

tunnel and segments of the historic tracks. Aspects of integrity that would be unaffected by these actions are location, association, and feeling.

- Introduction of new uses to the NHL District that will affect the historic viewshed, such as the alteration of existing views from within the District with new views that include: tracks, two platform/stations, overhead contact system, and signals. Specific effects to Fort Mason Building A: immediately adjacent western platform/station (Criteria of Adverse Effect IV: Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance). The aspects of integrity that would be adversely affected by this particular action would be integrity of setting, association, and feeling. Aspects of integrity that would be unaffected are location, design, workmanship, and materials.
- Introduction of new sources of noise, vibration, and light to the NHL District from streetcar operation (Criteria of Adverse Effect V. Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features). For example, patrons of the Fort Mason Center and other recreational users and visitors within the District may experience greater levels of noise, vibration, and light due to streetcar operation than exist currently in this location. The aspects of integrity that would be adversely affected by this particular action would be integrity of setting, association, and feeling. Aspects of integrity that would be unaffected are location, design, workmanship, and materials.

In summary, the demolition of historic fabric and a contributing resource to the NHL District, the alteration of the historic viewshed, and the introduction of new sources of noise, vibration, and light will combine to form an adverse effect to the San Francisco Port of Embarkation, U.S. Army NHL District/Fort Mason Historic District.

Indirect Effects of Noise and Vibration from Streetcar Construction and Operation

A noise and vibration study was conducted as part of the draft Environmental Impact Statement (EIS) for this undertaking. In summary, the EIS found that all noise and vibration effects from construction and operation of the streetcar line would be beneath the standard U.S. DOT thresholds for these factors. As the rail line would pass within 15 feet of the Maritime Museum and the West Speaker Tower, both of which are contributors to the Aquatic Park NHL District, operational vibration levels from a structural and a nuisance standpoint were also evaluated. The vibration study concluded that operational vibration on the structural condition of the museum and tower would be below the U.S. DOT criterion of 0.12 PPV (or 90 VdB). However, the vibration study also found that the vibration nuisance (non-structural) standards would exceed the nuisance threshold by 9Vdb. Mitigation measures identified in the EIS to reduce the nuisance vibration levels below the standard threshold include reducing vehicle speed down Beach Street during nighttime hours, installation of resilient fasteners between the rails and the concrete slab, as well as floating slab technologies. These measures would

also further reduce the structural vibration effects from streetcar construction and operation. As such, the proposed undertaking would not adversely affect the historic resources in the APE from a noise and vibration standpoint.

Effects on Other National Register-Listed Properties in the APE

In addition, no adverse effects are anticipated to the remaining National Register-listed properties in the APE, including Pumping Station #2 and the San Francisco Cable Cars. A new crossing of the in-street segment of the streetcar line with the existing route of the Hyde/Powell Street Cable Car is proposed, which is within the San Francisco Cable Cars NHL. This would occur at the intersection of Hyde Street and Beach Street, and would be similar to other existing streetcar rail crossings of the historic cables. No adverse effects are anticipated to other listed properties, including the California Fruit Cannery Association (Haslett) Warehouse and the Pioneer Woolen Mills & D. Ghirardelli Company.

Similarly, no adverse effects are anticipated to the California Register-eligible properties in the APE, including the Cannery, the Marina Safeway or two storage buildings on Jones Street. While new construction such as new tracks and the overhead contact system would be visible from these resources, the alteration of their historic setting is deemed to be relatively minor and somewhat typical for an urban setting such as San Francisco.

In addition, no adverse effects are anticipated at indigenous site CA-SFr-29, as this site is not located within the area proposed for ground-disturbing activities associated with the turnaround segment. Prior archeological testing for site CA-SFr-23 has not been conducted because of the dubious existence of the site based on existing documentation and the amount of disturbance and infrastructure changes that have occurred in the site locale historically. It was not considered prudent to conduct subsurface testing in this environment, and construction monitoring and treatment in accordance with post-review discoveries under 36 CFR 800.13 was considered more appropriate.

Cumulative Effects

Cumulative effects to cultural resources should consider the reasonably foreseeable actions in the APE and immediate vicinity in addition to potential effects of the proposed action. The projects identified include those which could affect cultural resources within the APE or immediate vicinity by substantially altering or impairing them, as well as ground-disturbing activities in archeologically sensitive areas.

There are a number of projects planned within or in the vicinity of the APE. Two projects at the Port of Embarkation, U.S. Army NHL District/Fort Mason Historic District, include seismic upgrades to Building E and a solar panel installation project on the roof of the Pier 2 Shed. Projects at San Francisco Maritime NHP include the Municipal Pier Rehabilitation Project, Maritime Heritage Learning Center, and Aquatic Park Bathhouse Exhibit Plan and Installation. Other projects in proximity to the APE include the San Francisco Marina Renovation Project; Fort Mason Bay Trail at Laguna

Street and Marina Boulevard; 721 Beach Street Development and the Fisherman's Wharf Public Realm Plan.

Implementation of standard mitigation measures to ensure the protection of both known and unknown cultural resources are included in the various environmental documents which have evaluated, or will evaluate, the environmental effects of each of these projects. In addition, effects to historic properties at any of the projects located on NPS-managed properties would be required to comply with the *Secretary of the Interior's Standards for the Treatment of Historic Properties*, further mitigating the intensity of the effects to cultural resources. All reasonably foreseeable projects would also have to undergo additional environmental review, thus ensuring further consideration and minimization of effects.

Projects such as the Aquatic Park Bathhouse Exhibit Plan and Installation, San Francisco Maritime NHP Municipal Pier Rehabilitation Project, and Seismic Upgrades to the Maritime Heritage Learning Center, specifically, would be subject to the provisions in the Aquatic Park Cultural Landscape Report, which is intended to minimize adverse effects to the Aquatic Park cultural landscape. Similarly, Fort Mason Bay Trail at Laguna Street and Marina Boulevard, Seismic Upgrades to Building E of the San Francisco Maritime NHP, and the Pier 2 Shed Solar Installation Project, would be subject to the Fort Mason Cultural Landscape Report, which is intended to minimize adverse effects to both the San Francisco Port of Embarkation, U.S. Army NHL District and the Fort Mason National Register Historic District. The Pier 2 Solar Panel Installation Project, specifically, was evaluated by the California SHPO and the Heritage Preservation Services Division of the National Park Service in October, 2010, which determined that this tax incentive project would comply with the *Secretary of the Interior's Standards for Rehabilitation* (see enclosure). Finally, effects to both known and unknown archeological resources as a result of any or all of these projects would be mitigated by implementing standard worker education and inadvertent discovery measures, and as required by NEPA and Section 106 of the NHPA. Therefore, based on available information, these projects in and of themselves are unlikely to have adverse effects on historic properties within the APE. However, when combined with the proposed undertaking to extend the streetcar service, which is considered on its own merits to be an adverse effect, the cumulative effect to historic properties will be adverse.

Request for Concurrence

The NPS is requesting concurrence that implementation of the proposed undertaking will constitute an adverse effect to two National Historic Landmark Districts in the APE; 1) the Aquatic Park NHL District, and 2) the San Francisco Port of Embarkation, U.S. Army NHL District/Fort Mason National Register Historic District.

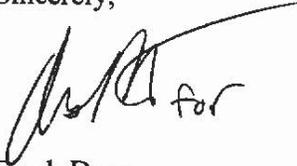
Resolution of Adverse Effects and Continuing Consultation

To resolve the adverse effects to these cultural resources, the NPS intends to draft and consult on a Memorandum of Agreement (MOA) for this undertaking. Consulting parties

will include the NPS and SHPO, and may include the ACHP, the Federal Transit Authority (FTA), the City and County of San Francisco, and Ohlone representatives.

If you have any questions regarding this undertaking please contact Paul Scolari at (415) 561-4963 or email (Paul_Scolari@nps.gov) or Robbyn Jackson at (415) 561-7019 or email (Robbyn_L_Jackson@nps.gov).

Sincerely,



Frank Dean
General Superintendent
Golden Gate National Recreation Area



Craig Kenkel
Superintendent
San Francisco Maritime NHP

Enclosures

cc: Mr. Reid Nelson, Advisory Council on Historic Preservation
Ms. Elaine Jackson-Retondo Ph.D., National Historic Landmarks Coordinator,
National Park Service – Pacific West Region
Ms. Rosemary Cambra, Chairperson, Muwekma Ohlone Indian Tribe
Mr. Tony Cerda, Chairman, Costanoan-Rumsen Carmel Tribe
Mr. Andrew Galvan, The Ohlone Indian Tribe
Ms. Louise Miranda Ramirez, Chairperson, Ohlone/Costanoan-Esselen Nation
Mr. Valentin Lopez, Chairman, Amah Mutsun Tribal Band
Mr. Patrick Orozco, Costanoan Ohlone Rumsen-Mutsun Tribe
Ms. Ann Marie Sayers, Indian Canyon Mutsun Band of Costanoan
Ms. Ramona Garibay, Representative, Trina Marie Ruano Family
Ms. Irene Zwierlein, Chairperson, Amah Mutsun Band of Ohlone Costanoan
Indians
Ms. Linda Yamane
Ms. Jakki Kehl
Mr. Jonathan Cordero
Mr. Anthony Miranda
Mr. Rico Miranda
Mr. Chuck Striplen

**OFFICE OF HISTORIC PRESERVATION
DEPARTMENT OF PARKS AND RECREATION**

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November 7, 2011

In reply refer to: NPS071019A

Frank Dean
Superintendent
Golden Gate National Recreational Area
Fort Mason # 201
San Francisco, CA 94123

Craig Kenkel, Superintendent
San Francisco Maritime National Historic Park
National Park Service
Fort Mason Center, Building E
San Francisco, CA 94123

Re: Extension of Historic Streetcar Service, San Francisco, CA

Dear Mr. Dean and Mr. Kenkel:

Thank you for your letter continuing consultation with regard to the proposed undertaking at Golden Gate National Recreation Area (GGNRA) and in San Francisco Maritime National Historic Park. The proposed undertaking, as I understand it, involves extending historic streetcar service from Fisherman's Wharf through the Aquatic Park, through the tunnel under Fort Mason, and into Lower Fort Mason. NPS initiated consultation on this Undertaking in 2007, and in a letter dated December 3 of that year, I offered my concurrence with the proposed Area of Potential Effect (APE).

Seven properties within the APE are listed on the National Register of Historic Places (NRHP). NPS commissioned a survey of the APE that identified a total of 37 buildings and structures outside NPS boundaries that were 45 years or older. None of these were found eligible for listing on the NRHP, but four were found eligible for listing on the California Register of Historical Resources (CRHR). Further application of the NRHP criteria is warranted for the properties found eligible for the CRHR. My staff has discussed these evaluations with NPS staff and both are working to finalize the evaluation efforts for these properties.

In addition, two archaeological properties (CA-SFr29 and CA-SFr-23) were located in previous surveys that were considered eligible for listing on the NRHP. An intensive pedestrian survey in 2009 revealed no new cultural resource discoveries and no evidence of the earlier two sites. An archaeological investigation in 2010 revealed no evidence of CA-SFr-29 in areas that could be affected by the Undertaking. Similarly, no evidence of CA-SFr-23 was visible in the 2009 pedestrian survey, but NPS concedes that subsurface cultural material may be present.

NPS has applied the criteria of adverse effect and finds this Undertaking will have an adverse effect because of project components in the Aquatic Park National Historic Landmark (NHL)

District and the San Francisco Port of Embarkation, U.S. Army NHL District. NPS proposes to resolve these adverse effects through the preparation of a Memorandum of Agreement (MOA) in consultation with this office and other consulting parties. I offer the following comments:

- With the exception of the above-mentioned non-NPS properties within the APE, I concur with NPS's efforts to identify historic properties within the APE.
- I concur that the undertaking will have an adverse effect on historic properties within the APE and with the plan to resolve these effects through the preparation of an MOA.

Thank you for seeking my comments and considering historic properties as part of your project planning. If you have any questions or concerns, please contact Mark Beason, Project Review Unit historian, at (916) 445 - 7047 or at mbeason@parks.ca.gov.

Sincerely,

Milford Wayne Donaldson, FAIA
State Historic Preservation Officer

DRAFT

**MEMORANDUM OF AGREEMENT BETWEEN
THE NATIONAL PARK SERVICE
AND THE CALIFORNIA STATE HISTORIC PRESERVATION OFFICER,
REGARDING THE *EXTENSION OF HISTORIC STREETCAR SERVICE PROJECT*
IN SAN FRANCISCO CITY AND COUNTY, CALIFORNIA**

WHEREAS, the National Park Service (NPS) as the lead agency in cooperation with the San Francisco Municipal Transportation Agency (MUNI) and the Federal Transit Administration (FTA) proposes the *Extension of Historic Streetcar Service from Fisherman's Wharf to Aquatic Park in San Francisco Maritime National Historical Park and the Golden Gate National Recreation Area's Fort Mason Center* (Undertaking), which will improve public access to Aquatic Park, Fort Mason, and other nearby areas with high public interest in San Francisco, California; and

WHEREAS, the NPS considered alternative routes and methods for improving public access to these important locales, established an Area of Potential Effect (APE) for historic resources, and assessed the Undertaking's effects to historic resources within the APE; and

WHEREAS, the NPS has determined that the Undertaking will have an adverse effect on contributing features of the Aquatic Park National Historic Landmark (NHL) District, the San Francisco Port of Embarkation NHL District, and the Fort Mason National Register of Historic Places (NHRP) District, all properties determined to be significant historic resources under the National Historic Preservation Act (NHPA) of 1966 (as amended); and

WHEREAS, the NPS has consulted with the California State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP) and Ohlone/Costanoan representatives pursuant to 36 CFR Part 800, the regulations implementing Section 106 of the National Historic Preservation Act (16 USC Section 470f) as amended, regarding the Undertaking's effects on historic properties, and has notified the ACHP of the adverse effect finding pursuant to 36 CFR § 800.6(a)(1); and

WHEREAS, the ACHP has been consulted and chose not to participate in this MOA; and

WHEREAS, the NPS, FTA, MUNI, and the City and County of San Francisco Planning Department are signatories to this MOA, and the Ohlone/Costanoan representatives and have been invited to sign this MOA as concurring parties (**NOTE: this clause is a tentative placeholder at this point**); and

WHEREAS, the Secretary of the Interior (SOI) has been invited to consult in this MOA pursuant to 36 CFR 800.10 (Special Requirements for Protection of National Historic Landmarks) and 36 CFR 800.4 through 36 CFR 800.6; and

WHEREAS, members of the public have been invited to comment on the Undertaking through the Draft Environmental Impact Statement (DEIS) process as required by the National Environmental Policy Act (NEPA). The DEIS public comment period concluded in August, 2011; and

WHEREAS, the NPS has thoroughly considered alternatives to the Undertaking, has determined that operational constraints on the design of the Undertaking preclude the possibility of avoiding adverse effects to the historic properties during the Undertaking's implementation, and has further determined that it will resolve adverse effects of the Undertaking on the subject historic properties through the execution and implementation of this Memorandum of Agreement (MOA);

NOW, THEREFORE, the NPS and the SHPO agree that, upon the NPS's decision to proceed with the Undertaking, the NPS will ensure that the Undertaking is implemented in accordance with the following stipulations in order to take into account the effect of the Undertaking on historic properties, and further agrees that these stipulations will govern the Undertaking and all of its parts until this MOA expires or is terminated.

STIPULATIONS

I. Definitions

The definitions provided at 36 CFR § 800.16 are applicable throughout this MOA.

II. Area of Potential Effect

The APE for the Undertaking was established to include all areas that may contain historic properties that would be directly or indirectly affected by all components of the Undertaking. The boundaries of the APE generally encompass an area in the City and County of San Francisco from Taylor Street to the east, Laguna Street to the west, the San Francisco Bay to the north, and Bay Street to the south. The APE consists of the properties fronting on streets or areas where new track would be constructed, as well as the full extent of several previously designated historic resources surrounding or abutting the project area. The APE for the Undertaking is included as Attachment A to this MOA.

II. Treatment of Historic Properties

A. Review of Future Design Submittals

The NPS will review all future design submittals by the San Francisco Municipal Transit Authority (MUNI, or its contractors) for compliance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (National Park Service, 1995 and updates), including, but not limited to, preliminary designs for station

platforms and shelters, lighting, signage, noise and vibration controls, and overhead contact systems. Appropriate treatments will be guided by the cultural landscape reports previously prepared for the Fort Mason and Aquatic Park NHL Districts. SHPO will also review future design submittals with regard to their effects on all historic properties in the APE. The future designs will aim to avoid or minimize specific effects and achieve compatibility within the historic districts.

B. Recordation

Both NHL Districts shall be the subject of partial recordation by the Historic American Building Survey/Historic American Engineering Record/Historic American Landscape Survey (HABS/HAER/HALS). Large-format (four by five inch or larger negative size) black and white photographs will be taken showing the landmarks in context, as well as details of their contributing elements and character-defining features that would be adversely affected by the Undertaking. Photographs will include, but are not limited to, the following affected elements: a stone retaining wall; the West Speaker Tower, Aquatic Park Bathhouse entrance; historic tracks of the state Belt Railway near the end of Van Ness Avenue at the Aquatic Park NHL District, and within the Fort Mason Tunnel; the northern end of the Fort Mason Tunnel retaining wall; historic tracks within the parking lot of the Fort Mason Center at the San Francisco Port of Embarkation NHL District; and the interior/overall quality of the existing conditions of the San Francisco Port of Embarkation NHL. NPS will ensure that the photographs will be processed for archival permanence in accordance with the HABS/HAER/HALS photographic specifications. The NPS will ensure that current site plans of the two NHLs are included in the documentation.

The recordation will follow the NPS HABS/HAER/HALS Guidelines. The HABS/HAER/HALS format, views, and other documentation details will be coordinated with the Pacific West Regional Office of the NPS, San Francisco, California. It is anticipated that the recordation will be completed to Level I or Level II HABS/HAER/HALS written data standards, and will include archival and digital reproduction of historic images, plans, and drawings.

NPS will ensure that copies of the documentation (including photo documentation processed for archival permanence) will be placed in the San Francisco Maritime NHP (Archives) and Golden Gate NRA (Park Archive and Records Center).

To the extent feasible, historic materials that would ordinarily be demolished should be reused in the new design. For example, the historic granite retaining wall with acorn finials at Aquatic Park could be incorporated into the new MUNI platform design in this location.

C. Information Display

NPS will ensure that interpretive signs or display panels will be installed at Aquatic Park and the Fort Mason Center to describe the Undertaking for the duration of construction.

D. Protection of the Historic Properties

For the duration of construction, NPS will ensure the protection of resources within the NHL and Historic Districts. The NPS (via SFMTA/MUNI or its contractors), will ensure against incidental damage to the NHL and Historic Districts by hiring an independent Cultural Compliance Monitor who will monitor the site(s) during construction and will prepare monthly reports documenting compliance and protection. The NPS will ensure that these reports are provided to the General Superintendent of the Golden Gate NRA (or designee), and Superintendent of the San Francisco Maritime NHP (or designee).

E. Repair of Inadvertent Damage

NPS will ensure that any damage to either NHL District or the Fort Mason Historic District resulting from the Undertaking will be repaired in accordance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*.

F: Reduction of Operational Noise and Vibration

The NPS and FTA will ensure that the operational noise and vibration of streetcar use in the vicinity of the Maritime Museum and the West Speaker Tower in the Aquatic Park NHL District will not exceed the federal noise or vibration nuisance (non-structural) standards. Potential measures to reduce the nuisance noise and vibration levels below the standard threshold shall be investigated during the design phase, and may include, but are not limited to, reducing vehicle speed down Beach Street during nighttime hours, installation of resilient fasteners between the rails and the concrete slab, as well as floating slab technologies.

G: Archeological Site Monitoring

The NPS will ensure that subsurface construction near the predicted location of archeological site CA-SFr-23 is monitored by a qualified cultural resource professional. Any cultural materials identified during construction will be treated in accordance with part III B. *Discoveries and Unanticipated Effects*, described below.

III. Administrative Provisions

A. Professional Qualifications and Standards

1. All activities prescribed by Stipulations II.A through II.G of this MOA will be carried out by or under the direct supervision of persons meeting the "Secretary of the Interior's Professional Qualification Standards" for cultural resource specialists (*Federal Register*, 1983).
2. All written and graphic materials prescribed by Stipulations II.A through II.F of this MOA will meet contemporary professional standards and conform to the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (National Park Service, 1995 and updates).

B. Discoveries and Unanticipated Effects

If the NPS determines after the construction of the Undertaking has commenced, that the Undertaking will affect a previously unidentified property within the APE that may be eligible for listing on the NRHP, or affect a known historic property in an unanticipated manner, NPS will address the discovery or unanticipated effect in accordance with 36 CFR § 800.13(b)(3). The NPS at its discretion may hereunder assume any discovered property to be eligible for listing on the NRHP in accordance with 36 CFR § 800.13(c).

C. Dispute Resolution

Should any signatory to this MOA object at any time to the manner in which the terms of this MOA are implemented, to any action carried out or proposed with respect to implementation of this MOA, the NPS will consult with such party to resolve the objection. If the NPS determines that such objection cannot be resolved within fifteen (15) calendar days, NPS will:

1. Forward all documentation relevant to the dispute, including the NPS's proposed resolution, to the ACHP. The NPS will also provide a copy to all signatories and concurring parties. The ACHP will provide the NPS with its advice on the resolution of the objection within thirty (30) days of receiving adequate documentation. Prior to reaching a final decision on the dispute, the NPS will prepare a written response that takes into account any timely advice or comments regarding the dispute from the ACHP, signatories, and concurring parties, and provide them with a copy of this written response. The NPS will then proceed according to its final decision.
2. If the ACHP does not provide its advice regarding the dispute within the thirty (30) day time period, the NPS may make a final decision on the dispute and proceed accordingly. Prior to reaching such a final decision, the NPS will prepare a written response that takes into account any timely comments regarding the dispute from the signatories and concurring parties to this MOA, and provide them and the ACHP with a copy of such written response.
3. The NPS responsibility to carry out all other actions subject to the terms of this MOA that are not the subject of the dispute remain in effect. The NPS may proceed with Undertaking activities that are unrelated to the dispute.

E. Amendments

If any signatory party to this MOA proposes an amendment to its terms, that party will consult with the other parties to consider such amendment. The amendment will be effective on the last date that a copy of it is signed by all of the signatories in counterpoint. If the signatories cannot agree to appropriate terms to amend this MOA, any signatory may terminate the MOA in accordance with Stipulation III.F, below.

F. Termination

1. If any signatory believes that the terms of this MOA are not being carried out or cannot be carried out, they may request that construction stop where historic properties are threatened while the terms of the MOA are amended per Stipulation II.E, above. If within thirty (30) days, or another time period agreed to by all signatories, an amendment cannot be reached, any signatory may terminate the MOA upon written notification to the other signatories.
2. If this MOA is terminated for any reason, and the NPS determines that the Undertaking will proceed, the NPS will either execute a new MOA with the signatories pursuant to 36 CFR § 800.6(c)(1), or request, take into account, and respond to the comments of the ACHP pursuant to 36 CFR § 800.7. The NPS will notify the signatories as to the course of action it will pursue.

G. Duration

1. If not amended as per Section III.E, or terminated as per Section III.F, this MOA will be in effect through the NPS's implementation of the Undertaking and will terminate and have no further force or effect when the NPS, in consultation with the other signatories, determines that the terms of this MOA have been fulfilled in a satisfactory manner. The NPS will provide the other signatories with written notice of its determination and of termination of this MOA.
2. If the NPS determines that the Undertaking has not been initiated or completed within ten years following execution of this MOA, the signatories will consult to reconsider its terms. Reconsideration may include continuation of the MOA as originally executed, amendment, or termination.

H. Effective Date

The NPS will ensure that each party is provided with a copy of the fully executed MOA. This MOA will take effect on the date that the last signatory has signed the MOA.

EXECUTION and implementation of this MOA by the signatory parties, and implementation of its terms, shall evidence that NPS has afforded the ACHP a reasonable opportunity to comment on the Undertaking and the effect of the Undertaking on historic properties, and that the NPS has taken into account the effects of the Undertaking on historic properties.

SIGNATORY PARTIES

National Park Service

By: _____ Date: _____
Frank Dean
General Superintendent
Golden Gate National Recreation Area

By: _____ Date: _____
Craig Kenkel
Superintendent
San Francisco Maritime National Historical Park

Federal Transit Administration

By: _____ Date: _____
Leslie T. Rogers
Regional Administrator

California State Historic Preservation Officer

By: _____ Date: _____
Milford Wayne Donaldson
State Historic Preservation Officer

San Francisco Municipal Transportation Agency/MUNI

By: _____ Date: _____
Edward D. Reiskin.
Director

City and County of San Francisco Planning Department

By: _____ Date: _____
John Rahaim
Director

CONCURRING PARTIES

Ohlone/Costanoan Representatives

By: _____ **Date:** _____
Name
Position

ATTACHMENTS

Attachment A – APE Map

DRAFT

APPENDIX D

Biological Resources

Appendix D includes Table 1, a summary of federally threatened and endangered species with potential to occur in the vicinity of the project and Table 2, additional special-status species with potential to occur in the project vicinity.

TABLE 1 FEDERALLY THREATENED AND ENDANGERED SPECIES WITH POTENTIAL TO OCCUR IN THE VICINITY OF THE PROJECT			
Scientific Name Common Name	Federal ¹ /State	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
Mammals			
<i>Arctocephalus townsendi</i> Guadalupe fur seal	FT/CT, FP	Coastal waters, islands, isolated, rocky haul-outs.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Balaenoptera borealis</i> sei whale	FE/--	Temperate open seas, nearshore and offshore, from Gulf of Alaska to Baja California.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Balenoptera musculus</i> blue whale	FE/--	Open waters, occasional inshore waters.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Balaenoptera physalus</i> finback whale	FE/--	Open waters, occasional inshore waters.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Enhydra lutris nereis</i> southern sea otter	FT/FP	This species occurs in nearshore marine environments from about Ano Nuevo, San Mateo County to Point Sal., Santa Barbara County. Needs canopies of giant kelp and bull kelp for rafting and feeding. Prefers rocky substrates with abundant invertebrates.	No potential to occur. No habitat present in the Project Area. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). The occurrence is located at Sausalito Point, Sausalito, which 2.2 miles north of the Golden Gate Bridge.
<i>Eubalaena glacialis</i> right whale	FE/--	Isolated shoreline and rocky islands from San Mateo County north.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Eumetopias jubatus</i> steller sea-lion	FT, CH/ -	Range along the Northern Pacific Rim from Northern Japan to California, but most are found in the Gulf of Alaska and Aleutian Islands. When in the water, steller sea lions usually occupy surface and midwater coastal regions within 45km of shore. Breed and give birth in rookeries. Rookeries include rock shelves, ledges, or slopes and boulder, cobble, gravel, or sand beaches. Take refuge in haulouts. Both haulouts and rookeries are usually located on relatively remote islands where access by predators is limited.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Physeter catodon</i> sperm whale	FE/--	Open waters, typically far from land.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).

TABLE 1 FEDERALLY THREATENED AND ENDANGERED SPECIES WITH POTENTIAL TO OCCUR IN THE VICINITY OF THE PROJECT			
Scientific Name Common Name	Federal ¹ /State	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Reithrodontomys raviventris</i> Salt-marsh harvest mouse	FE/CE, FP	Occurs only in the saline emergent wetlands of San Francisco Bay and its tributaries. Primary habitat is pickleweed. Builds loosely organized nests, not burrows. Requires higher areas for flood escape.	No potential to occur. The Project Area does not have saline emergent wetlands with pickleweed. There are twelve occurrences of this species within the vicinity of the project (CDFG, 2009). No occurrences are located in the San Francisco North quadrangle.
Birds			
<i>Brachyramphus marmoratus</i> marbled murrelet	FT/CE	Habitat is mature Douglas-fir and redwood forest within 56km (35mi) of the coast.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Charadrius alexandrinus nivosus</i> western snowy plover	FT/SSC	Federal listing only applies to the Pacific coast population. This species occurs on sandy beaches, salt pond levees and shores of large alkali lakes. Need sandy, gravelly or friable soils for nesting.	Not likely to occur. A sandy beach is located north of the Project Area. The Project Area may be used as a corridor for dispersal. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). This occurrence is in the Hunters Point quadrangle at Bay Farm Island in San Francisco Bay, adjacent to Oakland.
<i>Diomedea albatrus</i> short-tailed albatross	FE/SSC	Open waters of the Pacific Ocean.	Not likely to occur. Open waters are located adjacent but not within the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Pelecanus occidentalis californicus</i> California brown pelican	FE/DL, FP	Nests on coastal islands lacking ground predators; roost on piers, buoys, and other structures on water bodies near the coast.	Not likely to occur. Suitable habitat is located adjacent to Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Rallus longirostris obsoletus</i> California clapper rail	FE/CE, FP	Occurs in salt-water and brackish marshes traversed by tidal sloughs in the vicinity of San Francisco Bay. Associated with abundant growths of pickleweed, but feeds away from cover on invertebrates from mud-bottomed sloughs.	Not likely to occur. No habitat is present within or adjacent to the Project Area. There are thirteen documented occurrences of this species within the vicinity of the project (CDFG, 2009). No occurrences are located in the San Francisco North quadrangle.
<i>Sternula antillarum browni</i> California least tern	FE/CE, FP	Nests in colonies. Nests along the coast from San Francisco Bay south to northern Baja California. Nests on sparsely vegetated, flat substrates such as sand beaches, alkali flats, land fills, or paved areas.	Not likely to occur. Potential suitable habitat is located adjacent to the Project Area. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). No occurrences are located in the San Francisco North quadrangle.

TABLE 1 FEDERALLY THREATENED AND ENDANGERED SPECIES WITH POTENTIAL TO OCCUR IN THE VICINITY OF THE PROJECT			
Scientific Name Common Name	Federal ¹ /State	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Strix occidentalis caurina</i> northern spotted owl	FT/SSC	Found in old growth forest with a moderate to high canopy closure; multi-layered, multi-species canopy with large overstory trees.	No potential to occur. No suitable habitat present within the Project Area. This species needs large stands of old growth forest. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
Amphibians			
<i>Ambystoma californiense</i> California tiger salamander	FT/SSC, CCE	This species occurs in annual grasslands and grassy understory of valley-foothill hardwood habitats, need underground refuges during dry season, need vernal pools or other seasonal water sources for breeding. The known elevation range of this species extends from 3 m to 1,054 m.	No potential to occur. No habitat present in the Project Area. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). The occurrence is not located in the San Francisco North quadrangle.
<i>Rana draytonii</i> California red- legged frog	FT/SSC	Breed in stock ponds, pools, and slow-moving streams with emergent vegetation for escape cover and egg attachment.	No potential to occur. No habitat present in the Project Area. There are seventeen documented occurrences of this species within the vicinity of the project (CDFG, 2009). Seven of the occurrences are located in the San Francisco North quadrangle. These occurrences are located at: Lloyd Lake in Golden Gate Park, Mountain Lake in the Presidio, Lands End in the Lincoln Park Area, Stow Lake in Golden Gate Park, at the DeYoung Museum in Golden Gate Park, and at Strybing Arboretum at Golden Gate Park.
Reptiles			
<i>Caretta caretta</i> loggerhead turtle	FT/--	Open ocean, seldom California coast.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Chelonia mydas</i> green sea turtle	FT/--	Warm-water bays and lagoons.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Dermochelys coriacea</i> leatherback turtle	FE/--	Open ocean, California coast, bays and estuaries.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).

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Scientific Name Common Name	Federal ¹ /State	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Lepidochelys olivacea</i> olive ridley sea turtle	FT/--	Bay and lagoons, seldom in California.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Masticophis lateralis euryxanthus</i> Alameda whipsnake	FT/CT	Occurs in chaparral and other scrubland habitats.	No potential to occur. No habitat present in the Project Area. There is one documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Thamnophis sirtalis tetrataenia</i> San Francisco garter snake	FE/CE, FP	Occurs in the vicinity of freshwater marshes, ponds, and slow moving streams in San Mateo County and extreme northern Santa Cruz County. Prefers dense cover and water depths of at least one foot. Upland area near water is very important for this species.	No potential to occur. No habitat present in the Project Area. There are two documented occurrences of this species within the vicinity of the project (CDFG, 2009). Neither occurrence is in the San Francisco North quadrangle.
Fish			
<i>Acipenser medirostris</i> green sturgeon, southern distinct population segment (DPS)	FT/SSC	Southern DPS includes Sacramento River, Pit River, McCloud River, and Feather River. Spawn in deep pools in large, turbulent, freshwater river mainstems. Use large cobble substrates, but can also range from clean sand to bedrock substrates.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Eucyclogobius neuberryi</i> tidewater goby	FE/--	This species occurs in brackish water habitats along the California coast from Agua Hedionda Lagoon, San Diego County to the mouth of the Smith River. Found primarily in waters of coastal lagoons, estuaries, and marshes. They need fairly still but not stagnant water and high oxygen levels.	No potential to occur. No habitat present in the Project Area. There are five documented occurrences of this species within the vicinity of the project (CDFG, 2009). No occurrences are located in the San Francisco North quadrangle.
<i>Hypomesus transpacificus</i> Delta smelt	FT/CT	Found only from the Suisun Bay upstream through the San Joaquin-Sacramento Delta along the freshwater edge of the mixing zone (saltwater-freshwater interface), in brackish water, where the salinity is approximately 2 ppt.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Oncorhynchus kisutch</i> Coho salmon	FE, CH/CE	Federal Listing = pops between Punta Gorda and San Lorenzo River; State Listing = pops south of Punta Gorda. Require beds of loose, silt-free, coarse gravel for spawning. Also need cover, cool water, and sufficient dissolved oxygen.	No potential to occur. No habitat present in the Project Area. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). The occurrence is not in the San Francisco North quadrangle.
<i>Oncorhynchus mykiss irideus</i> Steelhead, Central Valley DPS	FT, CH/CSC	Occur in the Pacific Ocean and spawn in coastal streams and rivers, over gravel beds.	No potential to occur. The Project Area is outside of the known range of this species. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).

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<i>Oncorhynchus mykiss irideus</i> Steelhead, Central California Coast DPS	FT, CH/SSC	Occurs from Russian River, south to Soquel Creek and to, but not including, Pajaro River. Also San Francisco and San Pablo Bay Basins.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Oncorhynchus tshawytscha</i> Chinook salmon, California Coastal ESU	FT/--	Located in rivers and streams south of the Klamath River to the Russian River, California, as well as seven artificial propagation programs: the Humboldt Fish Action Council (Freshwater Creek), Yager Creek, Redwood Creek, Hollow Tree, Van Arsdale Fish Station, Mattole Salmon Group, and Mad River Hatchery fall-run Chinook hatchery programs.	No potential to occur. The Project Area is outside of the known range of this species. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Oncorhynchus tshawytscha</i> Chinook salmon, Central Valley spring-run ESU	FT/CT	This species is found in the Pacific Ocean and spawn in large, permanent coastal streams and rivers, over gravel beds. Spring-run Chinook salmon are primarily found in four tributaries of the Sacramento River: Butte, Big Chico, Deer, and Mill creeks. Spring-run Chinook salmon enter the Sacramento river between February and June.	No potential to occur. The Project Area is outside of the known range of this species. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
<i>Oncorhynchus tshawytscha</i> Chinook salmon, Sacramento River winter-run ESU	FE, CH/CE	This species is found in the Pacific Ocean and spawn in large, permanent coastal streams and rivers, over gravel beds. They return to the upper Sacramento River in the winter but delay spawning until the spring and summer. Juveniles spend five to nine months in the river and Sacramento-San Joaquin Estuary before entering the ocean.	No potential to occur. The Project Area is outside of the known range of this species. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
Invertebrates			
<i>Euphydryas editha bayensis</i> bay checkerspot butterfly	FT/--	This species is restricted to native grasslands and outcrops of serpentine soil in the vicinity of San Francisco Bay. Its primary host plant is <i>Plantago erecta</i> . Secondary host plants are <i>Orthocarpus densiflorus</i> and <i>O. purpurascens</i> .	Not likely to occur. No habitat present in the Project Area. Potential suitable habitat located in study area at Black's Point. There are four documented occurrences of this species within the vicinity of the project (CDFG, 2009). One of the occurrences is located in the San Francisco North quadrangle. This occurrence was at Twin Peaks but is now considered extirpated.
<i>Haliotes cracherodii</i> black abalone	FE/--	Live in tidal pools from Oregon to the southern tip of Baja California.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG 2008a).
<i>Haliotes sorenseni</i> white abalone	FE/--	Found in marine subtidal rocky habitats only.	No potential to occur. No habitat present in the Project Area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).

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Scientific Name Common Name	Federal ¹ /State	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Icaricia icarioides missionensis</i> Mission blue butterfly	FE/--	Inhabits grasslands of the San Francisco Peninsula. Has three larval host plants: <i>Lupinus albifrons</i> (March to June), <i>L. varicolor</i> , and <i>L. formosus</i> (April to August), of which <i>L. albifrons</i> is favored.	Not likely to occur. No habitat present in the Project Area, although there is a low potential for this species to occur in the study area at Black's Point. This species is primarily known from San Mateo County, although two occurrences are located in the San Francisco North quadrangle - one is located at Twin Peaks and the other at Fort Baker (CDFG, 2009).
<i>Incisalia mossii bayensis</i> San Bruno elfin butterfly	FE/--	Found in coastal scrub with its preferred host plant, Pacific stonewort (<i>Sedum spathulifolium</i>). Occurs in coastal, mountainous area with grassy ground cover, mainly in the vicinity of San Bruno Mountain, San Mateo County.	Not likely to occur. No habitat present in the Project Area, although there is potentially suitable habitat located in study area at Black's Point. There are four documented occurrences of this species within the vicinity of the project (CDFG, 2009), although none of these occurrences are in the San Francisco North quadrangle.
<i>Speyeria callippe callippe</i> callippe silverspot butterfly	FE/--	Found in native grasslands with its host plant <i>Viola pedunculata</i> (Bloom period: February to April).	No potential to occur. No habitat present in the Project Area. There are six documented occurrences of this species within the vicinity of the project (CDFG, 2009). One of the occurrences is located in the San Francisco North quadrangle, at Twin Peaks.
<i>Speyeria zerene myrtleae</i> Myrtle's silverspot butterfly	FE/--	Current populations restricted to four sites in western Marin and southwestern Sonoma counties - considered extirpated from the San Francisco peninsula. Inhabits coastal terrace prairie, coastal bluff scrub and adjacent non-native annual grassland. Host plant is the western dog violet (<i>Viola adunca</i>).	No potential to occur. Range of species outside of the project area. There are no documented occurrences of this species within the vicinity of the project (CDFG, 2009).
Plants			
<i>Arctostaphylos hookeri</i> ssp. <i>ravenii</i> Presidio manzanita	FE/CE	This evergreen shrub occurs in chaparral, coastal prairie, and serpentine outcrops of coastal scrub. Prefers open, rocky serpentine slopes, 20-215 meters. It blooms from February to March.	No potential to occur. No habitat present in the Project Area. There are seven documented occurrences of this species within the vicinity of the project (CDFG, 2009). Six of the occurrences are in the San Francisco North quadrangle, of which the only extant occurrences are located in the Presidio of San Francisco.
<i>Arctostaphylos pallida</i> pallid manzanita	FT/--	This evergreen shrub occurs in broadleaved upland, closed-cone coniferous forest, chaparral, cismontane woodland, and coastal scrub. It grows on uplifted marine terraces on siliceous shale, sandy or gravelly. May require fire. Blooms from December to March at elevations from 185 to 465 meters.	No potential to occur. The project area is lower in elevation than the elevational range of this species. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). This occurrence is not in the San Francisco North quadrangle.

<i>Scientific Name</i> Common Name	Federal ¹ /State	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Arenaria paludicola</i> marsh sandwort	FE/CE	This stoloniferous herb occurs in bogs and fens and freshwater swamps and marshes. It blooms from May to August at elevations from 3 to 170 meters.	No potential to occur. No habitat present in the Project Area. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). It was last seen in 1899 in the San Francisco North quadrangle at Fort Point in the Presidio Swamp, but the species is still presumed extant.
<i>Calochortus tiburonensis</i> Tiburon mariposa lily	FT/CT	This bulbiferous herb occurs in valley and foothill grassland; specifically on open, rocky, slopes in serpentine grasslands. It blooms from March till June at elevations from 50-150 meters.	No potential to occur. No habitat present in the Project Area. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). This occurrence is not in the San Francisco North quadrangle.
<i>Castilleja affinis</i> ssp. <i>neglecta</i> Tiburon paintbrush	FE/CT	This perennial herb parasitic occurs in valley and foothill grasslands on rocky serpentine sites. This species blooms from April to June at elevations from 60 to 400 meters.	No potential to occur. No habitat present in the Project Area. There are three documented occurrences of this species within the vicinity of the project (CDFG, 2009). None of the occurrences are in the San Francisco North quadrangle.
<i>Chorizanthe robusta</i> var. <i>robusta</i> robust spineflower	FE/--	This annual herb occurs in coastal dunes and coastal scrub on sandy terraces and bluffs or in loose sand, and in openings of cismontane woodland. Elevation: 3-300 meters. It blooms from April to September.	No potential to occur. No habitat present in the Project Area. There are three documented occurrences of this species within the vicinity of the project (CDFG, 2009). None of the occurrences are in the San Francisco North quadrangle.
<i>Clarkia franciscana</i> Presidio clarkia	FE/CE	This annual herb occurs in coastal scrub and valley and foothill grassland. Prefers serpentine outcrops in grassland or scrub. Elevation: 20-335 meters. It blooms from May to July.	No potential to occur. No habitat present in the Project Area. There are three documented occurrences of this species within the vicinity of the project (CDFG, 2009). All occurrences are located in the San Francisco North quadrangle, in the San Francisco Presidio.
<i>Hesperolinon congestum</i> Marin dwarf-flax (=western flax)	FT/CT	This annual herb occurs in chaparral and valley and foothill grassland. Occurs in serpentine barrens and in serpentine grassland and chaparral at elevations between 5 and 370 meters. It blooms from April to July.	No potential to occur. No habitat present in the Project Area. Low potential to occur. There are ten documented occurrences of this species within the vicinity of the project (CDFG, 2009). Four of these occurrences are located in the San Francisco North quadrangle. Two of the occurrences are considered extirpated. The last two occurrences are located in the Presidio, San Francisco, but one of the occurrences may possibly be extirpated.

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Scientific Name Common Name	Federal ¹ /State	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Holocarpha macradenia</i> Santa Cruz tarplant	FT/CE	This annual herb occurs in coastal prairie and valley and foothill grassland. Occurs in light, sandy soils or sandy clay, often with non-natives. Elevation: 10-260 meters. It blooms from June to October.	No potential to occur. No habitat present in the Project Area. There are fifteen documented occurrences of this species within the vicinity of the project (CDFG, 2009). None of the occurrences are in the San Francisco North quadrangle.
<i>Layia carnosa</i> beach layia	FE/CE	This annual herb occurs in coastal dunes on sparsely vegetated semi-stabilized dunes, usually behind foredunes. Elevation: 0-75 meters. Hugely reduced in range along California's north coast dunes. It blooms from March to July.	No potential to occur. No habitat present in the Project Area. There is one documented occurrence of this species within the vicinity of the project (CDFG, 2009). This occurrence which is located in the San Francisco North quadrangle is considered extirpated.
<i>Lessingia germanorum</i> San Francisco lessingia	FE/CE	This annual herb occurs in coastal scrub in remnant dunes and in open sandy soils relatively free of competing plants. Elevation: 20-125 meters. It blooms from August (rarely June) to November.	No potential to occur. No habitat present in the Project Area. There are five documented occurrences of this species within the vicinity of the project (CDFG, 2009). All three occurrences in the San Francisco North quadrangle are extant.
<i>Pentachaeta bellidiflora</i> white-rayed pentachaeta	FE/CE	This annual herb occurs in valley and foothill grassland in open dry slopes and grass area. Often on soils derived from serpentine bedrock. Elevation: 35-620 meters. It blooms from March to May.	No potential to occur. No habitat present in the Project Area. There are seven documented occurrences of this species within the vicinity of the project (CDFG, 2009). One occurrence is located in the San Francisco North quadrangle in the City of Marin.
<i>Streptanthus niger</i> Tiburon jewel- flower	FE/CE	This annual herb occurs in valley and foothill grassland in shallow, rocky serpentine slopes. Elevation: 30-150 meters. This species blooms from May to June.	No potential to occur. No habitat present in the Project Area. There are two documented occurrences of this species within the vicinity of the project (CDFG, 2009). None of the occurrences are in the San Francisco North quadrangle.
<i>Suaeda californica</i> California seablite	FE/--	This evergreen shrub occurs in marshes and swamps, specifically at the margins of coastal salt marshes. Elevation: 0-15 meters. It blooms from July to October.	No potential to occur. No habitat is present in the Project Area. There are three documented occurrences of this species within the vicinity of the project (CDFG, 2009). None of the occurrences are in the San Francisco North quadrangle.

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Scientific Name Common Name	Federal ¹ /State	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Trifolium amoenum</i> showy Indian clover	FE/--	Occurs in valley and foothill grassland and coastal bluff scrub. Historically occurred from the western edge of the Sacramento Valley in Solano County, west and north to Marin and Sonoma counties. Was considered extinct until 1993 when one locality was discovered. A second locality was discovered in 1996. The only known extant population of <i>T. amoenum</i> is that near Dillon's Beach. The other population is at the Bodega Marine Laboratory. Blooms from April to June at elevations of 5 to 560 meters.	No potential to occur. No habitat present in the Project Area. There is one documented occurrences of this species within the vicinity of the project (CDFG, 2009).
¹ Federal Categories (US Fish and Wildlife Service) FE Federal Endangered CT Federal Threatened Critical Habitat		² Preferred Habitat information compiled from the California Natural Diversity Database, California Department of Fish and Game, and California Native Plant Society websites (http://www.dfg.ca.gov/hcpb/species/search_species.shtml ; http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi).	
² State Categories (California Department of Fish and Game) CE California Endangered CT California Threatened SSC California Species of Special Concern FP Fully Protected CCE Candidate for listing as Endangered DL Delisted * Special animal			

CDFG 2009 and 2010; CNPS 2010; USFWS 2010

TABLE 2 ADDITIONAL SPECIAL-STATUS SPECIES, WITH POTENTIAL TO OCCUR IN THE PROJECT VICINITY			
Scientific Name Common Name	State ¹	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
Birds			
<i>Accipiter cooperii</i> Cooper's hawk	SSC, WL	Nests in woodland habitat; chiefly in open, interrupted or marginal type. Nest sites occur mainly in riparian growths of deciduous tress, as in canyon bottoms or river flood plains. Nest sites also in live oaks.	Not likely to occur. The Project Area may be used as a corridor for dispersal. No occurrences of this species in the San Francisco North quadrangle (CDFG, 2009).
<i>Asio flammeus</i> short-eared owl	SSC	Meadows, grasslands, wetlands, irrigated land.	Not likely to occur. No suitable habitat present in the Project Area or adjacent to the Project Area. No occurrences of this species in the San Francisco North quadrangle.
<i>Athene cucularia</i> burrowing owl	SSC	Nests and winters in open, dry annual or perennial grasslands, deserts, and sparse scrubland characterized by low growing vegetation; uses abandoned burrows of burrowing mammals for shelter and nest sites.	Not likely to occur. No suitable habitat present in the Project Area or adjacent to the Project Area. No occurrences of this species in the San Francisco North quadrangle.
<i>Circus cyaneus</i> northern harrier	SSC	Nests and forages in salt marsh, freshwater marsh, and grassland habitats. Nests on ground in shrubby vegetation, usually at marsh edge. Nests are built of a large mound of sticks in wet areas.	Not likely to occur. No suitable habitat present in the Project Area or adjacent to the Project Area. No occurrences of this species in the San Francisco North quadrangle (CDFG, 2009).
<i>Elanus leucurus</i> white-tailed kite	FP	Nests among dense-topped trees; forages in open grasslands, meadows or marshes.	Not likely to occur. The Project Area may be used as a corridor for dispersal. No occurrences of this species in the San Francisco North quadrangle (CDFG, 2009).
<i>Geothlypis trichas sinuosa</i> saltmarsh common yellowthroat	SSC	Resident of the San Francisco Bay Region. Occurs in fresh and salt-water marshes. Requires thick, continuous cover down to water surface for foraging. For nesting, requires tall grass, tule patches, and willows.	Not likely to occur. No suitable habitat (fresh and saltwater marsh) present in the Project Area or adjacent to the Project Area.
<i>Laterallus jamaicensis coturniculus</i> , California black rail	CT, FP	Mainly inhabits salt marshes bordering larger bays. Occurs in tidal salt marsh heavily grown to pickleweed and also in freshwater and brackish marshes, all at low elevation.	Not likely to occur. No suitable habitat (salt marsh) present in the Project Area or adjacent to the Project Area.
<i>Melospiza melodia pusillula</i> Alameda song sparrow	SSC	Resident of salt marshes bordering south arm of San Francisco Bay. Inhabits <i>Salicornia</i> marshes. Nests low in <i>Grindelia</i> bushes (high enough to escape high tides) and in <i>Salicornia</i> .	Not likely to occur. No suitable habitat (salt marsh) present in the Project Area or adjacent to the Project Area.
<i>Melospiza melodia samuelis</i> San Pablo song sparrow	SSC	Intermixed stands of bulrush (<i>Scirpus</i> spp.), cattail (<i>Typha</i> spp.), and other emergent vegetation.	Not likely to occur. No suitable habitat (emergent vegetation) present in the Project Area or adjacent to the Project Area.

TABLE 2 ADDITIONAL SPECIAL-STATUS SPECIES, WITH POTENTIAL TO OCCUR IN THE PROJECT VICINITY			
Scientific Name Common Name	State ¹	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Phalacrocorax auritus</i> Double-crested cormorant	SSC	Coastal cliffs, offshore islands, and inland along lake margins; nests on ground or in tall trees.	Not likely to occur. The Project Area may be used as a corridor for dispersal. One of the four occurrences is in the San Francisco North quadrangle (CDFG, 2009). Nests were found along the Bay Bridge.
<i>Riparia riparia</i> bank swallow	CT	Riparian vegetation, vertical banks or cliffs near streams, rivers, lakes, and oceans.	Not likely to occur. Two occurrences of this species in the San Francisco North Quadrangle (CDFG, 2009) - one is an extant colony in vertical sand cliffs at Ocean Beach, and the second occurrence is extinct.
Mammals			
<i>Antrozous pallidus</i> pallid bat	SSC	Roosts in rock crevices, caves, mine shafts, under bridges, in buildings and tree hollows. Range extends throughout all of California.	Potential to occur. Although this species was not observed in the Fort Mason tunnel, it could use the tunnel for roosting.
<i>Corynorhinus townsendii</i> Townsend's big-eared bat	SSC	Roosts in open areas of caves, buildings, and bridges; extremely sensitive to disturbance. Range extends throughout all of California.	Potential to occur. The Fort Mason tunnel contains suitable nesting substrate for this species.
<i>Lasiurus blossevillii</i> western red bat	SSC	Roosts in foliage of trees and shrubs, often in riparian habitat. Range extends throughout all of California.	Potential to occur. This species could roosts in foliage of trees, such as the cottonwoods in the Aquatic Park.
<i>Lasiurus cinereus</i> hoary bat	*	Roosts in foliage of coniferous and deciduous trees. Range extends throughout California.	Potential to occur. May roost in trees in the study area.
<i>Microtus californicus sanpabloensis</i> San Pablo vole	SSC	Saltmarshes of San Pablo Creek, on the south shore of San Pablo Bay. Constructs burrows in soft soil. Feeds on grasses, sedges and herbs. Forms a network of runways leaving from the burrow.	No potential to occur. Species only found on south shore of San Pablo Bay.
<i>Nyctinomops macrotis</i> big free-tailed bat	SSC	Need high cliffs or rocky outcrops for roosting sites.	No potential to occur. No habitat present in the Project Area. No occurrences of this species in the San Francisco North quadrangle (CDFG, 2009).
<i>Scapanus latimanus parvus</i> Alameda Island mole	SSC	Only known from Alameda Island. Found in a variety of habitats, especially annual and perennial grasslands. Prefers moist, friable soils. Avoids flooded soils.	No potential to occur. Species only found on Alameda Island.
<i>Sorex vagrans halicoetes</i> salt marsh wandering shrew	SSC	Salt marshes 6-8 feet above sea level where abundant driftwood is scattered throughout pickleweed.	No potential to occur. No habitat present in the Project Area or adjacent to the Project Area. Two occurrences of this species found near San Pablo Creek and not in the San Francisco North quadrangle (CDFG, 2009).

TABLE 2 ADDITIONAL SPECIAL-STATUS SPECIES, WITH POTENTIAL TO OCCUR IN THE PROJECT VICINITY			
Scientific Name Common Name	State ¹	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Taxidea taxus</i> American badger	SSC	Found throughout most of California, although in the coastal areas from Mendocino county south they have been drastically reduced in numbers. Principal requirements: sufficient food, friable soils, and relatively open, uncultivated ground. Grasslands, savannas, and mountain meadows near timberline are preferred. Prey primarily on burrowing rodents such as gophers, ground squirrels, and kangaroo rats. Estimated density of one badger/square mile.	No potential to occur. No habitat present in the Project Area or adjacent to the Project Area. No burrows were observed during the field reconnaissance. Three occurrences of this species in the San Francisco North quadrangle, at: Golden Gate Park, Fort Barry, and south of Lawton street and north of Moraga street, 46th Avenue (CDFG, 2009).
<i>Zapus trinotatus orarius</i> Point Reyes jumping mouse	SSC	Occurs primarily in bunch grass marshes on the uplands of Point Reyes. Also present in coastal scrub, grassland, and meadows. Eats mainly grass seeds with some insects and fruit taken. Builds grassy nests on ground under vegetation. Burrows in winter.	No potential to occur. No habitat present in the Project Area or adjacent to the Project Area. One of two occurrences in vicinity of the project located in San Francisco North quadrangle at Fort Barry (CDFG, 2009).
Amphibians			
<i>Rana boylei</i> foothill yellow-legged frog	SSC	Partly shaded, shallow streams and riffles with cobble size or larger rocky substrate.	No potential to occur. No habitat present in the study area. No occurrences of this species in the San Francisco North quadrangle (CDFG, 2009).
Reptiles			
<i>Actinemys marmorata</i> western pond turtle	SSC	Inhabit ponds, marshes, rivers, streams, irrigation ditches, need basking sites such as partially submerged logs or rocks, and suitable upland habit (sandy banks or grassy open fields) for egg laying. Require some slack- or slow-water aquatic habitat. Need dry nests. Nests also are typically located on a slope that is unshaded. The nesting site can be up to 402 m from the aquatic site, but the majority of nests located to date are within 200 m.	No potential to occur. No habitat present in the Project Area or adjacent to the Project Area. Two occurrences of this species in the San Francisco North quadrangle, at: Mallard Lake and Llyod Lake at Golden Gate Park (CDFG, 2009). All other occurrences outside of project area's quadrangle.
Fish			
<i>Archoplites interruptus</i> Sacramento perch	SSC, WL	SSC for Clear Lake population, watch list for populations outside of native range. Historically found in the sloughs, slow-moving rivers, and lakes of the Central Valley. Prefer warm water. Aquatic vegetation is essential for young to tolerate wide range of physico-chemical water conditions.	No potential to occur. No habitat present in the Project Area.
Invertebrates			
<i>Danaus plexippus</i> monarch butterfly	*	Eucalyptus groves, and occasionally Monterey pine and Monterey cypress groves, while migrating/overwintering (October through March).	Potential to occur. Record of this species overwintering in trees at Fort Mason in 1990 (CDFG, 2010).
Plants			

TABLE 2 ADDITIONAL SPECIAL-STATUS SPECIES, WITH POTENTIAL TO OCCUR IN THE PROJECT VICINITY			
Scientific Name Common Name	State ¹	Preferred Habitat ²	Likelihood That Species May Occur In the Project Area (Potential to occur, Not likely to occur, No potential to occur)
<i>Arctostaphylos imbricata</i> San Bruno Mountain manzanita	CE	This species occurs in maritime chaparral, coastal scrub, north-facing slopes.	Not likely to occur. No CNDDDB records in the study area (CDFG, 2010), and all records are from San Bruno Mountain.
<i>Arctostaphylos pacifica</i> Pacific manzanita	CE	This species occurs in maritime chaparral and coastal scrub habitat.	Not likely to occur. No CNDDDB records in the study area (CDFG, 2010), and currently only known to occur in a small area on a sandstone ridge near the summit of San Bruno Mountain.
<i>Plagiobothrys diffusus</i> San Francisco popcorn-flower	CE	This species occurs in coastal prairie and valley and foothill grassland, in areas with marine influence.	No potential to occur. No habitat is present for this species in the study area. This species is presumed extirpated from San Francisco, and known locations are generally south and coastal.
<i>Sanicula maritima</i> adobe sanicle	R	Chaparral, coastal prairie, meadows and seeps, and valley and foothill grassland/clay, serpentinite. Elevation: 30-240 meters. Blooms from February to May.	Unlikely to occur. No suitable habitat is present for this species in the Project Area or study area, and there are no recent CNDDDB records for this species here (CDFG, 2010).
¹ California Endangered Species Act CE Endangered CT Threatened SSC Species of Special Concern FP Fully Protected WL Watch List R Rare CCE Candidate for listing as Endangered * Special animal		² Preferred Habitat information compiled from the California Natural Diversity Database, California Department of Fish and Game, and California Native Plant Society websites (http://www.dfg.ca.gov/hcpb/species/search_species.shtml ; http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi).	

CDFG 2009 and 2010; CNPS 2010; USFWS 2010

Additional Special-Status Plants. Plant species that are threatened, endangered, or rare under the California Endangered Species Act are listed in Table 2. During the records search, several additional special-status species were identified as having occurred in the vicinity of the Project area at one time. These species are not threatened or endangered under federal or state endangered species acts, but are considered rare, threatened, or endangered in California and elsewhere by CNPS (a CNPS list 1B species), or rare, threatened, or endangered in California but more common elsewhere (CNPS list 2 species). Based on the current habitat conditions and the known range of these plants, none of these plant species have potential to occur within the Project area:

- Napa false indigo (*Amorpha californica* var. *napensis*)
- Bent-flowered fiddleneck (*Amsinckia lunaris*)
- Waldo rock cress (*Arabis aculeolata*)
- Franciscan manzanita (*Arctostaphylos hookeri* ssp. *franciscana*)
- Mt. Tamalpais manzanita (*Arctostaphylos hookeri* ssp. *montana*)
- Montara manzanita (*Arctostaphylos montaraensis*)
- Marin manzanita (*Arctostaphylos virgata*)
- Alkali milk-vetch (*Astragalus tener* var. *tener*)
- San Joaquin spearscale (*Atriplex joaquiniana*)
- Small groundcone (*Boschniakia hookeri*)
- Round-leaved filaree (*California macrophylla*)
- Tiburon mariposa lily (*Calochortus tiburonensis*)
- Coastal bluff morning-glory (*Calystegia purpurata* ssp. *saxicola*)
- Bristly sedge (*Carex comosa*)
- Pappose tarplant (*Centromadia parryi* ssp. *parryi*)
- San Francisco Bay spineflower (*Chorizanthe cuspidata* var. *cuspidata*)
- Sonoma spineflower (*Chorizanthe valida*)
- Franciscan thistle (*Cirsium andrewsii*)
- Mt. Tamalpais thistle (*Cirsium hydrophilum* var. *vaseyi*)
- Compact cobwebby thistle (*Cirsium occidentale* var. *compactum*)
- Round-head Chinese houses (*Collinsia corymbosa*)
- San Francisco collinsia (*Collinsia multicolor*)
- Point Reyes bird's-beak (*Cordylanthus maritimus* ssp. *palustris*)
- Western leatherwood (*Dirca occidentalis*)
- Marsh horsetail (*Equisetum palustre*)
- Tiburon buckwheat (*Eriogonum luteolum* var. *caninum*)

- Minute pocket-moss (*Fissidens pauperculus*)
- Marin checker lily (*Fritillaris lanceolata* var. *tristulis*)
- Fragrant fritillary (*Fritillaria liliacea*)
- Blue coast gilia (*Gilia capitata* ssp. *chamissonis*)
- Woolly-head gilia (*Gilia capitata* ssp. *tomentosa*)
- Dark-eyed gilia (*Gilia millefoliata*)
- San Francisco gumplant (*Grindelia hirsutula* var. *maritima*)
- Diablo helianthella (*Helianthella castanea*)
- Seaside tarplant (*Hemizonia congesta* ssp. *congesta*)
- Short-leaved evax (*Hesper-evax sparsiflora* var. *brevifolia*)
- Loma Prieta hoita (*Hoita strobilina*)
- Kellogg's horkelia (*Horkelia cuneata* ssp. *sericea*)
- Thin-lobed horkelia (*Horkelia tenuiloba*)
- Rose leptosiphon (*Leptosiphon rosaceus*)
- Woolly-headed lessingia (*Lessingia hololeuca*)
- Tamalpais lessingia (*Lessingia micradenia* var. *micradenia*)
- Arcuate bush mallow (*Malacothamnus arcuatus*)
- Oregon meconella (*Meconella oregano*)
- Mt. Diablo cottonweed (*Micropus amphibolus*)
- Marsh microseris (*Microseris paludosa*)
- Robust monardella (*Monardella villosa* ssp. *globosa*)
- Baker's navarretia (*Navarretia leucocephala* ssp. *bakeri*)
- Marin County navarretia (*Navarretia rosulata*)
- Choris's popcorn-flower (*Plagiobothrys chorisianus* var. *chorisianus*)
- Hairless popcorn-flower (*Plagiobothrys glaber*)
- North Coast semaphore grass (*Pleuropogon hooverianus*)
- Oregon polemonium (*Polemonium carneum*)
- Marin knotweed (*Polygonum marinense*)
- Tamalpais oak (*Quercus parvula* var. *tamalpaisensis*)
- Point Reyes checkerbloom (*Sidalcea calycosa* ssp. *rhizomata*)
- San Francisco campion (*Silene verecunda* ssp. *verecunda*)
- Santa Cruz microseris (*Stebbinsoseris decipiens*)
- Most beautiful jewel-flower (*Streptanthus albidus* ssp. *peramoenus*)
- Tamalpais jewel-flower (*Streptanthus batrachopus*)

- Mount Tamalpais jewel-flower (*Streptanthus glandulosus* ssp. *pulchellus*)
- Santa Ynez false lupine (*Thermopsis macrophylla*)
- Saline clover (*Trifolium depauperatum* var. *hydrophilum*)
- San Francisco owl's clover (*Triphysaria floribunda*)
- Coastal triquetrella (*Triquetrella californica*)
- Monterey cypress (*Cupressus macrocarpa*)
- Monterey pine (*Pinus radiata*)

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APPENDIX E

Air Quality

Appendix E presents air quality data for the 2010 Construction Greenhouse Gas Emissions and the Road Construction Emissions Model, Version 6.3.2.

Historic Streetcar Extension

2012 Construction GHG Emissions		EMISSIONS in tons			Total GHG
		CO2	CH4	N2O	
		471 (from ROADMOD)			
From CCAR GPR 3.1 (2009) Table C-6					
Diesel emission of CO2		10.15 kg CO2/gal			
		0.00058 kg CH4/gal			
		0.00026 kg N2O/gal			
So for Diesel Equipment Sources: CH4 emission =			5.71E-05 percent of CO2 Emissions		
N2O emissions =			2.56E-05 percent of CO2 Emissions		
Total Construction emissions in tons =					
	CO2	CH4	N2O		
	471.00	0.03	0.01		471.04
Total construction emissions as eCO2 in tons =					
	471.00	0.57	3.74		475.31
Total construction Emissions as eCO2 on Metric tons =		427.28	0.51	3.39	431.19

Road Construction Emissions Model, Version 6.3.2

Emission Estimates for -> Extension of Historic Streetcar				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	4.6	20.1	35.8	14.6	1.6	13.0	4.2	1.5	2.7	3,424.2
Grading/Excavation	7.2	44.6	53.8	15.6	2.6	13.0	5.0	2.3	2.7	5,977.7
Drainage/Utilities/Sub-Grade	4.6	18.5	32.8	14.8	1.8	13.0	4.4	1.7	2.7	3,194.9
Paving	3.2	10.9	15.5	1.4	1.4	-	1.3	1.3	-	1,415.6
Maximum (pounds/day)	7.2	44.6	53.8	15.6	2.6	13.0	5.0	2.3	2.7	5,977.7
Total (tons/construction project)	0.7	3.6	4.9	1.5	0.3	1.3	0.5	0.2	0.3	519.4
Notes: Project Start Year -> 2011										
Project Length (months) -> 12										
Total Project Area (acres) -> 5										
Maximum Area Disturbed/Day (acres) -> 1										
Total Soil Imported/Exported (yd ³ /day)-> 340										
PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.										
Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> Extension of Historic Streetcar				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	2.1	9.1	16.3	6.6	0.7	5.9	1.9	0.7	1.2	1,556.5
Grading/Excavation	3.3	20.3	24.5	7.1	1.2	5.9	2.3	1.1	1.2	2,717.2
Drainage/Utilities/Sub-Grade	2.1	8.4	14.9	6.7	0.8	5.9	2.0	0.8	1.2	1,452.2
Paving	1.4	4.9	7.0	0.6	0.6	-	0.6	0.6	-	643.5
Maximum (kilograms/day)	3.3	20.3	24.5	7.1	1.2	5.9	2.3	1.1	1.2	2,717.2
Total (megagrams/construction project)	0.6	3.3	4.4	1.4	0.2	1.2	0.5	0.2	0.2	471.1
Notes: Project Start Year -> 2011										
Project Length (months) -> 12										
Total Project Area (hectares) -> 2										
Maximum Area Disturbed/Day (hectares) -> 1										
Total Soil Imported/Exported (meters ³ /day)-> 260										
PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified.										
Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

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APPENDIX F

Noise

Appendix F includes the railway noise model; determination of construction noise at nearest receptors; logarithmic average of 12 streetcar noise readings on straightaway; and the noise monitoring report.

Railway Noise Model

Railway Noise Model

Computation of noise exposure at 50 feet for Fixed Guideway Assessment - Turn

Project: Extension of Historic Streetcars (F-line), San Francisco CA

Date: 8/2/2010

Locomotives:

$$\text{Hourly Leq at 50 feet} = \text{SELref} + 10\log(\text{Nsource}) + K\log(S/50) + 10\log(V) - 35.6$$

Where:

SELref = reference noise level at 50 feet
 Nsource = average number of locomotives per train
 K = +10 for electric trains
 S = train speed in miles per hour
 V = Average hourly volume of train traffic in trains per hour

Input Values

Input Values	Source
SEL ref = 87.8	Measurements
Ns = 1	FTA - single car
K = 1	Using measurement data, no correction needed)
S = 50	Using measurement data, no correction needed)
V = 6	based on 10 minute headways

Output Values

Hourly Leq at 50 ft = 59.98

Daytime Leq at 50 feet = 59.98

Nighttime Leq at 50 feet = 56.97

Vday = 6 (90 headways/15 hours)
 Vnight = 3 (18 Headways/9 hours)

$$\text{Ldn} = 10\log((15) \times 10^{(\text{Leq}(\text{day})/10)} + (9) \times 10^{(\text{Leq}(\text{night})/10)}) - 13.8$$

Ldn = 63.96303

Determination of Construction Noise at Nearest Receptors

Attenuation of construction noise

Fort Mason Street Car - Determination of Construction Noise at Nearest Receptors															
$N_s = 10 \times \text{LOG}_{10}((10^{(N_1/10)}) + (10^{(N_2/10)}))$															
where;															
Ns=		summation of noise levels													
N1=		noise level 1=		89.6 dBA		Source #1		Concrete Saw							
N2=		noise level 2=		90.3 dBA		Source #2		Mounted Impact Hammer							
Ns=		93.0 dBA													
$N_i = N_o - 30(\log D_i/D_o)$ (Bolt, Beranek, and Newman, 1971)															
where:															
Ni=		attenuated noise level of interest													
No=		reference noise level													
Di=		distance to receptor													
Do=		reference distance													
Receptor #1 = 50 ft			Receptor # 2 - 80 feet			Receptor # 3 - 100 feet			Receptor # 4 - 250 feet			Receptor # 5 - 400 feet			
No=		93.0 dBA		No=		93.0		No=		93.0		No=		93.0	
Di=		50 ft		Di=		80		Di=		100		Di=		250	
Do=		50 ft		Do=		50		Do=		50		Do=		50	
Ni=		92.97 dBA		Ni=		88.89		Ni=		86.95		Ni=		78.99	
				Ni=				Ni=		74.91					

Logarithmic Average of 12 Streetcar Noise Readings on Straightaway

Logarithmic Average of 12 Streetcar readings - Straightaway

SEL=	80.7	94.1	96.3	87.1	83.7	88.4	83.2	85.2	78.1	82.4	88.1	82.1
	1.17E+08	2.57E+09	4.27E+09	5.13E+08	2.34E+08	6.92E+08	2.09E+08	3.31E+08	64565423	1.74E+08	6.46E+08	1.62E+08
	80.7	80	80	87.1	83.7	88.4	83.2	85.2	78.1	82.4	88.1	82.1

Averaging 89.19907 85.78 Arithmetic average for comparison

B7 cell needs to have the referenced to how many to average (e.g. B4+C4+D4) and divide by N (the number of sources to be averaged)

Logarithmic Average of 14 Streetcar readings - Turn

	71.2	80.1	98.9	79.1	75	75.5	76.1	74.1	76.3	74.2	77.2	84.9	81.7	83.2	77.7
	13182567	1.02E+08	7.76E+09	81283052	31622777	35481339	40738028	25703958	42657952	26302680	52480746	3.09E+08	1.48E+08	2.09E+08	58884366
	71.2	80	80	79.1	75	75.5	76.1	74.1	76.3	74.2	77.2	84.9	81.7	83.2	77.7

Averaging 87.75198

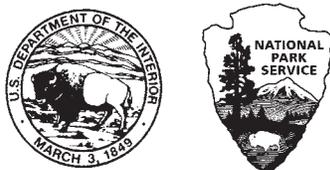
Noise Monitoring Report

Noise Monitoring Report - SF Sreetcar F-line

8/2/2010

Location 1: SE corner of Taylor and Beach Street 50 ft from rail center

Time:	Car Data	Lmax	SEL	Lmax at 100	Lmax at 200	
10:35	Car 1056	Not Read	80.7			
10:42	Car 1859	Not Read	94.1			
10:52	Car 1818	Not Read	96.3			
10:58	Car 1057		82.4			
11:07	PCC - Number missed		77.4			
11:14	Car 1076		83.5			
11:17	Car 1075		77.1			
11:33	Car 1077		78.7			
11:35	Car 1010		69.6			
11:47	Car 1059		75.5			
11:57	Car 952		80.1			
12:00	Car 1060		75.8			
Location 2:	SW corner of Jones and Beach Streets					
1:01	Picture		61.1	71.2	58.1	55.1
1:24	Car 1062		71.9	80.1	68.9	65.9
1:37	Car 952 (Wheel Squeel)		94.9	98.9	91.9	88.9
1:41	Car 1077		69.9	79.1	66.9	63.9
1:44	Car 1010		68.1	75	65.1	62.1
1:47	Car1059		68.5	75.5	65.5	62.5
1:55	Car 1060		69	76.1	66.0	63.0
2:02	Car 1075		66.6	74.1	63.6	60.6
2:30	Car 1007		69	76.3	66.0	63.0
2:32	Car 1051		66.7	74.2	63.7	60.7
2:36	Car 1056		70.8	77.2	67.8	64.8
2:42	Car 162		76.5	84.9	73.5	70.5
2:45	Car 1859		78.8	81.7	75.8	72.8
2:50	Car 1818		77.6	83.2	74.6	71.6
2:51	Car 1057		69.8	77.7	66.8	63.8



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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