | 87 |
| Loaded trucks | 0.076 | 86 |
| Excavator | 0.11 | 89 |
| Small bulldozer | 0.003 | 58 |
| Vibratory compactor/roller | 0.55[3] | 103[3] |

Notes:
[1] Peak particle ground velocity measured at 25 feet unless noted otherwise.
[2] RMS ground velocity in VdB referenced to 1 micro-in/second.
[3] Measured at 15 feet by Parsons.

Source: USDOT, 1995.

### 4.16.10.3 Avoidance, Minimization, and/or Mitigation Measures

Construction impacts are of a temporary nature, and construction is a necessary part of the East Bay BRT Project. Measures may be required to minimize construction noise and vibration, and a noise variance may be required in certain municipalities.

**Table 4.16.10-5: Construction Equipment Vibration Impact Distances**

| Equipment | Distance to Vibration Annoyance[1], feet | Distance to Vibration Building Damage[2], feet |
|---|---|---|
| Large bulldozer | 45 | -- |
| Loaded trucks | 40 | -- |
| Excavator | 50 | -- |
| Small bulldozer | -- | -- |
| Vibratory compactor/roller | 85 | 15 |

Notes:

[1] This is the distance at which the RMS velocity level is 80 VdB or less at the inside of the building structure. When propagating from the ground surface to the building structure foundation, there is a vibratory coupling loss of approximately 5 dB; however, this loss is offset by the building amplification in light-frame construction. Thus, no additional adjustments are applied.

[2] This is the distance at which the peak particle velocity is 0.50 in/sec or less.

"—" indicates distance is less than 10 feet.

Source: *Noise and Vibration Impact Assessment Technical Report*, Parsons, January 2006

Once details of the construction activities become available, the contractor would need to work with local authorities to develop an acceptable approach to minimize interference with the business and residential communities, traffic disruptions, and the total duration of the construction. Nighttime construction may be necessary to avoid unacceptable disruptions to street traffic during daytime hours. In the municipalities of Berkeley and Oakland, along the East Bay project alignment, a construction noise variance from their municipal code will be required to conduct nighttime construction activities outside the allowed time periods. Table 4.16.10-1 provides specific construction noise restrictions by jurisdiction.

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

Control measures, such as the following, would minimize noise and vibration disturbances at sensitive areas during construction:

1. Use newer equipment with improved noise muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.).

2. Perform all construction in a manner to minimize noise and vibration. Utilize construction methods or equipment that will provide the lowest level of noise and ground vibration impact. The contractor should be required to select construction processes and techniques that create the lowest noise levels.

3. During asphalt cutting, a temporary noise barrier should be placed between the cutting area and noise sensitive sites.

4. Conduct truck loading, unloading and hauling operations so that noise is kept to a minimum by carefully selecting routes to avoid going through residential neighborhoods to the greatest possible extent.

5. Construction lay-down or staging areas should be selected in industrially zoned districts. If industrially zoned areas are not available, commercially zoned areas may be used, or locations that are at least 90 feet from any noise sensitive land use such as residences, hotels and motels. Ingress and egress to and from the staging areas should be on collector streets or greater (higher street designations are preferred).

6. Turn off idling equipment.

7. Minimize construction activities during evening, nighttime, weekend, and holiday periods. Permits may be required in some cities before construction can be performed in noise sensitive areas between 7 pm and 7 am.

8. The construction contractor should be required by contract specification to comply with all local noise ordinances and obtain all necessary permits and variances.

It is expected that ground-borne vibration from construction activities would cause only intermittent localized intrusion along the East Bay BRT route. Processes such as earth moving with bulldozers, and the use of vibratory compaction rollers can create annoying vibration. There are cases where it may be necessary to use this type of equipment in close proximity to residential buildings. Procedures, such as the following, would be used to minimize the potential for annoyance or damage from construction vibration:

1. When possible, limit the use of construction equipment that creates high vibration levels, such as vibratory rollers and hammers, operating within 130 feet of residential structures.

2. Require vibration monitoring during vibration-intensive activities.

3. Restrict the hours of vibration-intensive equipment or activities such as vibratory rollers so that impacts to residents are minimal (e.g., weekdays during daytime hours only when as many residents as possible are away from home).

A combination of techniques for equipment noise and vibration control as well as administrative measures would be selected to provide the most effective means for reducing construction noise and vibration effects. Although, these measures would reduce construction impacts, temporary increases in noise would likely occur at some locations.

## 4.16.11 Biological Environment

No construction impacts are anticipated to the biological environment as there are few biological resources in the project area. BMPs described in Section 4.16.7, Hydrology and Water Quality (Construction Impacts) would avoid impacts to waterways connecting to biological resources outside the project area.

Iceland, Berkeley Senior Center, Berkeley YWCA, Tang Center, and Civic Center YMCA in Berkeley, and four branches of the Boys and Girls Club of Oakland, North Oakland Senior Center, Seton Senior Center, the Oakland YWCA, and three branches of the YMCA in Oakland. Other cultural facilities include H.J. Kaiser Convention Center, Oakland Convention Center, and Oakland Ice Center in Oakland; Martin Luther King, Jr. Civic Center in Berkeley; and San Leandro City Hall and Casa Peralta in San Leandro.

### Hospital and Medical Facilities

There are several hospitals and medical facilities within the corridor, including Alta Bates Summit Medical Center and Alta Bates Summit Medical Center Herrick Campus in Berkeley; Alta Bates Summit Medical Center and Children's Hospital in Oakland; and San Leandro Hospital in San Leandro.

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**Table 4.11-1: Environmental Risk Sites on the AC Transit East Bay BRT Project Alternatives (44 sites total)**

| Identified Property | Property Address | Hazardous Material |
|---|---|---|
| Shell | 2800 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1988. The substance leaked was gasoline. The abatement method was to excavate and dispose of the contaminated soil. A pollution characterization is underway. |
| Sears Auto Center #1058 | 2633 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was waste oil. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| Dave's Station | 2250 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was gasoline. The abatement method was to excavate and treat or dispose of the contaminated soil. A pollution characterization is underway. |
| Exxon | 2225 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline affecting soil and groundwater. The abatement method was to remove contaminated soil and free-floating product from the water table, pump and treat groundwater, and vent soil. Remedial action is underway. |
| Chevron 9-3600 | 2200 Telegraph Avenue, Oakland | (LUST, updated 5/26/04). A leak was discovered in 2000. The substance leaked was gasoline. A preliminary assessment is underway. |
| East Bay Packing Company | 208 Jackson Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1990. The substance leaked was diesel fuel. The abatement method was to excavate and dispose of the contaminated soil. A preliminary assessment is underway. |
| Miller Packing Company II | 206 2nd Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was diesel fuel affecting soil. A preliminary assessment is underway. |
| Miller Packing | 201 2nd Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1989. The substance leaked was gasoline. A preliminary assessment is underway. |
| Cooper Tire Shop Former | 1220 East 12th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1996. The substance leaked was gasoline affecting soil. The leak is being confirmed. |
| JR Used Auto Parts | 823 East 12th Street, Oakland | (LUST, updated 7/11/92). A leak was discovered during tank closure in 1988. The substance leaked was mineral spirits affecting soil. The leak is being confirmed and no action has yet been taken. |
| Harley Davidson Motorcycle | 744 East 12th Street, Oakland | (LUST, updated 5/26/04). A leak was discovered during inventory control in 1996. The substance leaked was gasoline. The leak is being confirmed. |
| Mobil | 14994 International Boulevard, Oakland | This site is listed on two LUST databases, both updated on 5/26/04. Leaks were discovered during tank closures in 1986 and 1987. The substance leaked was gasoline affecting soil and groundwater. Post remedial action monitoring is underway. |
| Quan's Automotive | 10100 International Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered during tank closure in 1994. The substance leaked was gasoline. The leak is being confirmed. |
| Arco #02185 | 9800 International Boulevard, Oakland | (LUST, updated 5/26/04). A leak was discovered in the piping during inventory control in 1989. The substance leaked was gasoline affecting soil and groundwater. A preliminary assessment is underway. |