CANDLESTICK POINT–HUNTERS POINT SHIPYARD PHASE II DEVELOPMENT PLAN PROJECT

Comments & Responses

Volume X: Comments & Responses (Appendices)

San Francisco Redevelopment Agency File No. ER06.05.07
City and County of San Francisco Planning Department File No. 2007.0946E
State Clearinghouse No. 2007082168

San Francisco Redevelopment Agency
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Draft EIR Publication Date: November 12, 2009
San Francisco Redevelopment Agency Commission Public Hearing Dates: December 15, 2009, January 5, 2010
San Francisco Planning Commission Public Hearing Date: December 17, 2009
Draft EIR Public Review Period: November 12, 2009–January 12, 2010
Final EIR Certification Hearing Date: June 3, 2010

May 13, 2010

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Appendix C&R-1 Biological Consultant Curriculum Vitae

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

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PROFESSIONAL EXPERIENCE

2004-present, 1997-2000 — Principal (2007-present), Senior Wildlife Ecologist, H. T. Harvey & Associates, Los Gatos, California. Supervised, managed, and contributed to hundreds of projects for public and private clients involving NEPA/CEQA impact assessment and mitigation, biological constraints analysis, environmental permitting, state and federal Endangered Species Act consultation, habitat restoration, and resource assessments and surveys. Conducted surveys for a variety of wildlife taxa, including threatened and endangered species. Researched specific anthropogenic impacts on wildlife to improve management techniques and mitigation of impacts. Provided expert testimony on avian ecology and riparian ecosystems. Supervised project staff, including project coordination and QA/QC, project scheduling, proposal preparation, and client/agency coordination.

2000-2004 — Ecology Section Chief/Senior Environmental Scientist, Wetland Studies and Solutions, Inc., Chantilly, Virginia. Managed and contributed to hundreds of projects involving a variety of wetlands and natural resources issues, such as wetland delineation, Section 404/401 and Virginia Water Protection permitting, mitigation monitoring, Chesapeake Bay Act studies, NEPA evaluations, Environmental Quality Corridor analyses, forest stand evaluations, and endangered species studies. Supervised 14 environmental scientists, including project coordination and QA/QC, project scheduling, proposal preparation, and client/agency coordination.

1989-1997 — Independent Ecological Consultant, Virginia and California. Assessed ecological risks and impacts, monitored populations of rare species. Conducted surveys for birds, butterflies, plants, and amphibians.

EDUCATION

1992-1997 — Ph.D., Department of Biological Sciences, Stanford University, Stanford, California. National Science Foundation Graduate Fellow. Dissertation research emphasized riparian ecology and impacts of urbanization on biodiversity.

1988-1992 — B.S., Department of Biology, College of William and Mary, Williamsburg, Virginia. Graduated *summa cum laude*, Phi Beta Kappa, with Highest Honors for senior thesis on flocking and foraging behavior of shorebirds.

RESEARCH EXPERIENCE

2004-present, 1997-2000 — H. T. Harvey & Associates, San Jose, California. Designed and conducted a study of the value of gabion revegetation to breeding birds. Helped design and study effects of various dredging regimes on wetland bird communities. Assisted in a study of the effects of dredge spoil disposal on seabirds and marine mammals.

1992-1997 — Doctoral Research, Department of Biology, Stanford University. Research Advisor: Prof. Paul R. Ehrlich.
- Effects of urbanization, land use, and habitat alteration on riparian bird and plant communities.
- Contribution of riparian systems to landscape-level biodiversity.
- Nest site selection and reproductive success of urban-nesting Red-shouldered Hawks.
- Social, economic, and environmental implications of floodplain development.

1990-1992 — Senior Honors Research, Department of Biology, College of William and Mary.
- Foraging and flocking strategies of shorebirds in agricultural fields.
- Shorebird and wetland conservation.

1989-1992 — Research Assistant, Department of Biology, College of William and Mary.
- Distribution, habitat associations, and breeding phenology of breeding birds on Virginia's barrier islands.

PUBLICATIONS AND PRESENTATIONS

Rottenborn, S. C. and E. S. Brinkley. 2007. Virginia's Birdlife: An Annotated Checklist (Fourth Edition). Virginia Society of Ornithology.

Henkel, L., S. Rottenborn, and R. Duke. 2007. Surveys for California clapper rails: some methodological considerations. Poster presentation at 2007 State of the San Francisco Estuary Conference.

Rottenborn, S. C. 2000. Nest-site selection and reproductive success of Red-shouldered Hawks in central California. *Journal of Raptor Research* 34:18-25.

Rottenborn, S. C. and J. Morlan. 2000. Report of the California Bird Records Committee: 1997 Records. *Western Birds* 31:1-37.

Rottenborn, S. C. 2000. Birds and Urbanization: Conservation Challenges and Opportunities. Banquet speaker at 2000 annual meeting of the Virginia Society of Ornithology.

Rottenborn, S. C. 1999. Predicting the impacts of urbanization on riparian bird communities. *Biological Conservation* 88:289-299.

Rottenborn, S. C. 1996. The use of coastal agricultural fields in Virginia as foraging habitat by shorebirds. *Wilson Bulletin* 108:783-796.

Also authored species accounts for the *Breeding Bird Atlas of Santa Clara County, California* (32 accounts) and *The Virginia Breeding Bird Atlas* (eight accounts; atlas in preparation) and wrote six articles on bird occurrences for the Virginia Society of Ornithology's publication *Raven*.

SAMPLE H. T. HARVEY & ASSOCIATES PROJECT EXPERIENCE

- **Candlestick Point – Hunters Point Shipyard**, 2008-present. Serves as principal-in-charge for H. T. Harvey's performance of a wetland delineation and tree survey, and provision of biological resources-related planning and permitting assistance for the Candlestick Point-Hunters Point Shipyard project in San Francisco. Client: Lennar/CP Development Co., LP.
- **South Bay Salt Ponds Restoration Project**, 2004-present. For this 15,000-acre restoration project in San Mateo, Santa Clara, and Alameda counties, managed H. T. Harvey's preparation of the biological resources section of the EIR/EIS and the programmatic and Phase I Biological Assessments for Federal Endangered Species Act consultation; participated in numerous public meetings and meetings of the Science Team to discuss potential project effects on biological resources; and contributed to project planning and design. Client: Philip Williams & Associates, Ltd. for the California Coastal Conservancy, U.S. Fish and Wildlife Service, and California Department of Fish and Game.
- **Antioch Bridge Nesting Bird Management**, 2009-present. Serves as principal-in-charge for H. T. Harvey's preparation and implementation of a nesting bird management plan to avoid impacts to nesting birds during a seismic retrofit project on the 1.8-mile long Antioch Bridge across the San Joaquin River (Contra Costa and Sacramento counties). Client: CH2M HILL.
- **Concord Naval Weapons Station/Marine Ocean Terminal Concord Rail Surveys**, 1997-1998 and 2010-present. Coordinated and conducted surveys for California clapper rails and California black rails at Concord Naval Weapons Station/Marine Ocean Terminal Concord (Contra Costa County) to inform planning for contaminant remediation (1997-1998) and to inform the Master Planning process (2010). Clients: TetraTech (1997-1998) and TEC, Inc. (2010).
- **Oyster Point Business Park**, 2009-present. Serves as principal-in-charge for H. T. Harvey's preparation of the biological resources section of an EIR for a proposed business park on Oyster Point in San Mateo County. Client: Lamphier-Gregory.
- **Concord Community Reuse Project**, 2008-present. Serves as principal-in-charge for H. T. Harvey's performance of a wetland delineation, preparation of the biological resources section of an EIR, contribution to a stream/wetland restoration plan, and regulatory permitting assistance for this 5200-acre project site in Contra Costa County. Clients: Arup, Ltd. and City of Concord.
- **East Contra Costa County Habitat Conservancy Special-Status Species Analysis**, 2008-present. Serves as principal-in-charge for H. T. Harvey's analysis of the potential effects of the East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan on "non-covered" special-status species. Client: East Contra Costa County Habitat Conservancy.
- **Newark Areas 3 and 4 Specific Plan**, 2005-present. Serves as project manager and senior wildlife ecologist for H. T. Harvey's preparation of the biological resources chapter of an EIR on proposed residential and golf course development on Newark Specific Plan Areas 3 and 4 in Alameda County; coordinated California tiger salamander and vernal pool branchiopod surveys. Client: David J. Powers & Associates.
- **Newby Island Sanitary Landfill Expansion**, 2007-present. Serves as principal-in-charge for H. T. Harvey's preparation of the biological resources chapter of an EIR and nuisance species abatement plan for the expansion of the Newby Island Sanitary Landfill in Santa Clara County. Client: David J. Powers & Associates.
- **Salinas River Lagoon Fisheries Enhancement**, 2008-present. Serves as principal-in-charge for H. T. Harvey's preparation of a biological resources report in support of an Initial Study/Mitigated Negative Declaration, preparation of a Biological Assessment for Federal Endangered Species Act consultation, and preparation of regulatory permits for a fish screen and

channel improvement project designed to enhance fish habitat in Salinas River Lagoon (Monterey County). Client: Schaaf & Wheeler.

- **Union City San Francisco Bay Trail**, 2006-2009. Coordinated wildlife surveys and compiled the wildlife sections of a Natural Environment Study and a Biological Assessment (for Federal Endangered Species Act consultation) for a 2.5-mile segment of the San Francisco Bay Trail adjacent to the California Department of Fish and Game's Eden Landing Ecological Preserve in Alameda County. Client: EIP Associates.
- **Delta Fish Agreement Consultation Assistance**, 2009. In support of the California Department of Water Resources' Delta Fish Agreement with the California Department of Fish and Game, conducted database and literature reviews and examined aerial photos to identify all federally listed species that could potentially be affected by the Agreement's conservation measures; prepared species accounts for nine listed plants and 11 listed animals that could potentially occur in or near the areas where conservation activities would be performed; and prepared effects analyses for each species and activity. Client: California Department of Water Resources.
- **U.S. Army Corps of Engineers South San Francisco Bay Shoreline Study**, 2007-2008. Assisted in planning and preparation of a biological resources existing conditions report for portions of the South San Francisco Bay in San Mateo, Santa Clara, and Alameda Counties on which the Corps may pursue a flood protection levee construction and tidal marsh habitat restoration project. Client: U.S. Army Corps of Engineers and California Coastal Conservancy.
- **South Bay Marshes California Clapper Rail Survey**, 2006**.** Coordinated and participated in conducting surveys for California clapper rails in a number of tidal marshes in South San Francisco Bay (Santa Clara and Alameda counties) as part of H. T. Harvey's long-term monitoring of the potential effects of freshwater discharges from the San Francisco-Santa Clara Water Pollution Control Plant on tidal marsh species. Client: City of San Jose.
- **Tri-Cities Landfill Closure**, 2006. Served as project manager for H. T. Harvey's preparation of the biological resources chapter of an EIR on the closure of the Tri-Cities Landfill in Alameda County. Client: David J. Powers & Associates.
- **South Bayside System Authority Nesting Bird Monitoring**, 2005-2006. Served as project manager for H. T. Harvey's monitoring of nesting herons, terns, and other birds at the South Bayside System Authority's plant in San Mateo County during construction of its Disinfection, Storage, and Pumping project. Client: South Bayside System Authority.
- **Greenbrae Boardwalk California Clapper Rail Survey**, 2005. Served as project manager for California clapper rail surveys conducted to document clapper rail use of the Greenbrae Shoreline Protection Project and Larkspur Ferry Terminal Marsh Mitigation Project (in Marin County) 15 years after construction.
- **Albany Landfill Reclamation**, 2005. Served as senior wildlife ecologist for H. T. Harvey's preparation of a biological resources report in support of an Initial Study/Mitigated Negative Declaration for tidal restoration and improved public access of a landfill along the Albany (Alameda County) shoreline. Client: Streamborn.
- **Alameda Creek Dredging Project**, 1998-2000. Assisted in the design of and conducted bird surveys for a study to determine the effects of different sediment dredging regimes on habitat conditions and wildlife along lower Alameda Creek in Alameda County. Client: Alameda County Public Works Agency.
- **Newark Magnesium Transmission Line Reconductoring**, 1997. Conducted field surveys for H. T. Harvey's preparation of a biological resources report and conducted wildlife construction monitoring for reconductoring of a 19-mile electrical transmission line running from Newark (Alameda County) to Cupertino (Santa Clara County). Client: David J. Powers & Associates.

Steve has contributed to more than 400 projects for H. T. Harvey & Associates involving wildlife impact assessment, NEPA/CEQA documentation, biological constraints analysis, endangered species issues, permitting, and restoration. Steve has conducted surveys for a variety of wildlife taxa, including threatened and endangered species, and contributes to the design of habitat restoration and monitoring plans. In his role as project manager and principal-in-charge for numerous projects, he has supervised data collection and analysis, report preparation, and agency and client coordination.

ADVISORY AND EDITORIAL POSITIONS

- Member, Scientific Advisory Board, San Francisco Bay Bird Observatory, 1999-2004, 2009-present.
- Regional Editor, American Birding Association's *North American Birds*, 1999-2000, 2008-present.
- Member, Riparian Mercury Biosentinel Science Advisory Group, San Francisco Estuary Institute, 2010.
- Member, San Francisco Bay Area Upland Habitat Goals Birds Focus Team, 2008.
- Contributing Scientist, *Ecological Connections between Baylands and Uplands: Examples from Marin County* (white paper workshop sponsored by San Francisco Estuary Institute), 2007.
- Member, Virginia Avian Records Committee, 2000-2005 (Vice Chair, 2004-2005).
- Member, Board of Directors, Virginia Society of Ornithology, 2000-2004.
- Member, California Bird Records Committee, 1997-2000.
- Regional Editor, American Birding Association's *Field Notes*, 1998-1999.
- Member, Board of Directors, Coyote Creek Riparian Station, 1994-1999.
- Chairman, Avian Research Committee, Coyote Creek Riparian Station, 1994-1995.

CONTINUING EDUCATION, WORKSHOPS, CONFERENCES

- Urbanization and Riparian Systems, University of California, Davis Extension Program, 1998.
- Wetlands Regulation, University of California, Davis Extension Program, 1999.
- Endangered Species Regulation, University of California, Davis Extension Program, 1999.
- Wetland Delineation, Wetland Training Institute, 2000.
- 2000 Nationwide Permits, Wetland Training Institute, 2000.
- Identification of Grasses, U.S. Department of Agriculture Graduate School, 2000.
- National Hydric Soils Workshop, Wetlands Regulatory Workgroup, Mid-Atlantic Hydric Soils Committee, 2001.
- Nationwide Permits Update, Wetland Training Institute, 2002.
- Soil Taxonomy and Classification, J.W. Teaford & Co., 2002.
- AutoCad 2000, CADD Microsystems, Inc., 2002.
- Virginia State Program General Permit (SPGP) Workshop, U.S. Army Corps of Engineers, 2002.
- Plant Identification, Bill Sipple, EPA (multiple in-house courses), 2001-2003.
- Conservation Design, Engineers & Surveyors Institute, 2003.
- Stream Classification and Mapping Workshop, Fairfax County Dept. of Public Works & Environmental Services, 2003.
- Intermittent and Perennial Stream Identification for Riparian Buffer Rule Applications, N. Carolina State University, 2003.
- Low Impact Development Workshop, U.S. Army Corps of Engineers, 2003.
- State of the San Francisco Estuary Conference, 2007.
- Habitat Conservation Planning from Tahoe to the Bay, 2009.

PERMITS HELD

- H. T. Harvey & Associates' U.S. Fish and Wildlife Service 10(a)(1)(A) recovery permit TE797267-10; authorized to conduct surveys for western snowy plover and California clapper rail
- California Department of Fish and Game Scientific Collecting Permit SC-010564.
- California Department of Fish and Game Memorandum of Understanding to conduct broadcast surveys for California clapper rail and California black rail

CURRENT MEMBERSHIPS

- American Ornithologists' Union
- Cooper Ornithological Society
- Wilson Ornithological Society
- The Waterbird Society
- Raptor Research Foundation
- Western Field Ornithologists
- Santa Clara Valley Audubon Society
- San Francisco Bay Bird Observatory
- Society for Conservation Biology
- Central California Coast Chapter, Society for Conservation Biology
- Virginia Society of Ornithology
- Augusta Bird Club

Appendix A1 PBS&J, Analysis of Project Development Schedule Modifications and Environmental Impact Report, April 10, 2010

memo

PBS&J

To: San Francisco Redevelopment Agency
San Francisco Planning Department

From: Alison Rondone, Senior Project Manager

CC:

Date: 4/10/2010

Re: Analysis of Project Development Schedule Modifications and Environmental Impact Report

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Since publication of the Draft EIR, modifications have been made in the Project Development Schedule, as outlined in Section B.1 (Project Refinements) of the C&R document.

Total development remains the same as identified in the Draft EIR. Project Documents provide for the horizontal land development of the Project to be built out in four Major Phases, with vertical development occurring during that period and beyond. Specifically, Major Phase 1 (2011–2019) includes demolition and abatement between 2011 and 2015, utilities and infrastructure improvements from 2013 to 2017, and structural shoreline improvements from 2013 to 2017. The rebuilding of Alice Griffith, together with the development of 3,160 residential units, 84,000 sf of neighborhood retail, 583,000 of R&D, and 38,000 of community facilities would occur in Major Phase 1. Also, if the 49ers satisfy the Stadium Conditions, the Developer must build significant infrastructure for the new 49ers stadium in the first Major Phase. Major Phase 2 (2016–2021) would include development of 2,005 residential units, 635,000 sf of regional retail, 76,000 sf of neighborhood retail, 150,000 sf of office, 150,000 sf hotel, 842,000 sf R&D, the 10,000-seat performance venue, and 50,000 sf of community facilities in CP North, CP Center, HPS North, HPS Village Center, and the R&D District on HPS Phase II. Major Phase 3 (2020–2027) would include development of 2,505 residential units, 90,000 sf of neighborhood retail, and 1,075,000 sf in CP North, CP Center, CP South, and completion of the R&D District on HPS Phase II. Major Phase 4 would include development of 2,830 residential units and 12,000 sf of community facilities in the Jamestown District and CP South. Full build-out of HPS Phase II would occur by 2027 and full build-out of Candlestick Point would occur in 2031, with final occupancy in 2032. The following table provides a comparison of the original development schedule and the schedule as revised.

Appropriate text changes have been made throughout the EIR to correct information related to the development schedule, and a thorough review of each technical section of the EIR has been done to determine whether the schedule changes would affect the analysis contained in the EIR. The following determinations were made:

Comparison of Draft EIR and Revised Development Schedule (previous schedule shown shaded)

Use	*Development Area*	*Completion Year*								*Subtotal*	*Total*
		2017	*2019*	*2021*	*2023*	*2025*	*2027*	*2029*	*2032*		
Residential Units	CP	795	1,000	2,680	1,515	3,220	2,505	1,155	2,830	7,850	10,500
	HPS	2,325	2,160	325	490	—	—	—	—	2,650	
Regional Retail (gsf)	CP	—	—	635,000	635,000	—	—	—	—	635,000	635,000
	HPS	—	—	—	—	—	—	—	—	—	
Neighborhood Retail (gsf)	CP	—	—	125,000	35,000	—	90,000	—	—	125,000	250,000
	HPS	60,000	84,000	65,000	41,000	—	—	—	—	125,000	
Office (gsf)	CP	—	—	150,000	150,000	—	—	—	—	150,000	150,000
	HPS	—	—	—	—	—	—	—	—	—	
Hotel (gsf)	CP	—	—	150,000	150,000	—	—	—	—	150,000	150,000
	HPS	—	—	—	—	—	—	—	—	—	
R&D (gsf)	CP	—	—	—	—	—	—	—	—	—	2,500,000
	HPS	2,278,000	583,000	222,000	842,000	—	1,075,000	—	—	2,500,000	
Community Services (gsf)	CP	—	—	50,000	50,000	—	—	—	—	50,000	100,000
	HPS	—	38,000	50,000	—	—	—	—	12,000	50,000	
Performance Venue (gsf/seats)	CP	—	—	10,000	10,000	—	—	—	—	10,000	10,000
Stadium (Seats)	HPS	69,000	69,000	—	—	—	—	—	—	69,000	69,000

SOURCE: Lennar Urban, 2010.

The impacts of a revised development schedule for both the Project and the Variants would be the same for most resource areas (Land Use and Plans, Population, Housing, and Employment, Aesthetics, Wind, Shadow, Cultural Resources and Paleontological Resources, Hazards and Hazardous Materials, Geology and Soils, Hydrology and Water Quality, Public Services, Recreation, and Utilities) as identified in the Draft EIR with respect to all construction and operational impacts, because these resource areas are dependent on intensity and types of land uses, amount of land coverage, specific areas developed, and overall size of the Project, not on when or for how long development occurs. The changes in the Development Schedule are focused on spreading development of R&D over a longer period and more equally distributing development of residential units across the phases. Generally, the order of development on the site remains the same. The first phase focuses on development of the stadium, HPS North, and rebuilding Alice Griffith Housing, the same as analyzed in the EIR. Subsequent phases follow the same general development pattern as analyzed in the EIR, including scheduling development of retail and parks to correspond with the appropriate level of residential development to support these uses. HPS Village Center development would follow the development of HPS North, and the pattern of development on Candlestick Point would remain substantially the same as analyzed, only beginning and ending two years later.

Analysis of impacts with respect to Land Use focus on division of an established community, consistency with applicable land use plans, and secondary land use effects. Land Use thresholds of significance are not time-dependent, and impacts would be the same regardless of when or over what period of time a project is constructed.

With regard to Population, Housing, & Employment, growth projections to 2030 were used in the Draft EIR. These data remain the most up-to-date growth projections available, and the analysis of the Project with full build-out at 2032 instead of 2030 would not change the significance conclusions in the EIR. In the future, citywide household sizes are expected to stay relatively constant or shrink slightly as a result of changing demographic trends.[1] Factors contributing to a decrease in household size include smaller family size and lower birth rates, a greater prevalence of single-person households, longer life spans, greater geographic mobility, and greater independence for seniors. Relative to other parts of the City, the Bayview Hunters Point neighborhood experiences a higher number of residents per habitable room.[2] As new housing varying in affordability, type, and size is developed in the area, existing crowding is expected to be alleviated. The Project would provide a range of housing sizes, including studios to 4 bedrooms, and the average housing unit would be 2.5 bedrooms. As a result, the household size at the Project site is expected to decrease to 2.33 people per unit by 2032, consistent with the 2005 citywide average and the average identified in the General Plan Housing Element. Therefore, the analysis for Population, Housing, & Employment would remain unchanged from that analyzed in the Draft EIR irrespective of the change in final build-out date or interim phasing.

Visual impacts are not time-dependent, and the impacts analyzed in the EIR would remain the same whether the Project is completed in 2032 or 2030 and, additionally, whether R&D is developed in later phases. The impacts of the Project were analyzed against existing conditions as well as cumulatively with regard to completion of the Yosemite Slough Restoration Project. Construction

[1] City and County of San Francisco, Draft General Plan Housing Element, Part 1: Data and Needs Analysis, 2009.
[2] City and County of San Francisco, General Plan Housing Element, 2004.

impacts would be temporary visual distractions regardless of when they occur. The visual impacts of full build-out of the Project also would not change with completion in 2032 versus 2030.

Similarly, impacts related to Wind and Shadow have no relationship to timing of development, but, rather, to size and placement of buildings. This remains unchanged from what was analyzed in the Draft EIR.

With regard to Cultural Resources and Paleontological Resources, Hazards and Hazardous Materials, Geology and Soils, Hydrology and Water Quality, and Biological Resources, these resources would also not be affected by the timing of development, as impacts in these areas are dependent on extent of development, types of land uses, and location of activities, which remain unchanged from that analyzed in the Draft EIR. Mitigation measures would still be implemented at the appropriate stage of development, regardless of when that occurs.

With regard to Recreation, the only area that could be affected by a change in the Development Schedule is the provision of adequate parkland at the completion of each phase of development. Section F (Draft EIR Revisions) includes changes to the parkland provided at the end of each phase of development as reflected in the modified Development Schedule. As the text changes in Section F indicate, at no time would the parkland-to-population ratio drop below the recommended threshold of 5.5 acres per 1,000 residents.

Impacts to electricity, natural gas, and telecommunications are a function of the overall intensity of development and are not time-dependent. The impact analysis would not change whether the Project is built out in 2032 or 2030.

With regard to Greenhouse Gas Emissions, because the total number of equipment hours and overall development would not change, the calendar time span over which the construction takes place is not a factor in the Greenhouse Gas calculations. Therefore, the analysis would remain unchanged from that contained in the Draft EIR. Refer to Appendix T5 (ENVIRON, Updated Greenhouse Gas Emissions Calculation for Candlestick Point–Hunters Point Shipyard Phase II Development Plan, Variants 2A and 3 [Tower Variant D], Alternative 2, and Subalternative 4A, March 12, 2010), which contains corrections to the construction GHG emissions calculations.

Technical memoranda have been prepared with regard to transportation and roadway phasing by LCW Consulting (refer to Appendix A3 [LCW Consulting, CP-HPS Phase II Development Plan Transportation Study—Revised Project Phasing, March 23, 2010]) and Fehr & Peers (refer to Appendix A4 [Fehr & Peers, Roadway and Transit Phasing Plan, March 17, 2010]) that provide a detailed analysis of the proposed schedule modifications. A memorandum from ENVIRON has also been prepared analyzing the schedule changes relative to the impacts of the Project analyzed in the Draft EIR (refer to Appendix A5 [ENVIRON, Updated Project Phasing Effect on Air Quality and Climate Change Analyses Candlestick Point–Hunters Point Shipyard Phase II Development Plan, April 26, 2010]). PBS&J staff prepared a memorandum (refer to Appendix A2 [PBS&J, Analysis of Revised Development Schedule Compared to the Noise Impacts Analyzed in the Draft EIR, March 25, 2010]) that analyzes the revised development schedule with regard to Noise.

Appendix A2 PBS&J, Analysis of Revised Development Schedule Compared to the Noise Impacts Analyzed in the Draft EIR, March 25, 2010

memo

PBS&J

To: San Francisco Redevelopment Agency
San Francisco Planning Department

From: Julian F. Capata, Associate Manager, Noise Specialist

CC:

Date: 3/25/2010

Re: Analysis of Revised Development Schedule Compared to the Noise Impacts Analyzed in the Draft EIR

Construction activities associated with the revised development phasing plan for the Project would be similar in duration, frequency and distance to existing residential neighborhoods adjacent to the site, with the construction activities beginning and ending later than was analyzed in the Draft EIR. In addition, construction would occur over a 20-year period rather than the 19-year period analyzed in the Draft EIR.

Under the revised phasing plan, construction of the R&D would occur later than as originally proposed. Thus, it is likely that a greater number of districts would be occupied by future residents at the time of construction of the R&D. The occupants of the Candlestick North district, the CP Center District, the HPS Village Center and HPS North would potentially be exposed to noise levels up to 101 dBA due to pile-driving activities, and approximately 92 dBA due to the use of heavy construction equipment. Construction activities would be required to comply with the City of San Francisco Noise Ordinance and all mitigation measures identified for the Project, which would reduce construction related noise impacts to less-than-significant levels. However, pile-driving and excavation activities would last throughout the 20-year construction phasing, and, therefore, this temporary increase in ambient noise levels would be noticeable and would likely be cause for human annoyance. Implementation of mitigation measures would reduce the noise levels associated with the loudest construction activities identified above, but not to a less-than-significant level. As such, construction-related temporary increases in ambient noise levels would be considered significant and unavoidable, which was identified in the Draft EIR.

Implementation of these measures would reduce vibration impacts, but not to a less-than-significant level, as vibration levels from pile-driving activities could be as high as 103 VdB for the residential uses within the Candlestick North District, the CP Center District, the HPS Village Center, and HPS North and South Districts when occupied. Vibration levels from construction activities would be as identified in the Draft EIR for the residential uses occupying the Project site during construction;

therefore, this impact would remain significant and unavoidable, unchanged from the previous analysis.

The noise assessment relies on the future transportation projections, which reflect the Project traffic and reasonably foreseeable background growth and development within the study area. Based upon the operational analysis contained in the March 23, 2010, CP-HPS Phase II Development Plan Transportation Study – Revised Project Phasing Memo from LCW Consulting (Appendix A3), the transportation impact analysis that was utilized for the noise assessment was conducted for future year 2030 conditions, assuming full build-out of the proposed development, roadway network, and transit operating plan. As indicated in Appendix A3, traffic volumes associated with the Project would not change as a result of the revised phasing; therefore, the Project's estimated contribution to roadway noise levels would not be different from that evaluated in the Draft EIR. As such, the Project's traffic related noise levels presented in Table III.I-14 (Modeled Noise Levels along Major Project Site Access Roads) would not change due to the revised phasing. Additionally, the Project's traffic-related noise levels would continue to contribute to cumulative increase in ambient noise levels as identified in Table III.I-18 (Modeled Cumulative Traffic Noise Levels along Major Project Site Access Roads) of the Draft EIR. After construction is complete, Project operation would create a substantial, permanent increase in traffic noise levels that would affect existing and future residential uses along all Project site access roads, the same as evaluated in the Draft EIR.

Appendix A3 LCW Consulting, CP-HPS Phase II Development Plan Transportation Study—Revised Project Phasing, March 23, 2010

LCW Consulting

Memo

To: Bill Wycko, San Francisco Planning Department, MEA

From: Luba C. Wyznyckyj, LCW Consulting
Chris Mitchell, Eric Womeldorff, Fehr & Peers

Date: March 23, 2010

Re: CP-HPS Phase II Development Plan Transportation Study – Revised Project Phasing

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This memorandum presents the changes to the transportation impact analysis contained in the *CP-HPS Phase II Development Plan Transportation Study Final Report* (November 2009) that are associated with the revised development phasing plan for the Project.

Operational Impacts
The transportation impact analysis was conducted for future year 2030 conditions, assuming full buildout of the proposed development, roadway network and transit operating plan. Therefore the changes in phasing of development would not affect the transportation impact analysis. In addition, none of the mitigation measures are affected by the changes in construction phasing.

No changes are therefore required to the transportation impact analysis discussion or mitigation measures in the EIR.

Construction Impacts
The revised development phasing schedule and the associated estimates of construction workers and construction truck trips would affect the construction assessment included in the Transportation Study and the EIR.

The revised section 6.10 Construction Impacts from the Transportation Study Final Report dated November 2009 (pages 316 to 323) reflects the updated construction worker and construction truck trip information provided by MACTEC, and the revised construction schedule for the Project, Variants and Alternatives, as presented in the Transportation Study. While the number of construction workers and truck trips changed based, the impact assessment remains unchanged, and conclusions of construction impacts as significant and unavoidable.

Edits to the EIR section to reflect these changes were provided to PBS&J under separate cover.

6.10 CONSTRUCTION IMPACTS

6.10.1 Project and Project Variants

Buildout of the Project would occur over a 20-year period between 2011 and 2032. Initial construction activities would include demolition of existing structures, utility relocation and site clearance and grading at Hunters Point Shipyard to make the land available for the new stadium. The new stadium and the Yosemite Slough bridge are anticipated to be completed by 2017 in time for the 2018 football season.

Buildout of the project would occur over about a 20-year period as part of four overlapping phases (see **Table 2** for development phasing). The duration of each phase would vary, depending on the type of development (e.g., residential, retail, office) and the amount of building space included in each phase. The majority of development would occur and be occupied by the end of the second phase, which has a scheduled completion date of 2023. The majority of the roadway network improvements would occur by 2019 (Phase I), and most transit improvements would be phased in by 2023 (within Phase I and Phase II). Construction impacts within the Project site would affect new residents, employees, and visitors to the area. Overall, throughout the construction period the addition of worker-related vehicles and transit trips would be less than those associated with Project conditions at full buildout.

During construction of the Project phases, building activities would generate traffic volumes from construction workers, truck deliveries of supplies and construction equipment, and the hauling of soils during Project grading and excavation. **Table 90** presents the phases and construction activity for the Hunters Point Shipyard and Candlestick Point development, the maximum number of construction workers that would be on-site on a daily basis, as well as the maximum number of construction truck trips that would travel to and from the sites on a daily basis. These truck trip estimates assume that approximately 40 percent of the required import fill materials would be brought onto the site via barge, with the remaining arriving by truck. **Table 91** presents the number of daily construction truck trips and construction workers, as well as the annual number of barge trips associated with improvements to the shoreline at both Hunters Point Shipyard and Candlestick Point.

The peak phases of construction activities would occur between 2013 and 2017, when grading and infrastructure improvements would be ongoing at both Candlestick Point and Hunters Point Shipyard. During this phase, there would be between 130 and 460 construction workers that would be on-site on a daily basis, and between 70 and 540 construction truck trips that would travel to and from the site on a daily basis. These truck trip estimates assume that about 40 percent of the required import fill materials would be brought onto the site via barge, with the remaining arriving by truck.

Table 90 Construction Workers and Trucks by Phase Hunters Point Shipyard and Candlestick Point			
Project Area/Construction Phase	**Construction Duration**	**Daily Construction Workers**	**Daily Construction Truck Trips**
Hunters Point Shipyard			
Phase 1 – Site Preparation [1]			
Abatement & Demolition	2011 – 2015	10-63	8-48
Grading and Infrastructure	2013 – 2017	25-130	8-288
Phase 1 – Building Construction [1]			
Structure/Rough In	2011 – 2016	18-100	8-32
Interior and Exterior Finishes	2011 – 2016	10-70	8-32
Phase 2 – Site Preparation			
Abatement & Demolition	2016 – 2019	13-65	8-56
Grading and Infrastructure	2018 - 2021	38-100	96-224
Phase 2 – Building Construction			
Structure/Rough In	2016 – 2019	60-80	16-32
Interior and Exterior Finishes	2016 – 2019	25-83	16-40
Phase 3 – Site Preparation			
Abatement & Demolition	2020 – 2023	13-35	8-32
Grading and Infrastructure	2022 - 2025	35-60	24-40
Phase 3 – Building Construction			
Structure/Rough In	2021 – 2024	16-20	8-16
Interior and Exterior Finishes	2021 – 2025	25-35	8-16
Phase 4 – Site Preparation			
Abatement & Demolition	2024 – 2028	13-28	8-32
Grading and Infrastructure	2026 - 2030	18-60	8-128
Phase 4 – Building Construction			
Interior and Exterior Finishes	2026 – 2031	10-50	8-40
Candlestick Point			
Phase 1 – Site Preparation			
Abatement & Demolition	2013 - 2015	10-13	8-16
Grading and Infrastructure	2013 – 2017	30-55	12-96
Phase 1 – Building Construction			
Structure/Rough In	2013 – 2016	14-18	8-16
Interior and Exterior Finishes	2013 - 2016	8-10	4-8
Phase 2 – Site Preparation			
Abatement & Demolition	2016 – 2019	13-38	8-32
Grading and Infrastructure	2018 – 2021	30-93	8-32
Phase 2 – Building Construction			
Structure/Rough In	2016 – 2021	18-35	16-32
Interior and Exterior Finishes	2016 – 2021	10-33	8-20

Table 90 (continued) Construction Workers and Trucks by Phase Hunters Point Shipyard and Candlestick Point			
Phase 3 – Building Construction			
Structure/Rough In	2021 – 2025	40-100	16-48
Interior and Exterior Finishes	2021 – 2025	20-75	16-36
Phase 4 – Site Preparation			
Abatement & Demolition	2024 – 2028	13-43	8-32
Grading and Infrastructure	2026 - 2030	30-135	16-52
Phase 4 – Building Construction			
Structure/Rough In	2024 – 2030	40-80	16-32
Interior and Exterior Finishes	2024 – 2031	33-90	16-48
Yosemite Slough Bridge	2015 – 2016	62-78	18-24
HPS Off-site Improvements	2015 – 2017	24-30	8-12
CP Off-site Improvements	2013 – 2018	24-30	8-12

Notes:

1. Includes stadium construction.

2. Does not include trips associated with field management. Estimated to be between 5 and 20 construction workers and 4 to 8 construction truck trips per day at Hunters Point Shipyard, and between 15 and 25 construction workers and 4 to 8 construction truck trips per day at Candlestick Point.

Source: MACTEC, 2010.

Table 91
Daily Construction Workers by Phase and Yearly Barge Trips
Shoreline Improvements

Project Area/Construction Year	Construction Duration (months)	Daily Construction Workers	Yearly Barge Trips
Hunters Point Shipyard			
2015 Shoreline	9	6-7	0
2016 Shoreline	9	18-21	6
2017 Shoreline	9	45-50	80
2018 Shoreline	6	35-40	55
2022 Shoreline	5	14-16	15
2023 Shoreline	5	14-16	15
2025 Shoreline	10	14-16	10
2026 Shoreline	9	42-48	40
Candlestick Point			
2018 Shoreline	2	5-7	2
2022 Shoreline	2	5-7	2
2024 Shoreline	2	5-7	2
2026 Shoreline	4	5-7	3
2027 Shoreline	4	5-7	3
2028 Shoreline	6	5-7	4

Note:

1. Includes stadium construction.

Source: MACTEC, 2010.

Shoreline improvements at both Hunters Point Shipyard and Candlestick Point would peak in 2017, and would require an additional 45 to 50 construction workers on-site.

Construction related activities would generally occur Monday through Saturday, between 7:00 A.M. and 8:00 P.M., and the typical work shift for most construction workers would be from 7:00 A.M. to about 3:30 P.M. Construction is not anticipated to occur on Sundays or major legal holidays, but may occur on an as-needed basis. The hours of construction would be stipulated by the Department of Building Inspection, and the contractor would be required to comply with the San Francisco Noise Ordinance.[1] Delivery and removal of extra long or wide bridge construction components, equipment, or materials may occur outside theses hours on an as-needed basis.

Construction staging would mostly occur within the individual sites under construction or along existing street right-of-way. Construction staging would involve staging of construction vehicles, storage of construction materials, construction worker vehicles, delivery, and hauling trucks. Due to the large amount of vacant land in the Project site, construction staging would occur on-site, and construction-worker vehicles would likely park near construction sites in the Project site during most phases, and would not occupy spaces on neighborhood streets.

While the exact routes that construction trucks would be using would depend on the location of individual construction sites, it is expected that Harney Way, Hunters Point Expressway, Innes Avenue, Evans Avenue, Cesar Chavez Street, and Third Street would be the primary haul routes between U.S. 101 and the various components of the Project.

In general, construction related transportation impacts would include impacts in the immediate vicinity of the development project under construction, on roadways within the Project site, and cumulative construction traffic impacts along the roadways in the Bayview Hunters Point neighborhood. Since the Project includes building construction as well as construction of a new street system and transit route extensions into the Project site, all Project construction operations would include plans for the closure of traffic/parking lanes and sidewalks adjacent to construction sites. The closure of sidewalks and parking lanes could last throughout the entire construction phase for each building or group of buildings. It is possible that more than one location within the Project site could be under construction at any one time and that multiple travel lane closures may be required.

During the construction period, temporary and intermittent disruption to existing and proposed transit routes and bus stops may occur, and some bus routes may need to be temporarily rerouted (for example, the 29-Sunset on Gilman Avenue and Giants Drive, the 54-Felton on Ingalls, the 23-Monterey and 44-O'Shaughnessey on Palou Avenue, and the 19-Polk on Innes Avenue. In addition, temporary and intermittent interference to transit operations caused by increased truck

[1] The San Francisco Noise Ordinance permits construction activities seven days a week, between 7:00 A.M. and 8:00 P.M.

movements to and from the construction sites may occur. Any change in transit routes and stops would have to be coordinated and approved by the SFMTA.

Due to the reduction in travel lanes, the remaining travel lanes would become more congested with automobiles, trucks and buses, which would pose a greater challenge for bicycle travel in the area. Since bicycle traffic in the Project vicinity is relatively low, this impact is not anticipated to be significant. Existing pedestrian volumes along the key access routes and at the proposed construction sites are low and, therefore, any sidewalk closures or rerouting of the walkway would not significantly affect pedestrian circulation. In general, temporary pedestrian walkways must be maintained in order to facilitate pedestrian movements.

The construction activities associated with the Project would overlap with construction activities of other development projects in the area, notably the HPS Phase I, Executive Park site, Brisbane Baylands, Visitacion Valley, India Basin Shoreline, and the Hunters View site. In addition, the Project construction activities would also overlap with nearby proposed transportation improvement projects, such as the U.S. 101/Harney interchange improvements, and the Geneva Avenue Extension. These overlapping construction activities would increase the number of construction worker vehicles and trucks traveling to and from the project sites along Harney Way and Jamestown Avenue for the Executive Park project and for development within Candlestick Point, and on Cesar Chavez Street and Evans Avenue for the India Basin Shoreline, Hunters View project, and development within Hunters Point Shipyard. For example, construction activities of one or more projects that adversely affect roadway capacity (e.g., Harney Way widening), combined with construction vehicle traffic traveling to and from the roadway project and nearby development projects under construction (e.g., Executive Park and Candlestick Point), could result in increased delays due to traffic diversions and substantial increases in truck traffic.

Given the magnitude of development proposed for the area, the Project's prolonged construction period, and the lack of certainty about the timing of the projects in the area, significant Project-related and significant Project contributions to cumulative traffic and circulation impacts could occur on some roadways, such as U.S. 101, Cesar Chavez Street, Evans Avenue, Harney Way, and Bayshore Boulevard. Cumulative impacts would include construction detours and increased travel times, although the extent and duration of delay would vary depending on individual driver’s origin and destination, time of travel and use of alternate routes. Implementation of individual traffic control plans would minimize impacts associated with each project and reduce each project’s contribution to cumulative impacts in overlapping areas. However, some disruption and increased delays could still occur even with implementation of traffic control plans, and it is possible that significant construction-related traffic impacts on local and regional roadways could still occur.

Project Mitigation Measure 16: The Project Applicant shall develop and implement a Candlestick Point–Hunters Point Shipyard Phase II Construction Traffic Management Program to minimize impacts of the Project and its contribution to cumulative impacts related to construction activities and construction traffic. The program shall provide necessary information to various contractors and agencies as to how to maximize the opportunities for complementing construction management measures and to minimize the possibility of conflicting impacts on the roadway system, while safely accommodating the traveling public in the area. The program shall supplement and expand, rather than modify or supersede any manual, regulations, or provisions set forth by SFMTA, DPW or other City departments and agencies.

Preparation of the Construction Management Program shall be the responsibility of the Project Applicant, and shall be reviewed and approved by SFMTA and DPW prior to initiation of construction. The Project Applicant shall update the program prior to approval of development plans for Phase 2, Phase 3 and Phase 4 of construction to reflect any change to Project development schedule, reflect transportation network changes, to update status of other development construction activities, and to reflect any changes to City requirements.

The program shall:

- Identify construction traffic management practices in San Francisco, as well as other jurisdictions that although not being implemented in the City could provide useful guidance for a project of this size and characteristics.
- Describe procedures required by different departments and/or agencies in the City for implementation of a construction management plan, such as reviewing agencies, approval process, and estimated timelines.
- Describe coordination efforts associated with the Navy remediation efforts and scheduling regarding construction vehicle routing via the Crisp gate.
- Identify construction traffic management strategies and other elements for the Project, and present a cohesive program of operational and demand management strategies designed to maintain acceptable levels of traffic flow during periods of construction activities in the Bayview Hunters Point area. These could include construction strategies, demand management strategies, alternate route strategies, and public information strategies.
- Coordinate with other projects in construction in the immediate vicinity, so that they can take an integrated approach to construction-related traffic impacts.
- Present guidelines for selection of construction traffic management strategies.

Implementation of Project Mitigation Measure 16 would help minimize the Project construction-related transportation impacts, and the Project’s contribution to cumulative-construction related transportation impacts. However, some disruption and increased delays could still occur even with implementation of Mitigation Measure 16, and it is possible that significant construction-related transportation impacts on local and regional roadways could still occur. Localized construction-related transportation impacts would therefore remain *significant and unavoidable*.

Project Variants: Construction activities associated with the Variant 1 and Variant 2 would be similar to the Project. These variants do not include construction of a new stadium at Hunters Point Shipyard, instead assume an additional 2,500,000 square feet of research and development uses under Variant 1, and reallocation of 1,350 residential units from Candlestick Point to Hunters Point Shipyard under Variant 2. Depending on the phasing of the additional development, the Variants 1 and 2 may result in fewer construction traffic impacts between future years 2012 and 2017 when the new stadium is proposed to be constructed, and somewhat greater impacts in the years the additional R&D space or housing units would be constructed. Implementation of a traffic control plan would reduce the project's contribution to significant cumulative impacts of overlapping construction traffic. However, as with the Project, cumulative transportation impacts associated with construction activities would be considered *significant and unavoidable.*

Implementation of Project Mitigation Measure 16 would be applicable to Project Variants 1 and 2. A Hunters Point Shipyard – Candlestick Point Construction Traffic Management Program would help minimize the Project Variants' construction-related transportation impacts and contribution to cumulative-construction related transportation impacts. However, since some disruption and increased delays could still occur even with implementation of the mitigation measure, and it is possible that significant construction-related transportation impacts on local and regional roadways could still occur. Localized construction-related transportation impacts would therefore remain *significant and unavoidable.*

6.10.2 Alternatives to the Project

Alternative 1 – No Project: Construction activities associated with Alternative 1 would be less than the Project. Alternative 1 assumes buildout of Hunters Point Shipyard Phase II per the Hunters Point Shipyard Redevelopment Plan and EIR (February 2000) and subsequent addendums dated November 19, 2003 and July 13, 2006. Under Alternative 1, the existing stadium would remain and no construction activities would occur within Candlestick Point. Due to the reduced level of development anticipated for Hunters Point Shipyard construction impacts associated with Alternative 1 would be *less than significant*.

Alternative 2 – No Bridge: The Alternative 2 development program is the same as the Project; however, Alternative 2 would not include construction of the Yosemite Slough bridge. Therefore, Alternative 2 would not include the construction impacts associated with the bridge and access roads (proposed to occur between 2015 and 2017). All other construction activities and impacts would be the same as described for the Project above. As with the Project, cumulative traffic impacts during construction would be considered *significant.*

Project Mitigation Measure 16 would be applicable to Alternative 2. Implementation of this measure would help minimize Alternative 2's construction-related transportation impacts, and contribution to cumulative-construction related transportation impacts. However, since some disruption and increased delays could still occur even with implementation of traffic control plans, and it is possible that significant construction-related transportation impacts on local and regional roadways could still occur. Localized construction-related transportation impacts would therefore remain *significant and unavoidable.*

Alternative 3 – 49ers stay at Candlestick: Construction activities associated with Alternative 3 would be less than for the Project within the Candlestick Point area. Construction within Hunters Point Shipyard would be similar to the Project; however, 1,350 residential units would be developed within Hunters Point Shipyard. Within Candlestick Point the existing stadium would remain, and only 1,210 residential units would be constructed. Overall construction activities and impacts would be somewhat less than identified for the Project, however, as with the Project cumulative traffic impacts during construction would be *significant*.

Project Mitigation Measure 16 would be applicable to Alternative 3. Implementation of this measure would help minimize Alternative 3's construction-related transportation impacts, and contribution to cumulative-construction related transportation impacts. However, since some disruption and increased delays could still occur even with implementation of traffic control plans, and it is possible that significant construction-related transportation impacts on local and regional roadways could still occur. Localized construction-related transportation impacts would therefore remain *significant and unavoidable.*

Alternative 4 – Lesser Build: Alternative 4 assumes a general reduction in development as compared to the Project (approximately a 30 percent reduction), and therefore construction activities and impacts would be similar to the Project, however, the extent and duration would likely be somewhat less than identified for the Project. As with the Project, cumulative traffic impacts during construction would be *significant*.

Project Mitigation Measure 16 would be applicable to Alternative 4. Implementation of this measure would help minimize Alternative 4's construction-related transportation impacts, and contribution to cumulative-construction related transportation impacts. However, since some disruption and increased delays could still occur even with implementation of traffic control plans, and it is possible that significant construction-related transportation impacts on local and regional roadways could still occur. Localized construction-related transportation impacts would therefore remain *significant and unavoidable.*

Alternative 5 – Park Agreement: The Alternative 5 development program is similar to Project Variant 2, which assumes 1,350 more residential units in Hunters Point Shipyard rather than in Candlestick Point. Alternative 5 does not include construction of a new stadium or a Yosemite Slough bridge, and therefore construction activities associated with these elements would not occur. As with the Project, cumulative traffic impacts during construction would be *significant.* As with the Project, cumulative traffic impacts during construction would be considered *significant.*

Project Mitigation Measure 16 would be applicable to Alternative 5. Implementation of this measure would help minimize Alternative 5's construction-related transportation impacts, and contribution to cumulative-construction related transportation impacts. However, since some disruption and increased delays could still occur even with implementation of traffic control plans, and it is possible that significant construction-related transportation impacts on local and regional roadways could still occur. Localized construction-related transportation impacts would therefore remain *significant and unavoidable.*

Appendix A4 Fehr & Peers, Roadway and Transit Phasing Plan, March 17, 2010

FEHR & PEERS
TRANSPORTATION CONSULTANTS

MEMORANDUM

Date: March 17, 2010

To: Candlestick Point / Hunters Point Shipyard Phase II Development Plan Team

From: Chris Mitchell, PE

Subject: Roadway and Transit Phasing Plan

SF08-0407

This memorandum is intended to summarize the roadway and transit service improvement phasing plan previously developed as part of the Project's Draft Infrastructure Plan. Further, this memo demonstrates the flexibility of the phasing plan to accommodate reasonable changes without creating a mis-match between the level of roadway and transit improvements constructed and the amount of development provided.

ROADWAY IMPROVEMENTS

The overall phasing plan calls for certain on- and off-site improvements to be constructed based on certain levels of development. First, specific auto trip generation rates were derived for each land use proposed by the Project, based on the forecasts in the *Candlestick Point – Hunters Point Shipyard Phase II Development Plan Transportation Study (LCW Consulting, Fehr & Peers, and CHS Consulting Group, November 2009)* ("Transportation Study"). **Tables 1 and 2** below present the effective automobile trip generation rates for each of the major land uses within the Candlestick Point and Hunters Point Shipyard development sites, respectively.

For those improvements that are required to increase capacity to accommodate Project traffic, the amount of traffic generated by the Project (and a proportional share of background traffic growth based on the Project's Transportation Study) that would cause facilities to deteriorate from acceptable levels of service (LOS D or better) to unacceptable levels of service (LOS E or F) was identified. That amount of traffic was deemed the "trigger" point at which improvements would be required to be implemented. Other improvements, such as streetscape enhancements and bicycle/pedestrian improvements would be implemented roughly at the same time as nearby development parcels were constructed, or based on the "Adjacency Principle" as described in the project's Infrastructure Plan.

Tables 3 and 4 present the implementation "triggers" for intersection and roadway segment improvements, respectively, for the Candlestick Point site. **Tables 5 and 6** present similar information for the Hunters Point Shipyard site. As shown, the key triggers for most improvements are construction of certain parcels, such as the Hunters Point Stadium. In other cases, the improvements are required based on a certain level and type of development that is forecasted to produce a certain amount of auto demand. As a result of this approach, the infrastructure improvements will be timed to match the appropriate level of development, regardless of whether changes are made to the current phasing plan.

Table 1
Effective PM Peak Hour Vehicle Trip Generation Rates – Candlestick Point

Land Use	Amount Provided	Unit	Effective PM Peak Hour Trip Generation Rate (Auto Trips Per Unit of Development)[a]
Residential	7,594	Dwelling Units	0.28
Retail	760	Ksf	3.22
Hotel	220	Rooms	0.32
Office	150	Ksf	1.25
Park	105	Acres	0.04
Community Services	50	Ksf	1.42

SOURCE: Fehr & Peers, 2009.

a. The effective rates are the total number of person trips forecasted to be generated by each use, with the mode split forecasts developed as part of the project's transportation impact study. Overall, the site was projected to experience a reduction, compared to standard rates from *Trip Generation* (ITE, 2007), of 32 percent based on the scale of development, the mix of uses, and the bicycle- and pedestrian-oriented design. For purposes of developing this table, the reduction was applied evenly to each use. Further, the number of auto trips generated per unit of development is dependent on both the size of development and the mix of uses proposed. As the project uses change, the vehicle trip generation rates per unit of development may not be constant. Thus, the rates presented in this table should be used cautiously.

Table 2
Effective PM Peak Hour Vehicle Trip Generation Rates – Hunters Point Shipyard

Land Use	Amount Provided	Unit	Effective PM Peak Hour Trip Generation Rate (Auto Trips Per Unit of Development)[a]
Residential	2,650	Dwelling Units	0.28
Retail	125	Ksf	2.57
R&D	2,500	Ksf	0.38
Stadium/Artists	--	--	--
Park	232	Acres	0.03
Community Services	50	Ksf	1.42

SOURCE: Fehr & Peers, 2009.

a. The effective rates are the total number of person trips forecasted to be generated by each use, with the mode split forecasts developed as part of the project's transportation impact study. Overall, the site was projected to experience a reduction, compared to standard rates from *Trip Generation* (ITE, 2007), of 32 percent based on the scale of development, the mix of uses, and the bicycle- and pedestrian-oriented design. For purposes of developing this table, the reduction was applied evenly to each use. Further, the number of auto trips generated per unit of development is dependent on both the size of development and the mix of uses proposed. As the project uses change, the vehicle trip generation rates per unit of development may not be constant. Thus, the rates presented in this table should be used cautiously.

Table 3 - Project Intersection Improvements – Candlestick Point

Intersection	Improvement	Stadium Option		Non-Stadium Option	
		Traffic Volume Trigger?[c]	Trigger	Traffic Volume Trigger? [c]	Trigger
Project Improvements					
Arelious Walker Drive / Harney Way / P Street	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Arelious Walker Drive / Jamestown Avenue	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Arelious Walker Drive / Bill Walsh Way	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Arelious Walker Drive / Ingerson Avenue	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Arelious Walker Drive / Gilman Avenue	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Arelious Walker Drive / Egbert Avenue	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Arelious Walker Drive / Carroll Avenue	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Harney Way / 8 Street	New Traffic Signal	No	Adjacency	No	Adjacency
Harney Way / Ingerson Avenue	New Traffic Signal	No	Construction of 4th Intersection Leg/Adjacency	No	Construction of 4th Intersection Leg/Adjacency
West Harney Way / Ingerson Avenue	New Traffic Signal	No	Adjacency	No	Adjacency
West Harney Way / Gilman Avenue	New Traffic Signal	No	Construction of 3rd and 4th Legs/Adjacency	No	Construction of 3rd and 4th Legs/Adjacency
West Harney Way / Egbert Avenue	New Traffic Signal	No	Adjacency	No	Adjacency
Earl Street / Egbert Avenue	New Traffic Signal	No	Adjacency	No	Adjacency
Harney Way / Executive Park East	New Traffic Signal, Reconfiguration[a]	No	Construction of HPS Stadium	Yes	Harney Way widening (3,537 PM Peak Hour Vehicle Trips)
Harney Way / Thomas Mellon Drive	New Traffic Signal, Reconfiguration[a]	No	Construction of HPS Stadium	Yes	Harney Way widening (3,537 PM Peak Hour Vehicle Trips)
Mitigation Measures					
Tunnel Avenue / Blanken Avenue	Reconfiguration[b]	Yes	4,377 PM Peak Hour Vehicle Trips	Yes	4,377 PM Peak Hour Vehicle Trips

SOURCE: Fehr & Peers, 2009.

a. Reconfiguration of Harney Way intersections with Executive Park East and Thomas Mellon Drive to be completed based on separate and currently ongoing study of proposed Executive Park Project transportation impacts.

b. Reconfigure the northbound and southbound approaches to the intersection of Tunnel Avenue / Blanken Avenue to provide dedicated left-turn lanes adjacent to shared through/right-turn lanes.

c. Assumes other background traffic increases as same rate as buildout of the Project.

Table 4 - Project Street Segment Improvements - Candlestick Point					
Intersection	**Improvement**	**Stadium Option**		**Non-Stadium Option**	
		Traffic Volume Trigger?[c]	**Trigger**	**Traffic Volume Trigger?**[c]	**Trigger**
Project Improvements					
Arelious Walker Drive, Shafter Avenue to Carroll Avenue	Construct Yosemite Slough Bridge[a]	No	Construction of HPS Stadium or Implementation of BRT	No	Implementation of BRT
Arelious Walker Drive, Carroll Avenue to Gilman Avenue	See Figures 2.1.2A – 2.1.2G	No	Construction of HPS Stadium or Implementation of BRT	No	Implementation of BRT
Arelious Walker Drive, Gilman Avenue to Harney Way	See Figures 2.1.2A – 2.1.2G	No	Construction of HPS Stadium or Implementation of BRT	No	Implementation of BRT
Harney Way Widening (Near Term), Arelious Walker Drive to Thomas Mellon Drive	See Figure 2.13	No	Construction of HPS Stadium or Implementation of BRT	Yes	3,537 PM Peak Hour Vehicle Trips or Implementation of BRT
Harney Way Widening (Long-Term), Arelious Walker Drive to Thomas Mellon Drive	See Figure 2.14	TBD[1]	Study Determines LOS Conditions Warrant	TBD[1]	Study Determines LOS Conditions Warrant
Jamestown Avenue, Arelious Walker Drive to Third Street	Resurface and Restripe	No	Demolition of Candlestick Park	No	Demolition of Candlestick Park
Ingerson Avenue, Arelious Walker Drive to Third Street	Resurface and Restripe	No	Demolition of Candlestick Park	No	Demolition of Candlestick Park
Gilman Avenue, Arelious Walker Drive to Third Street	Reconstruct or Resurface and Restripe	No	TBD	No	TBD
Carroll Avenue, Arelious Walker Drive to Ingalls Street	See Figures 2.1.2A – 2.1.2G	No	Construction of HPS Stadium	Yes	3,131 PM Peak Hour Vehicle Trips (CP & HP)[2]
Ingalls Street, Carroll Avenue to Thomas Avenue	See Figures 2.1.2A – 2.1.2G	No	Construction of HPS Stadium	Yes	3,131 PM Peak Hour Vehicle Trips (CP & HP)[2]
Mitigation Measures					
San Bruno Avenue, Mansell Street to Silver Avenue	Signal Priority Treatments	No	Supplemental study Determines Transit Travel Times Have Degraded	No	Supplemental study Determines Transit Travel Times Have Degraded
Gilman Avenue, Arelious Walker Drive to Third Street	Full-time WB transit only lane and PM peak hour EB transit-only lane	No	Supplemental study Determines Transit Travel Times Have Degraded	No	Supplemental study Determines Transit Travel Times Have Degraded
Paul Avenue, Third Street to Bayshore Boulevard	Full-time WB transit only lane	No	Supplemental study Determines Transit Travel Times Have Degraded	No	Supplemental study Determines Transit Travel Times Have Degraded

SOURCE: Fehr & Peers, 2009

a. Refer to Figure 2.1.2A and 5.4.1 for configuration of Yosemite Slough Bridge.

b. The isolated intersection analysis conducted for this study shows that the two intersections along Harney Way would operate acceptably with the near-term configuration even with full buildout of the project. However, because Harney Way is part of a complex series of roadway improvements and due to the inherent uncertainty in traffic forecasts, a study will be conducted prior to construction of each development phase to determine whether conditions are better or worse than projected. The results of that study will indicate whether additional development can be accommodated under the near-term configuration while maintaining acceptable LOS or whether widening is required.

Table 5 - Project Intersection Improvements – Hunters Point Shipyard Phase II					
Intersection	**Improvement**	**Stadium Option**		**Non-Stadium Option**	
		Traffic Volume Trigger?[f]	**Trigger**	**Traffic Volume Trigger?** [f]	**Trigger**
Project Improvements					
Crisp Road / Arelious Walker Drive	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Crisp Road / Outer Ring Road (West)	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Crisp Road / Inner Ring Road (West)	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Crisp Road / Inner Ring Road (East)	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Crisp Road / Outer Ring Road (East)	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Robinson Street / Fisher Street	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Robinson Street / Donahue Street	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Innes Avenue / Donahue Street	New Traffic Signal	No	Construction of HPS Stadium	No	Adjacency
Palou Avenue / Griffith Street / Crisp Avenue	New Traffic Signal / Reconfiguration[a]	No	Construction of HPS Stadium	No	Adjacency
Palou Avenue / Hawes Street	New Traffic Signal	No	Construction of HPS Stadium	Yes	TBD - Based on Transit Phasing
Palou Avenue / Ingalls Street	New Traffic Signal	No	Construction of HPS Stadium	Yes	TBD - Based on Transit Phasing
Palou Avenue / Jennings Street	New Traffic Signal	No	Construction of HPS Stadium	Yes	TBD - Based on Transit Phasing
Palou Avenue / Keith Street	New Traffic Signal	No	Construction of HPS Stadium	Yes	TBD - Based on Transit Phasing
Palou Avenue / Lane Street	New Traffic Signal	No	Construction of HPS Stadium	Yes	TBD - Based on Transit Phasing
Ingalls Street / Carroll Avenue	New Traffic Signal / Reconfiguration[b]	No	Construction of HPS Stadium	Yes	3,131 PM Peak Hour Vehicle Trips (CP & HP)[g]
Ingalls Street / Thomas Avenue	New Traffic Signal / Reconfiguration[c]	No	Construction of HPS Stadium	Yes	3,131 PM Peak Hour Vehicle Trips (CP & HP)[g]
Hunters Point Boulevard / Evans Avenue / Jennings Street	New Traffic Signal / Reconfiguration[d]	Yes	1,515 PM Peak Hour Vehicle Trips	Yes	1,515 PM Peak Hour Vehicle Trips
Pennsylvania Avenue / 25th Street	New Traffic Signal	Yes	1,926 PM Peak Hour Vehicle Trips	Yes	1,926 PM Peak Hour Vehicle Trips

Table 5 - Project Intersection Improvements – Hunters Point Shipyard Phase II					
Intersection	**Improvement**	**Stadium Option**		**Non-Stadium Option**	
		Traffic Volume Trigger?[f]	**Trigger**	**Traffic Volume Trigger?**[f]	**Trigger**
Mitigation Measures					
Amador/Cargo/Illinois	Reconfiguration[e]	Yes	2,121 PM Peak Hour Vehicle Trips	Yes	2,121 PM Peak Hour Vehicle Trips

SOURCE: Fehr & Peers, 2009.

a. The Project will reconfigure the intersection by removing the southwest leg of Crisp Avenue and creating limited access for the eastern block of Palou Avenue. The Crisp Avenue westbound approach, which is a Project roadway, would be restriped to provide two approach lanes, a left turn lane and a shared left/through/right lane. The Project will also reconfigure the northbound Griffith Street approach to provide two lanes, a shared left/through/right turn lane and a dedicated right turn lane. The Project will also reconfigure the eastbound approach on Palou Avenue to provide two approach lanes, a left turn lane and a shared through/right turn lane.

b. The Project will reconfigure Carroll Avenue to provide two travel lanes and a bicycle lane in each direction. This will allow for a shared left turn and through lane, and a shared through and right turn lane at both the east- and westbound approaches. The southbound approach will be reconfigured to allow for two approach lanes: a left turn lane, and a shared through and right turn lane. The reconfiguration of the southbound approach will require displacement of about 200 feet of on-street parking/loading on the west side of Ingalls Street.

c. The Project will reconfigure the westbound approach of Thomas Avenue to Ingalls Street to provide two lanes, a left turn lane, and a shared through and right turn lane. Thomas Avenue will be reconfigured to provide two travel lanes in each direction and on-street parking on both sides of the street.

d. The Project will reconfigure the existing three travel lanes on Evans Avenue in both the eastbound and westbound approaches to provide a shared through/left turn lane, a through lane, and a right turn lane. The Project will also reconfigure the southbound approach on Jennings Street to provide a southbound left turn pocket, a shared southbound through lane, and a right turn lane.

e. Reconfigure the southbound approach to the intersection to provide one dedicated left-turn lane and one dedicated right turn lane. City is currently evaluating the feasibility of this mitigation measure.

f. Assumes other background traffic increases as same rate as buildout of the Project.

g. Combined total from CP and HP

Table 6 - Project Street Segment Improvements – Hunters Point Shipyard Phase II

Intersection	Improvement	Stadium Option		Non-Stadium Option	
		Traffic Volume Trigger?[a]	Trigger	Traffic Volume Trigger?[a]	Trigger
Project Improvements					
Palou Avenue, Griffith Avenue to Third Street	Resurface and Restripe, Streetscape Amenities See Figure 2.1.4	No	Construction of HPS Stadium	Yes	TBD - Based on Transit Phasing
Thomas Avenue, Ingalls Street to Griffith Street	See Figures 2.1.2A – 2.1.2E	No	Construction of HPS Stadium	Yes	3,131 PM Peak Hour Vehicle Trips (CP & HP)[b]
Griffith Street, Thomas Street to Palou Street	See Figures 2.1.2A – 2.1.2E	No	Construction of HPS Stadium	Yes	Reconstruction of Crisp Avenue
Innes Avenue, Donahue Street to Earl Street	See Figures 2.1.2A – 2.1.2E	No	Construction of HPS Stadium	Yes	1,000 PM Peak Hour Vehicle Trips
Innes Avenue/Hunters Point Boulevard/Evans Street, Earl Street to Jennings Street	See Figure 2.1.3	No	Construction of HPS Stadium	Yes	1,000 PM Peak Hour Vehicle Trips
Mitigation Measures					
Palou Avenue, Crisp Avenue to Third Street	Narrow sidewalks to 12-feet, transit only lane in both directions	TBD	Supplemental study Determines Transit Travel Times Have Degraded	TBD	Supplemental study Determines Transit Travel Times Have Degraded
Evans Street, Jennings Street to Napoleon Street	Convert one lane in each direction to transit only	TBD	Supplemental study Determines Transit Travel Times Have Degraded	TBD	Supplemental study Determines Transit Travel Times Have Degraded
Third Street, Thomas Avenue to Kirkwood Avenue	Provide exclusive LRT right of way, remove parking as needed	TBD	Supplemental study Determines Transit Travel Times Have Degraded	TBD	Supplemental study Determines Transit Travel Times Have Degraded

SOURCE: Fehr & Peers, 2009

a. Assumes other background traffic increases as same rate as buildout of the Project.
b. Combined total from CP and HP

TRANSIT PHASING

The transit phasing plan has been developed using a similar approach to the roadway phasing plan. However, in contrast to the roadway plan, which was designed to ensure that roadway facilities projected to operate at LOS D or better in the Project's Transportation Study remained at acceptable levels of service throughout the development process, the transit phasing has been designed to ensure that the level of transit service provided is generally substantially greater than the Project's transit demand. This will ensure that the Project maintains its "transit orientation" throughout the development horizon. Tables 7 and 8 present the effective transit trip generation rates per unit of land use for the Candlestick Point and Hunters Point Shipyard sites, respectively.

Table 7
Effective PM Peak Hour Transit Trip Generation Rates – Candlestick Point

Land Use	Amount Provided	Unit	Effective PM Peak Hour Trip Generation Rate (Transit Trips Per Unit of Development)
Residential	7,594	Dwelling Units	0.13
Retail	760	Ksf	0.95
Hotel	220	Rooms	0.15
Office	150	Ksf	0.64
Park	105	Acres	0.02
Community Services	50	Ksf	0.72

Table 8
Effective PM Peak Hour Transit Trip Generation Rates -
Hunters Point Shipyard Phase II

Land Use	Amount Provided	Unit	Effective PM Peak Hour Trip Generation Rate (Transit Trips Per Unit of Development)
Residential	2,650	Dwelling Units	0.13
Retail	125	Ksf	0.75
R&D	2,500	Ksf	0.19
Stadium/Artists	--	--	--
Park	232	Acres	0.02
Community Services	50	Ksf	0.72

Table 9 presents the various levels of transit service expected to be provided at the site throughout various points of development, and the associated transit trip generation expected to "trigger" those levels of transit service. As shown, generally, each transit route would be extended into the site at approximately 20 percent buildout of Major Phase 1 (for routes serving Hunters Point Shipyard) or Major Phase 2 (for routes serving Candlestick Point). Service would be gradually increased until routes reach their maximum expected service frequencies at 50 percent buildout of the respective Major Phases in most cases.

SUMMARY

Based on this approach, the roadway and transit phasing would be tied to specific levels of development, such that if development happened more quickly or slowly than predicted, or if uses that generate more trips were initiated sooner than expected, the appropriate roadway infrastructure and transit service would be in place to accommodate the associated travel demand.

We hope this has clarified the approach to phasing, and demonstrated the flexibility of the phasing plan to accommodate reasonable modifications to development timing. Please note that this information has been included in the Project's Draft Infrastructure Plan, which is currently under review by various City agencies. As a result, based on comments from the City, some of the triggers in this plan may be revised; however, we do not expect the underlying principle of triggers based on expected travel demand (as opposed to specific years) to be modified.

Table 9 - Transit Improvement Phasing

Improvement	Headway (min.)	One-Way Capacity Serving Project Site (pax/hr)	Stadium Option		Non-Stadium Option	
			Major Phase	Trigger (PM Peak Hour Transit Trips)	Major Phase	Trigger (PM Peak Hour Transit Trips)
Begin Hunters Point Express (HPX)	20	192	1	115 [1]	1	115 [1]
	12	320	1	288 [2]	1	288 [2]
Begin Candlestick Point Express (CPX)	20	192	2	164 [3]	2	164 [3]
	15	256	2	838 [2]	2	838 [2]
	10	384	3	1514 [3]	3	1514 [3]
Extend 23-Monterey	15	256	1	115 [1]	1	115 [1]
Extend 24-Divisadero	7.5	512	2	643 [1]	2	643 [1]
	6	640	2	744 [2]	2	744 [2]
Extend 48-Quintara	15	256	1	1 [3]	1	1 [3]
	10	384	1	288 [2]	1	288 [2]
Extend 44-O'Shaughnessy	7.5	512	1	115 [1]	1	115 [1]
	6.5	591	1	288 [2]	1	288 [2]
Begin/Extend 28L/BRT	8	480	2	1075 [1, 4]	2	1075 [1, 4]
	5	768	2	1582 [2, 4]	2	1582 [2, 4]
Extend 29-Sunset	10	384	2	433 [1]	2	433 [1]
	5	768	2	838 [2]	2	838 [2]
Construct Hunters Point Shipyard Transit Center	N/A	N/A	1	Construction of HPS Stadium	1	288 [5]

Notes:

General: Note that triggers are based on total site transit trip generation; only a fraction of the "trigger" amount will travel on each transit route.

1. Initial route extensions based on 20% of buildout of Major Phase (based on Stadium Option land uses)
2. Based on 50% buildout of Major Phase (based on Stadium Option land uses)
3. Based on initiation of Major Phase. In the case of the CPX, this is because completion of Major Phase 1 will include some residential development that could be served by the CPX, but not likely enough until full buildout of Major Phase 1. In the case of the 48-Quintara, the route would be extended as part of the TEP. Initial route will depend on which streets are constructed.
4. Includes total of trips generated by CP and HP. In the case of the 28L, this means 20% buildout of Major Phase II.
5. Under Non-Stadium Option, implementation of Hunters Point Transit Center based on service improvements to HPX, 48-Quintara, and 44-O'Shaughnessy.

Appendix A5 ENVIRON, Updated Project Phasing Effect on Air Quality and Climate Change Analyses Candlestick Point–Hunters Point Shipyard Phase II Development Plan, April 26, 2010

ENVIRON

April 26, 2010

MEMORANDUM

To: Alison Rondone, PBS&J
Michael Rice, PBS&J
Kimberly Avila, PBS&J

Cc: Therese Brekke, Lennar Urban

From: Michael Keinath, ENVIRON
Elizabeth Miesner, ENVIRON
Shari Libicki, ENVIRON
Jennifer Schulte, ENVIRON

Subject: Updated Project Phasing Effect on Air Quality and Climate Change Analyses
Candlestick Point-Hunter's Point Shipyard Phase II Development Plan

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On March 22, 2010, MACTEC, on behalf of Lennar Urban, provided ENVIRON with a comparison of phasing for construction activities on each sub-phase of the Candlestick Point-Hunter's Point Shipyard Phase II Development Plan ("Project"), included here as Attachment 1. Per your request, we have evaluated the impacts of the revised phasing on the air quality and climate change analyses we conducted as part of the Project's Draft Environmental Impact Report (DEIR).

Under the revised phasing schedule virtually all sub-phases start at the same time or later than that designated in the DEIR and in most cases, construction activities on each sub-phase will start later than what was evaluated under the DEIR. Based on the March 22 comparison, the only exceptions are Building 101 Artist Studios, a subset of the original HP-07 sub-phase, and a portion of the original CP-11 sub-phase known as the "Last Port" on the far eastern end of Candlestick Point. As shown in the attached phasing map (Attachment 2), Building 101 is located on the central portion of the Hunter's Point Shipyard (HPS), to the northeast of the stadium site. The Last Port is located on the eastern shore of Candlestick Point (CP),

Under the DEIR, construction activities for HP-07 were scheduled to commence in 2012; however, under the current phasing, construction activities at Building 101 are anticipated to start in 2011, one year earlier. Construction activities at the Last Port were scheduled to commence in 2022; however, under the current phasing, construction activities at the Last Port are anticipated to start in 2021, one year earlier. We also understand that while the phasing may shift, there will be no changes to the number of equipment resources required to complete horizontal and vertical construction for each subparcel area of the Project.

DPM emissions (as compared to the DEIR) would occur earlier as a result of construction activities at Building 101, and at the Last Port, however as both of these locations on HPS and CP are to the east (and therefore downwind) of the maximally exposed individual residents and workers identified in App. H1-I, the DPM associated with the construction activities, at these sites contribute little, if any, to the overall impacts at the maximally exposed receptors.

As discussed in the analysis we conducted as part of the DEIR (DEIR Appendix H1, Attachment I: Human Health Risk Assessment of Construction-Related Diesel Particulate Matter, herein referred to as "App. H1-I"), the California Resources Board (CARB) is currently in the process of implementing an In-Use Off-Road Diesel Vehicle Rule which sets increasingly stringent fleet-average emission rates year-by-year through 2021. Additionally, mitigation measure AQ-2.1 requires the Project to utilize construction equipment with emission control technology such that 50% of the fleet will meet USEPA Tier 2 standards outfitted with California ARB Level 3 VDECS (Verified Diesel Emission Control Strategies) for particulate matter control (or equivalent) during the first two years of construction activities, increasing to 75% of fleet in the third year and 100% of the fleet starting in the fourth year and for the duration of the Project. Because of the CARB rule and mitigation measure AQ-2.1, any delay in the onset in construction activities will result in lower diesel particulate matter (DPM) emissions than if the Project had started construction activities on the schedule initially considered in the DEIR. Because the duration of the project has been extended, there will be additional field management workers providing construction oversight and an increase in the use of small trucks because of these activities, however, construction oversight does not include the use of diesel fueled equipment and therefore will not result in any additional DPM emissions.

As such, the carcinogenic and noncarcinogenic health risks posed by DPM emissions during construction activities associated with development of Project with mitigation will continue to be below the risk thresholds, this impact will continue to be less than significant with mitigation.

Some of the hauling truck trips listed in the DEIR were not included in the original construction calculations. Attachment 3 shows the revised GHG construction emissions incorporating these trips along with the revised phasing information. This revised calculation shows an increase of 23,687 tonnes of GHG emissions compared to what had previously been reported. There is no threshold for construction emissions and the increase would continue to be insignificant in relation to the amount of construction GHG emissions that occur annually in the state and San Francisco Bay Area. Therefore, the conclusions reached in the DEIR with respect to climate change impacts remain valid.

In summary, as the equipment resources will not increase and the phasing of all sub-phases has generally been shifted to later years when lower emission construction equipment are available, the overall impacts from the revised phasing will be the same as or negligibly higher (for greenhouse gas emissions) or lower (for DPM) than those considered in the DEIR.

Attachments:

Attachment 1: CPHP II Phasing Comparison (DEIR vs. Current) 3/22/2010
Attachment 2: Stadium Option Phasing Map, 3/23/2010
Attachment 3: Revised Construction GHG Emission Tables (note tables are numbered to correspond to ENVIRON's original technical report {*Climate Change Technical Report Candlestick Point–Hunters Point Shipyard Phase II Development Plan,* October 2009} which is Appendix S of the DEIR.

Attachment 1:

CPHP II Phasing Comparison (DEIR vs. Current) 3/22/2010

CPHP II Phasing Comparison (DEIR vs. Current) 3/22/2010

Previous DEIR Phasing Map			Current Phasing Map		
DEIR Subphase ID	Horizontal Duration	Vertical Duration	Equivalent Revised Subphase ID	Horizontal Duration	Vertical Duration
Hunters Point					
HP-01	2010 - 2012	2013 - 2014	75% HP-01 50% Northside Park/African	2012-2014 2014-2015	2014-2016 2016-2019
HP-02	2012	NA	25% HP-01	2012-2014	NA
HP-03	2010-2013	2014-2015	HP-02 MP-1 Promenade 1 50% Northside Park/African	2014-2016	2016-2019
HP-04	2010-2014	2015-2016	HP-03 MP-1 Promenade 2	2015-2018	2017-2019
HP-05	2014	NA	35% HP-06	2014-2015	NA
HP-06	2012 - 2014	2015-2016	90% HP-12	2012-2014	2015-2017
HP-07	2012-2015	2016-2017	Bldg 101 Artist	2011 - 2017	2011-2019
			HP-04 30% HP-05	2016-2019	2018-2021
			HP-07, 08, 09, 10, 11	2019-2024	2021-2026
			MP-1 Heritage Park MP-2 Heritage Park MP-2 Promenade 1 MP-2 Promenade 2	2016-2024	2019-2027
			50% HP-14	2029-2030	2031-2032
HP-08	2014-2016	2017	HP-13	2014-2017	2017
			Urban Rec Area Corp Yard 50% HP-14	2025-2030	2026-2032
HP-09	2016	NA	35% HP-06	2014-2015	NA
HP-10	2012-2016	2017-2018	10% HP-12	2012-2014	2015-2017
			70% HP-05	2016-2019	2018-2022
HP-11	2015-2017	2017-2018	Grasslands Ecology Park North Grasslands Ecology Park South	2025-2026	2025-2028

Notes:

1. The equipment resources required to complete horizontal and vertical construction of the project for each subparcel area have not changed.

2. While the quantity of construction workers required to complete horizontal and vertical construction for each subphase remains the same; the overall number of workers for the project has gone up due to the extended length of the project. With additional years of work comes more field management workers and more mobilizations and demobilizations. Even though this results in more workers the average length of time that they will be working each year has decreased.

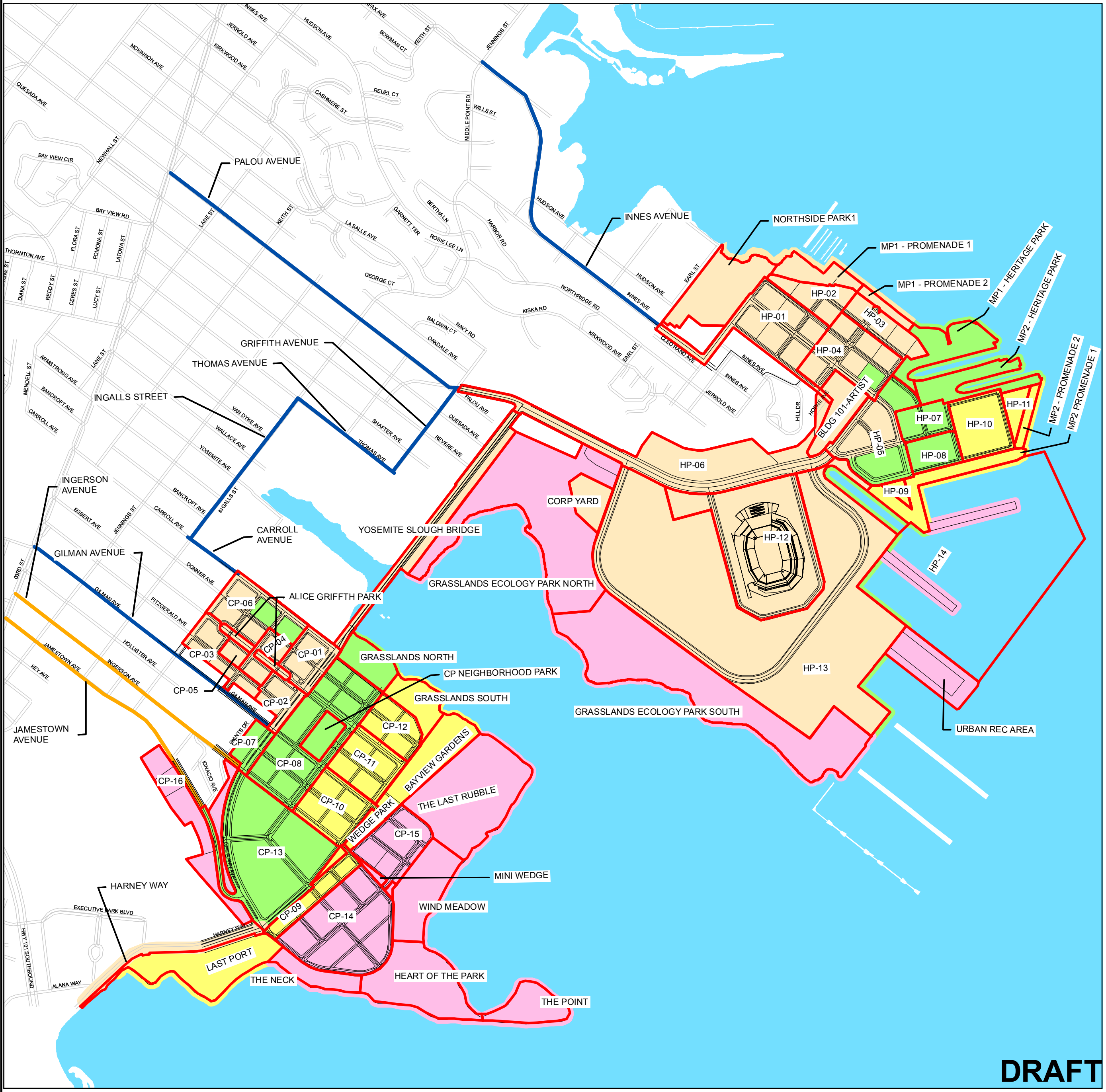
CPHP II Phasing Comparison (DEIR vs. Current) 3/22/2010

Previous DEIR Phasing Map			Current Phasing Map		
DEIR Subphase ID	Horizontal Duration	Vertical Duration	Equivalent Revised Subphase ID	Horizontal Duration	Vertical Duration
Candlestick Point					
CP-01	2011-2012	2012-2013	90% CP-01	2012-2013	2014-2015
CP-02	2011-2013	2013-2014	5% CP-01 95% CP-02	2012-2014	2014-2016
CP-03	2013-2014	2015-2016	CP-03	2014-2015	2016-2017
CP-04	2014-2015	2016-2017	CP-04 CP-05 Alice Griffith Park CP-07	2015-2020	2017-2022
			5% CP-01	2012-2013	2014-2015
CP-05	2015-2016	2017-2018	60% CP-06	2016-2019	2018-2021
CP-06	2016-2017	2018-2019	40% CP-06	2016-2019	2018-2021
CP-07	2017-2018	2019-2020	CP-08 CP-Neighborhood Park 50% CP-09 95% CP-13	2019-2023	2021-2025
CP-08	2019	2020-2021	50% CP-09 CP-10	2021-2023	2023-2025
CP-09	2020	2021-2022	50% CP-11 Bayview Gardens Wedge Park	2021-2024	2024-2026
CP-10	2021	2022-2023	50% CP-11 CP-12	2022-2025	2024-2027
CP-11	2022	2023-2024	45% CP-14	2025-2028	2029-2030
			Last Port	2021-2023	2024-2025
CP-12	2023	2024-2025	30% CP-14 40% CP-15 Mini Wedge Wind Meadow The Last Rubble	2024-2028	2025-2030
CP-13	2024	2025-2026	60% CP-15 25% CP-14 CP-16 The Neck Heart Of The Park The Point	2025-2029	2027-2031
			5% CP-13	2019-2021	2021-2023
Grasslands North	2012	2013-2014	Grasslands North	2019-2020	2022-2023
Grasslands South	2016	2017-2018	Grasslands South	2024-2025	2025-2026
Roads					
Innes Palou Griffith Thomas Ingalls Carrol Gilman	2015-2016 2013-2014 2015 2015 2016 2013 2013-2015	NA	Innes Palou Griffith Thomas Ingalls Carrol Gilman	2013-2017	NA
Ingerson Jamestown	2020 2021		Ingerson Jamestown	2018	NA
Harney	2016		Harney Phase 1	2016-2017	NA
			Harney Phase 2	2024	NA

Attachment 2:

Stadium Option Phasing Map

PROPOSED SITE PREPARATION SCHEDULE (PROJECT)



LEGEND

PHASE 1: DEMOLITION & ABATEMENT 2011-2015
UTILITIES & INFRASTRUCTURE 2013-2017
STRUCTURAL SHORELINE IMPROVEMENTS 2013-2017

PHASE 2: DEMOLITION & ABATEMENT 2016 - 2019
UTILITIES & INFRASTRUCTURE 2018 - 2021
STRUCTURAL SHORELINE IMPROVEMENTS 2018 - 2021

PHASE 3: DEMOLITION & ABATEMENT 2020-2023
UTILITIES & INFRASTRUCTURE 2022-2025
STRUCTURAL SHORELINE IMPROVEMENTS 2022-2025

PHASE 4: DEMOLITION & ABATEMENT 2024-2028
UTILITIES & INRASTRUCTURE 2026-2030
STRUCTURAL SHORELINE IMPROVEMENTS 2026-2030

OFFSITE TRANSPORTATION PHASE 1: MAJOR ACCESS IMPROVEMENTS COMPLETION BY 2017

OFFSITE TRANSPORTATION PHASE 2: MAJOR ACCESS IMPROVEMENTS COMPLETION BY 2018

ONSITE CONSTRUCTION PHASING BOUNDARY

STRUCTURAL SHORELINE IMPROVEMENTS (COLOR BASED ON PHASE OF COMPLETION)

NOTES:

1. PARK LANDSCAPING AND VERTICAL DEVELOPMENT IS NOT INCLUDED IN THE PHASING PLAN BUT IS TYPICALLY CONSTRUCTED WITHIN 2-3 YEARS OF THE HORIZONTAL INFRASTRUCTURE COMPLETION.
2. THE EQUIPMENT RESOURCES REQUIRED TO COMPLETE HORIZONTAL AND VERTICAL CONSTRUCTION OF THE PROJECT FOR EACH SUBPARCEL AREA HAVE NOT CHANGED.
3. WHILE THE QUANTITY OF CONSTRUCTION WORKERS REQUIRED TO COMPLETE HORIZONTAL AND VERTICAL CONSTRUCTION FOR EACH SUBPHASE REMAINS THE SAME; THE OVERALL NUMBER OF WORKERS FOR THE PROJECT HAS GONE UP DUE TO THE EXTENDED LENGTH OF THE PROJECT. WITH ADDITIONAL YEARS OF WORK COMES MORE FIELD MANAGEMENT WORKERS AND MORE MOBILIZATIONS AND DEMOBILIZATIONS. EVEN THOUGH THIS RESULTS IN MORE WORKERS THE AVERAGE LENGTH OF TIME THAT THEY WILL BE WORKING EACH YEAR HAS DECREASED.

N

0 425 850 1,700 Feet

Thursday, April 22, 2010 4:12:30 PM
P:\4096\097756_HPS-CP\GIS\Data\MXD\Phasing\Stadium_Phasing_EIR_20100322_Exhibit.mxd

NO.	DATE	REVISIONS	DRAWN: RR	PROJECT NO: 4096097772	MACTEC	HUNTERS POINT / CANDLESTICK POINT	ABATEMENT/DEMOLITION / HORIZONTAL INFRASTRUCTURE PROPOSED SITE PREPARTION SCHEDULE (PROJECT)	FIGURE: --
			ENGINEER: JHD/DR	SCALE: AS SHOWN		INTEGRATED PROJECT HUNTERS POINT NAVAL SHIPYARD SAN FRANCISCO, CALIFORNIA		
			CHECKED:	APPROVED:				
			DATE: 03-23-10	DATE: 03-23-10				

Attachment 3:

Revised Construction GHG Emission Tables

Note: tables are numbered to correspond to ENVIRON's original technical report (*Climate Change Technical Report Candlestick Point–Hunters Point Shipyard Phase II Development Plan, October 2009*) which is Appendix S of the DEIR

Table 3-3
GHG Emissions from Worker Commutes
Candlestick Point-Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Location	Worker Round Trips[1]	Trip Length [2]	EF^3_{LDA}		EF_{LDT2}		CO_2 Emissions[4]		Total CO_2 Emissions	Total CO_2e Emissions[5,6]
			Running	Startup	Running	Startup	Running	Startup		
		(miles)	(g/mile)	(g/trip)	(g/mile)	(g/trip)	(tonne)			
Candlestick Point	233,513	29.8	340	209	424	259	2,658	109	2,768	2,913
Hunter's Point Shipyard	219,130	29.8	340	209	424	259	2,494	103	2,597	2,734
Total									**5,365**	**5,647**

Notes:

1. Worker trips were calculated based on the average number of workers and duration of each project phase as provided by Mactech.
2. The roundtrip length is 29.8 miles based on the Home-Work trip lenth for San Francisco provided by Fehr and Peers.
3. The running emission factor depends on the speed of the vehicle. The emission factor used in this calculation refers to the URBEMIS 9.2.4 default vehicle speed: 30 MPH.
   The startup emission factor depends on the settling period before driving. The startup emissions were conservatively calculated based on a 12 hour wait before each engine startup.
4. GHG Running Emission calculation formula: GHG Emission = Roundtrips x Trip Length x (0.5 x EF_{LDA} + 0.5 x $EF_{LDT2})_{Running}$
   GHG Startup Emission calculation formula: GHG Emission = Worker Trips x (0.5 x EF_{LDA} + 0.5 x $EF_{LDT2})_{Startup}$
   URBEMIS 9.2.4 assumes that LDA and LDT have a 50:50 mixing ratio.
5. $CO_2e = CO_2 / 0.95$: The United States Environmental Protection Agency (USEPA) recommends assuming that CH_4, N_2O, and HFCs account for 5% of GHG emissions from on-road vehicles, taking into account their global warming potentials.
6. The emission factor values of calendar year 2011, the anticipated start date of the project, were used for all calculations.

Abbreviations:

CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
g - gram
GHG - Greenhouse Gas
EF - Emission Factor
HFC - hydro fluorocarbons
hr - hour
LDA - Light Duty Auto
LDT - Light Duty Truck
MPH - Miles per hour
URBEMIS - Urban Emissions Model

Table 3-4
GHG Emissions from Hauling Trips
Candlestick Point-Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Location	Hauling Round Trips[1]	Trip Length[2]	EF^3_{HHD}		CO_2 Emissions[4]		Total CO_2 Emissions	Total CO_2e Emissions[5,6]
			Running	Startup	Running	Startup		
		(miles)	(g/mile)	(g/trip)	(tonne)			
Candlestick Point	121,319	14.6	1,610	389	5,703	94	5,798	6,103
Hunter's Point Shipyard	362,306	14.6	1,610	389	17,033	282	17,314.6	18,226

Notes:

1. Hauling trips are calculated based on information provided by Mactech.
2. Trip length is based on URBEMIS default for San Francisco consumer non-work of 7.3 miles one way.
3. The running emission factor depends on the speed of the vehicle. The emission factor used in this calculation refers to the URBEMIS 9.2.4 default vehicle speed: 30 MPH.
   The startup emission factor depends on the settling period before driving. The startup emissions are conservatively calculated based on a 12 hour wait before each engine startup.
4. URBEMIS 9.2.4 assumes that all haulers drive heavy-heavy-duty trucks.
   CO_2 Running Emission calculation formula: CO_2 Emission = trips x trip length x $EF_{HHD\text{-}Running}$
   CO_2 Startup Emission calculation formula: CO_2 Emission = Hauler Trips x $EF_{HHD\text{-}Startup}$
5. $CO_2e = CO_2 / 0.95$: The United States Environmental Protection Agency (USEPA) recommends assuming that CH_4, N_2O, and HFCs account for 5% of GHG emissions from on-road vehicles, taking into account their global warming potentials.
6. The emission factor values of calendar year 2011, the anticipated start date of the project, are used for all calculations.

Abbreviations:

CH_4 - methane
CO_2 - carbon dioxide
CO_2e - carbon dioxide equivalent
g - gram
GHG - Greenhouse Gas
EF - Emission Factor
GVW - Gross Vehicle Weight
HFC - Hydro Fluorocarbons
HHD - Heavy-Heavy Duty
hr - hour
MPH - Miles per hour
URBEMIS - Urban Emissions model

Table 3-5
Overall Construction GHG Emissions
Candlestick Point-Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Location	Construction Equipment	Worker Commuting	Hauling	Total GHG Emissions
	(tonnes CO_2e)			
Candlestick Point	56,403	2,913	6103	**65,419**
Hunter's Point Shipyard	42,895	2,734	18226	**63,854**
Total	**99,298**	**5,647**	**24,329**	**129,274**

Notes:

1. See previous tables for calculation detail. The table includes emissions from construction equipment, worker commuting and hauling.

Abbreviations:

CO_2e - carbon dioxide equivalent
GHG - Greenhouse Gas

Appendix D1

Fehr & Peers, CP-HPS Phase II Developmental Plan Transportation Study—Transit Delay Analysis Erratum, April 2010

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April 26, 2010

Mr. Bill Wycko
San Francisco Planning Department, MEA
1650 Mission Street, 4th Floor
San Francisco, CA 94103

Re: CP-HPS Phase II Developmental Plan Transportation Study – Transit Delay Analysis Erratum

Dear Bill:

This letter report is an erratum to the *Candlestick Point-Hunters Point Shipyard Phase II Development Plan Transportation Study* (November 2009) to update the transit delay analysis in the original report.

Our recent work refining transit mitigation measures identified in the DEIR has led to updated calculations for transit travel time savings associated with the measures. In the course of this refinement, we identified discrepancies in the calculation of transit travel increases associated with the Proposed Project, Variants and Alternatives.

This letter report contains the revised calculations. Revisions have been made to Tables 76, 77, 82, and 83 as they appear in the Transportation Study. Rather than renumbering for this letter report, those tables have been left with their original numbering scheme.

The revised transit delay analysis includes a Project Variant that was not included in the report at the time of publication, Variant 2A. For additional background on Variant 2A and the reasons for its inclusion please see *CP-HPS Phase II Developmental Plan Transportation Study, Supplemental Memorandum – Project Variant 2A (Housing/R&D)*, LCW Consulting, March 2010.

The revisions contained herein were not found to identify any additional significant impacts to transit travel times beyond those previously identified and disclosed in the Transportation Study and DEIR. The same mitigation measures identified in those documents would continue to apply based on the information presented in this letter.

TRANSIT DELAY ANALYSIS

The transit delay analysis and impact methodologies are the same as described in Chapter 6 (Year 2030 Project Impact Analysis) of the Transportation Study and are summarized below.

Transit Delay Methodology

Transit delay is the sum of three components; traffic congestion delay, transit re-entry delay, and passenger delay. The following is a brief description of each delay component:

Traffic congestion delay – Traffic congestion associated with increases in area traffic slows down transit vehicles and results in increased transit travel times. Traffic congestion delays are calculated by summing the average vehicular delay at each intersection along the transit line's route within the study area. The increase in total route segment delay is equal to the increase in travel time associated with the project.

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Transit re-entry delay – Transit vehicles typically experience delays after stopping to pick up and drop off passengers while waiting for gaps in adjacent street traffic in order to pull out of bus stops. As traffic volumes on the adjacent street increase, re-entering the flow of traffic becomes more difficult and transit vehicles experience increased delay. Transit re-entry delay was calculated using empirical data presented in the 2000 Highway Capacity Manual (HCM). Total transit re-entry delay for each route was calculated as the sum of transit re-entry delay at each stop within the study area.

Passenger boarding delay – Although increases in transit ridership are generally viewed positively, the amount of time a transit vehicle has to stop to pick up and drop off passengers (i.e., the transit vehicle dwell time) is directly correlated to the number of passengers boarding the vehicle. If, as proposed, the project includes substantial improvements to transit service in the future (and as general transit ridership grows), vehicles would have to spend more time at stops, which may increase overall transit travel times. Passenger boarding delay was calculated assuming two seconds per passenger boarding for buses, and 0.5 seconds per passenger boarding for light rail or bus rapid transit (BRT) vehicles. Passenger boarding's within the study area were estimated by examining the increases in ridership across the study area cordons.

Although the transit routes in the study area would not be extended into the study area under existing conditions or under 2030 No Project conditions, transit delay for those scenarios was calculated as if the transit routes were extended only for purposes of comparing project impacts. Generally, the increases in travel times associated with the project are somewhat smaller than those associated with the increases expected between existing and 2030 No Project conditions.

Transit Delay Study Segments

Transit delay was calculated for the study transit routes between the project site and key destination/transfer points over the following segments:

- 9-San Bruno: Bayshore Boulevard between Sunnydale Avenue and Jerrold Avenue
- 23-Monterey: between Ingalls Street/Oakdale Avenue and the Glen Park BART Station
- 24-Divisadero: between Hunters Point Shipyard and Mission Street
- 28L-19th Avenue: between Hunters Point Shipyard and Mission Street
- 29-Sunset: between Candlestick Point and Mission Street
- 44-O'Shaughnessy: between Hunters Point Shipyard and the Glen Park BART Station
- 48-Quintara-24th St: between Hunters Point Shipyard and the 24th Street BART Station
- 54-Felton: between Jerrold Avenue/Earl Street and Mission Street
- T-Third: Third Street between Thomas Avenue and Jerrold Avenue

Transit Delay Impact Criteria

As noted in the Transportation Study and the DEIR, the Proposed Project would have a significant impact if it would increase travel times such that additional vehicles would be required to maintain the proposed headways. This was assumed to be the case if either the project's travel time increases to a particular route would be greater than ½ its proposed headway or if the number of required vehicles estimated using SFMTA's cost/scheduling model, which takes into account scheduled breaks and extra time built into schedules, increases by one or more vehicles with the addition of the project characteristics.

Revised Transit Delay Analysis – Project and Project Variants

This section describes the transit delay analysis and impacts associated with the Project and Project Variants.

Table 76 summarizes the increases in transit travel times associated with the Proposed Project and the Project Variants for each route within the study area, compared to 2030 No Project

(Alternative 1) conditions. **Table 77** identifies the number of additional vehicles that would be required to meet the proposed headways.

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Table 76
Project Increases to Transit Travel Time (minutes:seconds) [1]
Project and Project Variants – Weekday AM and PM Peak Hours

Route	Proposed Headway (min.)	Northbound/Eastbound				Southbound/Westbound			
		Project	Variant 1 (R&D)	Variant 2 (Housing)	Variant 2A (Housing/R&D)	Project	Variant 1 (R&D)	Variant 2 (Housing)	Variant 2A (Housing/R&D)
AM Peak Hour									
9-San Bruno	10	**1:09**	**1:07**	**1:19**	**0:01**	**8:04**	**8:42**	**8:09**	**7:00**
23-Monterey	15	0:41	0:41	0:38	**0:26**	3:51	3:51	3:51	**4:18**
24-Divisadero	6	**4:56**	**9:50**	**4:46**	**5:14**	**4:21**	**2:07**	**4:41**	**5:01**
28L-19th Ave Ltd	5	**4:23**	**5:28**	**4:17**	**4:29**	**10:07**	**10:04**	**9:47**	**12:47**
29-Sunset	10	**8:04**	**12:50**	**9:39**	**9:36**	**10:21**	**15:52**	**9:06**	**8:57**
44-O'Shaughnessy	6	**5:53**	**8:24**	**5:54**	**6:47**	**6:16**	**7:53**	**6:14**	**6:09**
48-Quintara-24th St	15	0:51	2:04	1:04	2:10	2:38	2:38	2:48	2:34
54-Felton [2]	20	0:56	3:23	1:39	1:55	-0:17	-3:10	-3:00	-1:59
T-Third	8	1:34	1:42	1:35	1:38	1:39	1:39	1:39	1:39
PM Peak Hour									
9-San Bruno	10	**4:03**	**4:19**	**3:55**	**3:06**	**6:49**	**6:56**	**6:49**	**6:25**
23-Monterey	15	0:56	0:58	0:58	**0:53**	1:57	2:01	1:57	**1:28**
24-Divisadero	6	**8:25**	**8:13**	**8:36**	**9:06**	**5:53**	**11:56**	**8:59**	**9:33**
28L-19th Ave Ltd	5	**8:59**	**9:42**	**8:50**	5:35	**6:03**	**6:46**	**5:54**	6:03
29-Sunset	10	**15:00**	**17:07**	**14:53**	**16:19**	**21:07**	**22:19**	**21:02**	**21:02**
44-O'Shaughnessy	6	**6:05**	**12:30**	**6:56**	**5:40**	**7:18**	**10:04**	**8:00**	**9:03**
48-Quintara-24th St	15	**8:03**	**9:02**	**8:40**	**6:57**	**3:37**	**5:21**	**3:43**	**4:48**
54-Felton [2]	20	**3:48**	**5:44**	**4:09**	**4:30**	**5:32**	**3:45**	**3:13**	**4:35**
T-Third	8	**2:57**	**3:35**	**2:50**	**3:08**	**2:33**	**2:45**	**2:32**	**2:38**

Notes:
1. Routes where the Project would increase travel times such that additional vehicles would be required highlighted in **bold**.
2. Due to roadway improvements proposed by the Project and differences between the No Project and Project land use assumptions at the Hunters Point Shipyard, there would be less traffic congestion along 54-Felton route in study area with the Project, than under 2030 No Project conditions.

Source: Fehr & Peers, 2010.

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Table 77
Additional Muni Transit Vehicle Requirements
Project and Project Variants – Weekday AM and PM Peak Hours

Route	Project	Variant 1 (R&D)	Variant 2 (Housing)	Variant 2A (Housing/R&D)
AM Peak Hour				
9-San Bruno	**1**	**1**	**1**	**1**
23-Monterey	0	0	0	0
24-Divisadero	***2***	**2**	**2**	**2**
28L-19th Ave Ltd	**1**	**1**	**1**	**1**
29-Sunset	***2***	***3***	**2**	***2***
44-O'Shaughnessy	***1***	***1***	**1**	***1***
48-Quintara-24th Street	*0*	*0*	0	*0*
54-Felton	0	0	0	0
T-Third	0	0	0	0
Total	*7*	*8*	*7*	*7*
PM Peak Hour				
9-San Bruno	**1**	**1**	**1**	**1**
23-Monterey	0	0	0	0
24-Divisadero	***2***	**3**	**3**	***3***
28L-19th Ave Ltd	**1**	**1**	**1**	*0*
29-Sunset	***4***	***4***	**4**	***4***
44-O'Shaughnessy	***3***	**4**	**3**	***3***
48-Quintara-24th Street	***1***	**1**	**1**	**1**
54-Felton	**1**	**1**	**1**	**1**
T-Third	**1**	**1**	**1**	**1**
Total	***14***	***16***	***15***	***15***

Note:
Transit vehicle requirements for Project and Project Variants are in addition to those required for the 2030 No Project condition (Alternative 1, Table 83)
Italic indicates figure is different than that which appears in Transportation Study, November, 2010.
Source: Fehr & Peers, 2010.

Proposed Project: As shown on Table 77, under the Proposed Project, traffic and ridership demands would increase compared to conditions without the Proposed Project, and would result in the need for an additional 7 transit vehicles AM peak hour, and an additional 14 vehicles in the PM peak hour. During the AM peak hour, additional vehicles would be required on the 9-San Bruno (one vehicle), 24-Divisadero (two vehicles), 28L-19th Avenue Limited (one vehicle), 29-Sunset (two vehicles), and the 44-O'Shaughnessy (two vehicles) routes. These would be in addition to the 18 vehicles required to maintain 2030 No Project headways (see Table 83). In the PM peak hour, additional vehicles would be needed on the 9-San Bruno (one vehicle), 24-Divisadero (two vehicles), 28L-19th Avenue Limited (one vehicle), 29-Sunset (four vehicles), 44-O'Shaughnessy (three vehicles), 48-Quintara-24th Street (one vehicle), 54-Felton (one vehicle), and the T-Third (one train car). These would be in addition to the 16 required to maintain 2030 No Project headways.

These impacts to transit travel times were discussed in Impacts TR-21 through TR-27. Although mitigation measures were identified to reduce the severity of these impacts, the DEIR determined that their feasibility was uncertain because they would require detailed engineering feasibility studies and ultimate approval by SFMTA. Further, in some cases, even if feasibility were certain, the proposed mitigation measures would not fully mitigate the transit impacts to less than significant levels. Consequently, the DEIR concluded that the impacts would remain significant and unavoidable.

Many of the mitigation measures described in the DEIR included a series of options and/or improvements that should be considered in the feasibility study. Since the time of publication of the DEIR, feasibility studies have been conducted in collaboration with the Planning Department and SFMTA. As a result of this process, the recommended mitigation measures have been refined considerably and the mitigation measures have been made more specific. The language used to describe mitigation measures MM TR-21.1 through MM TR-27.1 has been refined as a result of this subsequent feasibility study, and will be included as staff-initiated text changes in the FEIR. Further, Master Response 18 – Traffic Mitigation Measures, has been included in the Comments and Responses portion of the FEIR, and includes a more detailed discussion of the mitigation measures, their feasibility, and their benefits to transit travel times.

However, because the mitigation measures require further approvals by the SFMTA board, and because some of them do not fully mitigate their associated impacts to less than significant levels, the conclusions of the DEIR (namely that the transit travel time impacts discussed in Impacts TR-21 through TR-27 would remain significant and unavoidable with mitigation) are unchanged.

Project Variant 1 – R&D: Under Project Variant 1, traffic and ridership demands would increase and result in the need for one additional transit vehicle (29-Sunset, one vehicle) in the AM Peak Hour and two additional vehicles (24-Divisadero, one vehicle; 44-O'Shaughnessy, one vehicle) in the PM Peak Hour in addition to those identified for the Proposed Project. The same significant impacts associated with Variant 1 identified in the Transportation Study and the DEIR would remain significant and unavoidable.

Project Variant 2 – Housing: Under Project Variant 2, traffic and ridership demands would increase and result in the need for zero additional transit vehicles in the AM Peak Hour and one additional vehicle (24-Divisadero, one vehicle) in the PM Peak Hour in addition to those identified for the Proposed Project. The same significant impacts associated with Variant 2 identified in the Transportation Study and the DEIR would remain significant and unavoidable.

Project Variant 2A – Housing/R&D: Under Project Variant 2A, traffic and ridership demands would increase and result in the need for zero additional transit vehicles in the AM Peak Hour and one additional vehicle (24-Divisadero, one vehicle) in the PM Peak Hour in addition to those identified for the Proposed Project. The same significant impacts associated with Variant 2A identified in *CP-HPS Phase II Developmental Plan Transportation Study, Supplemental Memorandum – Project Variant 2A (Housing/R&D)*, LCW Consulting, March 2010 would remain significant and unavoidable.

Revised Transit Delay Analysis – Project and Project Alternatives

This section describes the transit delay analysis and impacts associated with Project Alternatives.

Table 82 summarizes the increases in transit travel times associated with Alternatives to the Project for each route within the study area, compared to 2030 No Project (Alternative 1) conditions. Although neither Alternative 1 nor the existing conditions include extensions of transit routes into the project site, the analysis of increases to transit travel times over existing conditions associated with Alternative 1 was conducted for the same segments as the Project, to provide a meaningful comparison. **Table 83** identifies the number of additional vehicles that would be required to meet the proposed headways.

Table 82
Project Increases to Transit Travel Time (minutes:seconds)[1]
Alternatives to the Project – Weekday AM and PM Peak Hours [2]

Route	Proposed Headway (min.)	Northbound / Eastbound			Southbound / Westbound		
		Alt. 1 No Project	Alt. 3 49ers at Candlestick	Alt. 4 Lesser Build	Alt. 1 No Project	Alt. 3 49ers at Candlestick	Alt. 4 Lesser Build
AM Peak Hour							
9-San Bruno	10	**39:52**	-1:06	**0:53**	**9:20**	0:25	**7:26**
23-Monterey	15	**8:24**	0:07	0:35	**3:33**	0:18	3:50
24-Divisadero	6	**6:35**	**12:46**	**12:16**	**7:41**	**-0:06**	**0:20**
28L-19th Ave Ltd	5	**5:20**	3:24	3:44	**7:24**	7:54	8:32
29-Sunset	10	**3:42**	**7:54**	**12:04**	**3:53**	**12:56**	**16:43**
44-O'Shaughnessy	6	**11:06**	**6:11**	4:24	**8:25**	**5:09**	4:58
48-Quintara-24th St	15	**8:03**	-0:02	-1:00	**0:14**	2:00	1:41
54-Felton [3]	20	**4:24**	-0:02	-0:54	**4:59**	-2:18	-3:05
T-Third	8	**7:01**	0:54	1:13	**5:13**	1:39	1:39
PM Peak Hour							
9-San Bruno	10	**43:53**	0:52	**3:12**	**23:02**	1:21	**6:15**
23-Monterey	15	**8:14**	0:42	0:54	**10:26**	0:34	1:44
24-Divisadero	6	**4:08**	-3:33	**-2:41**	**4:30**	6:59	**7:03**
28L-19th Ave Ltd	5	**2:26**	**10:10**	12:29	**5:20**	**3:49**	5:13
29-Sunset	10	2:36	**7:50**	**15:55**	-1:35	**13:53**	**20:22**
44-O'Shaughnessy	6	**12:57**	**4:48**	**4:01**	**10:21**	**8:06**	**5:52**
48-Quintara-24th St	15	**11:53**	-2:44	-3:26	**6:30**	5:03	3:30
54-Felton [3]	20	**13:31**	**3:28**	**3:28**	**6:56**	**2:43**	**3:15**
T-Third	8	**4:16**	**1:54**	**2:17**	**5:13**	**1:07**	**1:58**

Notes:
1. Routes where project would increase travel times such that additional vehicles would be required highlighted in **bold**.
2. Travel times for Alternative 2 same as for Project, and travel times for Alternative 5 same as Project Variant 2, as presented on Table 76. The exception is the 28L-19th Avenue Limited, were travel times in each direction would increase by five minutes per direction as neither Alternative 2 nor Alternative 5 would include the Yosemite Slough bridge.
3. Due to roadway improvements proposed by the Project and differences between the No Project and Project land use assumptions in the Hunters Point Shipyard, there would be less traffic congestion along 54-Felton route in the study area with the Project, than under 2030 No Project conditions.
Source: Fehr & Peers, 2010.

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Table 83
Additional Muni Transit Vehicle Requirements
Alternatives to the Project – Weekday AM and PM Peak Hours

Route	Alternative 1 No Project	Alternative 2 No Bridge	Alternative 3 49ers at Candlestick	Alternative 4 Lesser Build	Alternative 5 No Park Agreement
AM Peak Hour					
9-San Bruno	*6*	**1**	0	**1**	**1**
23-Monterey	**1**	0	0	0	0
24-Divisadero	*3*	*2*	*2*	**1**	*2*
28L-19th Ave Ltd	**1**	**1**	0	0	**1**
29-Sunset	**1**	*2*	*2*	*3*	*2*
44-O'Shaughnessy	*2*	**2**	*1*	*0*	*1*
48-Quintara-24th St	**1**	*0*	*0*	*0*	*0*
54-Felton	**1**	0	0	0	0
T-Third	**2**	0	0	0	0
Total	*18*	*8*	*5*	*5*	*7*
PM Peak Hour					
9-San Bruno	**7**	**1**	0	**1**	**1**
23-Monterey	**1**	0	0	0	0
24-Divisadero	*2*	*2*	*0*	*1*	*3*
28L-19th Ave Ltd	**1**	**1**	**1**	**0**	**1**
29-Sunset	**0**	*4*	*2*	*4*	*4*
44-O'Shaughnessy	**4**	*3*	**2**	**2**	*3*
48-Quintara-24th St	**1**	*1*	*0*	*0*	**1**
54-Felton	**1**	**1**	**1**	**1**	**1**
T-Third	**1**	**1**	*1*	**1**	**1**
Total	*18*	*14*	*7*	*10*	*15*

Note:
Transit vehicle requirements for Alternatives 2 through 5 are in addition to those required for the 2030 No Project condition (Alternative 1).
Italic indicates figure is different than that which appears in Transportation Study, November, 2010.
Source: Fehr & Peers, 2010.

Alternative 1 – No Project: As shown on Table 83, under Alternative 1 - No Project, traffic and ridership demands would increase and result in the need for an additional 18 transit vehicles in the AM peak hour, and an additional 18 vehicles in the PM peak hour. During the AM peak hour, additional vehicles would be required on the 9-San Bruno (six vehicles), 23-Monterey (one vehicle), 24-Divisadero (three vehicles), 28L-19th Avenue Limited (one vehicle), 29-Sunset (one vehicle), 44-O'Shaughnessy (two vehicles), the 48-Quintara-24th Street (one vehicle), the 54-Felton (one vehicle) and the T-Third (two train cars). In the PM peak hour, additional vehicles would be needed on the 9-San Bruno (seven vehicles), 23-Monterey (one vehicle), 24-Divisadero (two vehicles), 28L-19th Avenue Limited (one vehicle), 44-O'Shaughnessy (four vehicles), 48-Quintara-24th Street (one vehicle), 54-Felton (one vehicle), and the T-Third (one train car).

Alternative 2 – No Bridge: Under Alternative 2, traffic and ridership demands would increase and result in the need for 8 additional transit vehicles in the AM Peak Hour and 14 additional vehicles in the PM Peak Hour in addition to those identified to maintain 2030 No Project conditions (18 vehicles in the AM peak hour, and 18 vehicles in the PM peak hour). The same significant impacts associated with Alternative 2 identified in the Transportation Study and the DEIR would remain significant and unavoidable.

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Alternative 3 – 49ers at Candlestick: Under Alternative 3, traffic and ridership demands would increase and result in the need for 5 additional transit vehicles in the AM Peak Hour and 7 additional vehicles in the PM Peak Hour in addition to those identified to maintain 2030 No Project conditions (18 vehicles in the AM peak hour, and 18 vehicles in the PM peak hour). The same significant impacts associated with Alternative 3 identified in the Transportation Study and the DEIR would remain significant and unavoidable.

Alternative 4 – Lesser Build: Under Alternative 4, traffic and ridership demands would increase and result in the need for 5 additional transit vehicles in the AM Peak Hour and 10 additional vehicles in the PM Peak Hour in addition to those identified to maintain 2030 No Project conditions (18 vehicles in the AM peak hour, and 18 vehicles in the PM peak hour). The same significant impacts associated with Alternative 4 identified in the Transportation Study and the DEIR would remain significant and unavoidable.

Alternative 5 – No Park Agreement: Since the land use program and transit operating plan for Alternative 5 would be the same as for Project Variant 2. The same significant impacts associated with Alternative 5 identified in the Transportation Study and the DEIR would remain significant and unavoidable.

SUMMARY

The revisions described herein to the transit delay analysis presented in the Transportation Study and DEIR did not identify any additional significant impacts to transit travel times beyond those previously identified and disclosed in the Transportation Study and DEIR. The same mitigation measures identified in those documents would continue to apply based on the information presented in this letter. However, as discussed above and further described in Master Response 18 in the Comments and Responses to the DEIR, additional feasibility studies of transit-related mitigation measures have been performed since publication of the DEIR. This has resulted in more detailed information regarding feasible improvements. As a result, the text of mitigation measures MM TR-21 through MM TR-27 has been revised to incorporate this subsequent feasibility study.

We hope you find this information useful. Please do not hesitate to call for clarifications or additional information.

Sincerely,

FEHR & PEERS

Eric Womeldorff
Senior Transportation Engineer

SF08-0407

Appendix H3

ENVIRON, Ambient Air Quality and Human Health Risk Assessment, May 2010 [Main Text and Attachment IV Only]

Appendix H3: Ambient Air Quality Human Health Risk Assessment

Candlestick Point – Hunters Point Shipyard Phase II Development Plan San Francisco, California

Prepared for:
PBS&J
San Francisco, California

Prepared by:
ENVIRON International Corporation
San Francisco and Emeryville, California

Date:
~~October 30, 2009~~ May 4, 2010

Project Number:
03-20816A

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List of Acronyms

AAQ	Ambient Air Quality
AERMOD	American Meteorological Society/Environmental Protection Agency Regulatory Model
ARB	California Air Resources Board
BAAQMD	Bay Area Air Quality Management District
Cal/EPA	California Environmental Protection Agency
CEQA	California Environmental Quality Act
CP	Candlestick Point
DPM	Diesel Particulate Matter
EIR	Environmental Impact Report
EMFAC	EMission FACtor model
HHRA	Human Health Risk Assessment
HI	Hazard Index
HPS	Hunters Point Shipyard
MEI	Maximally Exposed Individual
NFL	National Football League
PBS&J	Post, Buckley, Schuh & Jernigan, Inc.
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter Less than 2.5 Microns in Aerodynamic Diameter
PM_{10}	Particulate Matter Less than 10 Microns in Aerodynamic Diameter
R&D	Research and Development
SFDPH	San Francisco Department of Public Health
TAC	Toxic Air Contaminants
USEPA	United States Environmental Protection Agency

List of Units

gsf	gross square footage
m^3	cubic meter
μg	microgram

1 Introduction

At the request of Post, Buckley, Schuh & Jernigan, Inc. (PBS&J), ENVIRON International Corporation (ENVIRON) has performed four ambient air quality (AAQ) human health risk assessments (HHRA) as part of the Environmental Impact Report (EIR) for the proposed Candlestick Point – Hunters Point Shipyard Phase II Development Plan ("Project"). The EIR for the Project is being prepared by PBS&J on behalf of the San Francisco Redevelopment Agency and the San Francisco Planning Department.

The Project will consist of the development of approximately 702-acre area east of U.S. 101 in the southeast area of the City and County of San Francisco and will occupy the waterfront area from south of India Basin to Candlestick Cove. The Project is comprised of two major sub-components: Candlestick Point (CP) and Hunters Point Shipyard (HPS) Phase II.

Details of the Project are described in Chapter II of the EIR. The Project proposed by Lennar Urban includes a mixed-use community with a range of residential, retail, office, research and development, civic and community uses, and parks and recreational open space. In addition, a major component would be a new stadium for the San Francisco 49ers, a National Football League (NFL) team. Necessary infrastructure improvements (including several roadway modifications) are also proposed in support of the Project development plan.

The EIR also examines variants to the Project:

- Variant 1 would include an additional 2.5 million gross square footage (gsf) of research and development space on the proposed stadium site. All other elements of the Project would remain the same.
- Variant 2 would redistribute 1,350 residential units to the proposed stadium site from Candlestick Point. All other elements of the Project would remain the same.
- A third variant (Variant 3) would include the same land use program and overall description as the Project, with different locations for the residential towers.
- Variant 4 is the same overall development plan as the Project, but with minor shifts in building locations to accommodate 570,000 gsf for the proposed utility systems (with 330,000 gsf located below ground).
- Variant 5 assumes that a new stadium would be constructed and shared between the San Francisco 49ers and the Oakland Raiders football teams. The land use program would remain the same as the proposed Project.

Chapter IV of the EIR analyzes these Variants. Evaluation of the variants in the EIR allows for consideration and approval of these variants without further environmental review.

ENVIRON conducted four AAQ HHRAs in support of the EIR for the Project, as follows:

1. **Human Health Risk Assessment of Construction-Related Diesel Particulate Matter:** This HHRA included evaluation of the potential health effects associated with exposure to diesel particulate matter (DPM) that may be emitted during Project-related construction activities.

2. **Human Health Risk Assessment of Chemicals Bound to Airborne PM_{10}:** This HHRA included an evaluation of the potential health effects associated with potential exposures to chemicals bound to particulate matter (PM) with a mean diameter of 10 microns or less (PM_{10}) released from soils during Project-related construction activities. Those chemicals present in soil dusts at concentrations above the residential cleanup goal are evaluated.

3. **Analysis of Toxic Air Contaminant Emissions from Stationary Sources in Research and Development Areas:** This HHRA involved a screening-level prospective analysis to evaluate potential health impacts from future stationary sources of toxic air contaminant (TAC) emissions in the areas designated for research and development (R&D) within the proposed Project.

4. **$PM_{2.5}$ Analysis of Traffic/Vehicular Emissions**: This HHRA included an evaluation of the potential health impacts associated with concentrations of particulate matter (PM) with a mean diameter of 2.5 microns or less ($PM_{2.5}$) along major thoroughfares in the vicinity of the Project due to Project-related traffic.

The HHRAs performed by ENVIRON have been conducted in accordance with the California Environmental Quality Act (CEQA) and were prepared using information obtained from PBS&J and Lennar Urban.

The HHRAs are presented in four separate attachments to this main report, as identified below. Attachment V presents documentation of the meteorological data used in the air dispersion modeling component of the four AAQ HHRAs. The methods used in each HHRA as well as the findings from each analysis are summarized below.

Since the HHRAs were completed, changes were made to the Project Description including the addition of roadway improvements on Ingerson and Jamestown Avenues, compaction of Candlestick Point construction schedule (completion in 2026), and slight changes to the Candlestick Point phasing boundaries. These changes to the Project Description were found not to change the HRA conclusions significantly, as documented in a technical memorandum included in Attachment VI. In addition to the above changes, Variant 4 (a new stadium constructed and shared between the San Francisco 49ers and the Oakland Raiders football teams) has been renumbered Variant 5; with a new Variant 4 (the Utilities Variant) which proposes centralized wastewater facilities, heating and cooling plants, and a transvac system for trash (tubes). This new Variant 4 includes 527,000 gsf of new development most of which is underground.

2 Analysis of Construction Equipment Emissions

ENVIRON performed an HHRA to evaluate the potential human health effects associated with potential exposure to DPM that may be emitted during construction activities related to the Project. The full HHRA is included as Attachment I.

2.1 Methodology

The methods used in the analysis of DPM emissions from Project-related construction emissions are consistent with CEQA guidelines and Bay Area Air Quality Management District (BAAQMD), California Environmental Protection (Ca/EPA) and United States Environmental Protection Agency (USEPA) risk assessment guidance. The HHRA incorporates conservative (i.e., health-protective) methodologies for the following: 1) the estimation of DPM emissions, 2) the calculation of airborne DPM concentrations at receptor locations, and 3) the estimation of excess lifetime cancer risks and noncancer health effects or hazard indices (HIs).

ENVIRON estimated DPM emissions for construction equipment associated with the Project construction activities. Construction activities considered in this evaluation include abatement, demolition, grading, excavation, and foundation and structure construction. Specifically, construction sources of DPM evaluated in this HHRA included off-road construction equipment such as lifts, loaders, excavators, dozers, and graders. ENVIRON also evaluated three types of vehicle traffic in this DPM construction HHRA:

- Equipment and material delivery,
- Spoils and debris hauling, and
- Construction employee commute.

Airborne DPM concentrations were then estimated at receptor locations using the DPM emissions estimates and the USEPA recommended air dispersion model American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) version 07026.

Offsite receptors evaluated in this HHRA included residents (child and adult), workers and sensitive receptors (school children) located in the surrounding community and along the expected travel routes of on-road delivery and haul trucks. Onsite receptors evaluated in this HHRA included residents at the Alice Griffith Housing area. As stated in the Chapter II of the EIR, the proposed Project includes rebuilding Alice Griffith Housing to provide one-for-one replacement units and ensuring that eligible Alice Griffith Housing residents have the opportunity to move to the new, upgraded units directly from their existing Alice Griffith Housing units without having to relocate to any other area. Based on the proposed plan outlined in the EIR, it is anticipated that construction activities within the Alice Griffith Housing area will be phased by parcel. While construction occurs at one parcel, residents will continue to reside at the remaining parcels. These residents were identified as onsite receptors for the Project.

Based on the results of the exposure evaluation and air dispersion modeling, ENVIRON developed quantitative estimates of excess lifetime cancer risks and noncancer HIs associated with potential exposure to DPM that may be emitted during construction activities related to the Project. The methods used to estimate excess lifetime cancer risks and noncancer HIs are consistent with risk assessment guidance from BAAQMD, Cal/EPA and USEPA.

In accordance with CEQA, the cancer risks and chronic noncancer HIs estimated in this HHRA were then compared to the BAAQMD CEQA thresholds of significance. Pursuant to BAAQMD *CEQA Guidelines* (BAAQMD 1999), projects that expose the public to TACs in excess of the following thresholds would be considered to have a significant air quality impact:

- Probability of contracting cancer for the maximally exposed individual (MEI) exceeds 1×10^{-5} (10 in a million);
- Ground level concentrations of noncarcinogenic TACs resulting in a Hazard Index greater than 1 for the MEI.

2.2 Findings

The results of this HHRA indicate that potential excess lifetime cancer risks to offsite residents, workers and sensitive receptors in areas surrounding the Project are below 10 in a million for DPM emitted from construction activity, assuming that certain mitigation measures are implemented as discussed in Attachment I. Further, estimated cancer risks for onsite residents at the Alice Griffith Housing area are also below 10 in a million. The estimated chronic noncancer hazard indices are below one for all receptors evaluated in this HHRA. Thus, based on the results of this HHRA, DPM emission related to Project construction activities should not have a significant air quality impact according to BAAQMD CEQA Guidelines (BAAQMD 1999).

The many conservative assumptions that have been used in this assessment regarding the estimation of emissions, ambient air concentrations, exposure assumptions, and carcinogenic potency lead to an overestimate of potential risks, the magnitude of which could be substantial.

A screening-level analysis was conducted to evaluate the potential impacts of changes to the Project Description on the HHRA conclusions. This screening-level analysis is described in Attachment VI: Technical Memorandum, Updated Project Description. Using this screening approach, the estimated excess lifetime cancer risks and chronic noncancer HIs for all receptors are below the BAAQMD CEQA thresholds of significance, and therefore, the impact from these emissions remains less than significant.

3 Analysis of Airborne Soils

ENVIRON performed a HHRA to evaluate the potential human health risks due to potential exposure to chemicals that may be present in airborne soils (dusts) emitted during Project-related construction activities. The full HHRA is included as Attachment II.

3.1 Methodology

The methods used in the analysis of soil dust emissions from Project-related construction activities are consistent with CEQA guidelines and BAAQMD, Ca/EPA, and USEPA risk assessment guidance. The dusts evaluated are referred to as PM_{10}, that is, PM with a mean aerodynamic diameter of 10 microns or less. PM_{10} corresponds to particles of a size that could be inhaled and retained in the lungs.

Conservative (i.e., health-protective) methodologies were applied for the following: 1) the estimation of PM_{10} emissions from soils, 2) the calculation of airborne PM_{10} and associated chemical concentrations at receptor locations, and 3) the estimation of excess lifetime cancer risks and noncancer health effects or HIs.

The sources of PM_{10} emissions evaluated were demolition and soil grading activities associated with Project construction activities. Those Project areas where PM_{10} emissions were from soils with chemicals present at concentrations above residential cleanup goals were included in the evaluation. Airborne PM_{10} concentrations were estimated at receptor locations using the PM_{10} emissions estimates and the USEPA recommended air dispersion model AERMOD version 07026. Chemical concentrations associated with the airborne PM_{10} were estimated based on the chemical concentrations in soils, referred to as the soil source terms.

Offsite receptors evaluated in the HHRA included residents (child and adult), workers, and sensitive receptors (school children) located in the surrounding community. Onsite receptors evaluated included residents at the Alice Griffith Housing area. As discussed in Section 2.1, it is anticipated that construction activities within the Alice Griffith Housing area will be phased by parcel. While construction occurs at one parcel, residents will continue to reside at the remaining parcels.

Inhalation exposures were quantitatively evaluated for all receptors. In addition, a sensitivity analysis – referred to as a multipath analysis – was conducted for specific chemicals to evaluate the potential contribution of other (noninhalation) exposure pathways. Specifically, airborne dusts released during construction activities could deposit on soils such that exposures could also occur through other pathways (i.e., incidental ingestion of and dermal contact with soil for all receptors, and for residents, ingestion of produce grown in residential gardens).

Based on the results of the exposure evaluation and air dispersion modeling, ENVIRON developed quantitative estimates of excess lifetime cancer risks and noncancer HIs associated with potential exposures to chemicals bound to PM_{10} emitted during construction activities. The methods used to estimate excess lifetime cancer risks and noncancer HIs are consistent with risk assessment guidance from BAAQMD, Cal/EPA, and USEPA. The estimated cancer risks and chronic noncancer HIs were then compared to the BAAQMD CEQA thresholds of significance presented in Section 2.1.

3.2 Findings

The results of this HHRA indicate that potential excess lifetime cancer risks to offsite residents, workers, and sensitive receptors surrounding the Project are below 10 in a million for inhalation exposures to chemicals bound to PM_{10} emitted during construction activities. Further, estimated cancer risks for onsite residents at the Alice Griffith Housing area are below 10 in a million. The estimated chronic noncancer HIs are below one for all receptors evaluated. Thus, based on the results of this HHRA, PM_{10} emissions related to Project construction activities should not have a significant air quality impact according to current BAAQMD CEQA Guidelines (BAAQMD 1999).

The results of the sensitivity analysis for cumulative exposures from inhalation and noninhalation (i.e., incidental ingestion of and dermal contact with soil for all receptors, and for residents, ingestion of produce grown in residential gardens) exposure pathways indicate that the estimated cancer risks and noncancer HIs are below BAAQMD thresholds for all populations evaluated.

A screening-level analysis was conducted to evaluate the potential impacts of changes to the Project Description on the HHRA conclusions. This screening-level analysis is described in Attachment VI: Technical Memorandum, Updated Project Description, which indicates that at the MEI worker, resident adult and resident child the estimated excess lifetime cancer risks continue to be below the threshold of 10 in a million (1.0×10^{-5}) and the noncancer chronic HIs and acute HIs are below the threshold of 1.0. The estimated excess lifetime cancer risks and chronic and acute noncancer HIs for all receptors are below the BAAQMD CEQA thresholds of significance, and therefore, the impact from these emissions remains less than significant.

4 Analysis of Operational Sources

ENVIRON performed a prospective screening-level analysis to evaluate potential health impacts from operational sources of TACs which may locate in the areas designated for R&D within the Project. The full analysis included as Attachment III.

4.1 Methodology

For this prospective screening-level analysis, ENVIRON made a series of assumptions:

- A wide range of stationary sources could operate in the R&D area; thus, the identity and amounts of the TACs emitted from these sources can not be determined at this time.
- The area designated for proposed R&D development would be divided into one-acre plots, which is consistent with the minimum size of a parcel based on the expected land uses within the R&D parcels.
- A single R& D facility (or stationary source) would be constructed on the one-acre plot.
- The cancer risk at the boundary of each one-acre plot was set not to exceed a designated cancer risk level or chronic noncancer HI threshold.
- It was conservatively assumed that all receptor locations surrounding the R&D area were residential.

Evaluation of the impacts associated with stationary sources consisted of two (2) steps:

1.) TAC emissions for each stationary source within a one-acre plot were estimated assuming that the cancer risk and HI at the plot boundary corresponded to 5 in a million and 0.5, respectively.

2.) TAC emissions from each stationary R&D source were summed to assess the cumulative impact of all potential stationary sources within the area designated for R&D development on the surrounding community.

Pursuant current BAAQMD *CEQA Guidelines* (BAAQMD 1999), projects that expose the public to TACs in excess of the following thresholds would be considered to have a significant air quality impact:

- Probability of contracting cancer for the MEI exceeds 1 x 10^{-5} (10 in a million);
- Ground level concentrations of noncarcinogenic TACs resulting in a HI greater than 1 for the MEI.

4.2 Findings

This analysis presents a conservative assessment of the cumulative excess lifetime cancer risk and chronic noncancer HI due to TAC emissions from the R&D areas at any surrounding receptor location. All receptors were initially evaluated as residential receptors. It assumes that each allowable location for TAC emissions will emit chemicals at the maximum allowable rate. In fact, the TAC emissions at some of these locations will be below the maximum rate (for example office building emissions for TAC would be zero or close to zero), and the resultant cumulative risks will also be lower.

Under this conservative evaluation, there are limited areas outside of the R&D areas that would exceed the proposed BAAQMD thresholds if they were residential locations. However, none of these areas are designated for residential land use in the proposed Project. If these areas were used for commercial or recreational land use, the frequency and duration of potential exposures would be less than that for a resident. Thus, the estimated risks and HIs would decrease below the proposed thresholds.

Further evaluation may be warranted if land use in the vicinity of the Project is modified or if the placement of the stationary sources does not conform to the assumptions made in this screening-level analysis.

5 Analysis of $PM_{2.5}$ Concentrations

ENVIRON performed an evaluation of $PM_{2.5}$ concentrations due to Project-associated traffic. The evaluation of potential health impacts from $PM_{2.5}$ is not required under current CEQA guidelines~~, but was performed in response to guidance developed by the San Francisco Department of Public Health (SFDPH)~~. The complete evaluation is included as Attachment IV.

5.1 Methodology

The methods used in the analysis of $PM_{2.5}$ emissions from Project-related traffic are consistent with guidance of the San Francisco Department of Public Health (SFDPH). As discussed in Attachement IV, based on guidance from the US Environmental Protection Agency, Bay Area Air Quality Management District, and SFDPH, a $PM_{2.5}$ action level of 0.2 microgram per cubic meter [µg/m^3] was chosen as a conservative action level for judging significance in this analysis. ~~The SFDPH is concerned that individuals who live in the proximity of heavily-travelled roads or freeways will incur adverse health effects as a result of exposure to vehicle emissions. To minimize contributions to health impacts associated with locating new residential projects near roadway "hot spots", the SFDPH developed a strategy to assess and mitigate air pollution at these locations. Their strategy is based on the use of an annual average threshold concentration of $PM_{2.5}$ (0.2 microgram per cubic meter [µg/m^3]) within a 150 meter zone of a new project as a means of assessing the potential for concern. The threshold concentration of $PM_{2.5}$ is meant to serve as a health-protective "proxy" or surrogate for pollutant exposures from vehicles i.e., $PM_{2.5}$ is not the only pollutant of concern. Instead, the $PM_{2.5}$ threshold serves as a concentration meant to protect the health of residents from all vehicle-associated emissions from a project.~~

Emissions from vehicle exhaust, tire wear, and brake wear were estimated using emission factors generated using the most recent version of the EMission FACtor model (EMFAC), developed by the California Air Resources Board (ARB). Vehicle volumes were estimated from the traffic report, prepared by the CHS Consulting Group.

The concentration of $PM_{2.5}$ from vehicular emissions was characterized by developing exposure point concentrations at residential receptors surrounding the thoroughfares and roadways evaluated: Third Street; Innes Avenue/Hunters Point Boulevard /Evans Avenue; Palou Avenue; Gilman Avenue/Paul Avenue; and Harney Way. Those thoroughfares were identified in the traffic report as primary or secondary roads which connect the proposed Project site and major arterials to U.S. 101. In addition, Evans Avenue/Hunters Point Boulevard /Evans Avenue, and Harney Way were selected since they were identified as streets with significant truck traffic and thus are expected to yield more $PM_{2.5}$ compared to other roads. Furthermore, Palou Avenue, Gilman Avenue/Paul Avenue were selected since there are residences in the vicinity of these roads where individuals may incur exposure to $PM_{2.5.}$

Annual average airborne concentrations of $PM_{2.5}$ attributable to Project-related traffic emissions were estimated by applying a Gaussian air dispersion model, approved by the USEPA and ARB for use in the environmental documentation of transportation projects. Both free flowing traffic and queuing at intersections were evaluated.

The potential health impacts from Project-associated $PM_{2.5}$ were evaluated by comparing predicted concentrations of $PM_{2.5}$ to the ~~SFDPH $PM_{2.5}$ threshold~~ action level of 0.2 µg/m^3. The evaluation of potential health impacts from $PM_{2.5}$ is not required under current CEQA guidelines~~, but was conducted to comply with SFDPH guidance~~.

5.2 Findings

Modeled concentrations of $PM_{2.5}$ attributable to Project traffic do not exceed the ~~SFDPH threshold concentration~~ action level of 0.2 µg/m^3. The maximum $PM_{2.5}$ concentration in residential areas is below the 0.2 µg/m^3 action level, indicating that ~~by comparison to the SFDPH threshold,~~ residents in the areas impacted by Project traffic are not expected to experience adverse health effects above the proposed level of significance.

This evaluation utilized a number of conservative assumptions in modeling $PM_{2.5}$ concentrations which provide support for the determination that adverse effects of exposure to $PM_{2.5}$ are not likely.

A screening-level analysis was conducted to evaluate the potential impacts of changes to the Project Description on the HHRA conclusions. As described in Attachment VI: Technical Memorandum, Updated Project Description, $PM_{2.5}$ concentrations in the area surrounding Gilman, Ingerson, Jamestown, and Third Street are not expected to exceed 0.2 ~~micrograms per cubic meter (~~µg/m^3~~)~~ action level~~, the SFDPH threshold (SFDPH 2008)~~. The maximum estimated concentration is 0.15 µg/m^3, which occurs on the northern side of Gilman, near its easternmost end. As the impact from traffic $PM_{2.5}$ remains below the ~~SFDPH threshold~~ action level, the impact from these emissions remains less than significant.

6 References

Bay Area Air Quality Management District (BAAQMD). 1999. *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans*. December.

San Francisco Department of Public Health (SFDPH). 2008. *Assessment and Mitigation of Air Pollutant Health Effects from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review.* May 6.

Attachment IV:
$PM_{2.5}$ Analysis of Traffic/Vehicular Emissions

Candlestick Point– Hunters Point Shipyard
Phase II Development Plan,
San Francisco, California

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List of Acronyms

AAQS	Ambient Air Quality Standards
ARB	Air Resources Board
CEQA	California Environmental Quality Act
CP	Candlestick Point
DPM	Diesel Particulate Matter
EIR	Environmental Impact Report
EMFAC	EMission FACtor model
gfs	gross square footage
HPS	Hunters Point Shipyard
PBS&J	Post, Buckley, Schuh & Jernigan, Inc.
NAAQS	National Ambient Air Quality Standards
NED	National Elevation Dataset
NFL	National Football League
PAHs	Polynuclear Aromatic Hydrocarbons
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter Less than 2.5 Microns in Diameter
PM_{10}	Particulate Matter Less than 10 Microns in Diameter
R&D	Research and Development
SFDPH	San Francisco Department of Public Health
SFPD	San Francisco Police Department
SRA	State Recreation Area
UCSF	University of California San Francisco
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compound

List of Units

m^3	cubic meter
mph	miles per hour
mg	milligram
μg	microgram
μm	micrometer or micron

1 Introduction

At the request of Post, Buckley, Schuh & Jernigan, Inc. (PBS&J), ENVIRON International Corporation (ENVIRON) estimated the concentration of particulate matter (PM) with a mean diameter of 2.5 microns or less ($PM_{2.5}$) in the vicinity of the proposed Candlestick Point (CP) – Hunters Point Shipyard (HPS) Phase II Development Plan ("Project"), and assessed the potential impacts of $PM_{2.5}$ concentrations attributable to Project-related traffic along the thoroughfares and nearby roads. The Project is situated such that there are several major thoroughfares which Project-related traffic would use to access neighboring freeways and other areas of San Francisco. Estimates for the Project-associated traffic, including average speeds, on each of these thoroughfares were taken directly from the traffic report (CHS Consulting Group et al. 2009) developed in support of the Environmental Impact Report (EIR).

1.1 Objectives and Methodology

The objective of this assessment is to estimate Project-related concentrations of $PM_{2.5}$ along major roadways in the vicinity of the Project, and to examine the potential health affects associated with these concentrations.

$PM_{2.5}$ from vehicle exhaust, tire wear, and brake wear were estimated using emission factors generated using the most recent version of the EMission FACtor model (EMFAC), developed by the Air Resources Board (ARB). On December 12, 2008, ARB adopted an On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation which affects exhaust emission for vehicles larger than 14,000 pounds gross vehicular weight. EMFAC 2007, the most recent EMFAC version, does not yet include impacts for the new ARB Regulation, therefore, ENVIRON used the emission reduction estimates developed for the ARB rulemaking process in order to evaluate the impacts of the new Regulation. Vehicle volumes were estimated from the traffic report (CHS Consulting Group et al. 2009).

The concentration of $PM_{2.5}$ from vehicular emissions was characterized by developing exposure point concentrations at residential receptors surrounding the thoroughfares evaluated. This analysis was conducted by estimating the average annual airborne concentrations of $PM_{2.5}$ expected to result from Project-related traffic emissions, and by conducting air dispersion modeling of those emissions. A Gaussian air dispersion model, approved by the United States Environmental Protection Agency (USEPA) and ARB for use in the environmental documentation of transportation projects, was used to estimate ambient air concentrations. Both free flowing traffic and queuing at intersections were evaluated.

The potential health impacts from Project-associated $PM_{2.5}$ were evaluated by comparing predicted concentrations of $PM_{2.5}$ to ~~the San Francisco Department of Public Health (SFDPH 2008) $PM_{2.5}$ threshold of~~ a 0.2 microgram per cubic meter (µg/m^3) action level. The evaluation of potential health impacts from $PM_{2.5}$ is not required under current CEQA guidelines. The analysis~~, but~~ was conducted in accordance with methods ~~to comply with~~ presented by the San

Francisco Department of Public Health (SFDPH) in their 2008 guidance ~~(2008). The SFDPH (2008) $PM_{2.5}$ threshold is documented in~~:

- SFDPH. 2008. *Assessment and Mitigation of Air Pollutant Health Effects from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review*. May 6.

1.2 Report Organization

This report is divided into eight sections as follows:

Section 1.0 – Introduction: describes the purpose and scope of this assessment and outlines the report organization.

Section 2.0 – Background: presents a description of the Project and provides the regulatory background.

Section 3.0 – Chemical Selection: describes the selection of the chemical evaluated in this Attachment.

Section 4.0 –Estimated $PM_{2.5}$ Concentrations in Air: discusses the methods used to estimate emissions of $PM_{2.5}$, including a description of the emission sources, the air dispersion model used to predict $PM_{2.5}$ concentrations, meteorological data, building and terrain considerations, land use analysis, identification of receptor locations, and results of the modeling.

Section 5.0 –Risk Characterization: presents a comparison of Project-associated $PM_{2.5}$ concentrations to the ~~SFDPH threshold concentration~~0.2 $\mu g/m^3$ action level.

Section 6.0 –Conclusions: summarizes the results of this assessment.

Section 7.0 –Uncertainty: discusses the different sources and types of uncertainties in this assessment.

Section 8.0 –References: includes all references cited in this report.

2 Background

2.1 Project Description

Details of the Project have been provided in the Project Description included in Chapter II of the EIR prepared by PBS&J. Based on information provided in this source, the Project will consist of the development of two areas collectively referred to as the Candlestick Point- Hunters Point Shipyard Phase II Development Plan (the "Project"). The description of the Project is organized under two major sub-components: Candlestick Point (CP) and Hunters Point Shipyard Phase II (HPS Phase II). The Project comprises an approximately 702-acre area shown on Figure 2-1 and Figure 2-2. The Project proposed by Lennar Urban includes a mixed-use community with a range of residential, retail, office, research and development, civic and community uses, and parks and recreational open space. In addition, a major component would be a new stadium for the San Francisco 49ers, a National Football League (NFL) team. Necessary infrastructure improvements (including several roadway modifications) are also proposed in support of the Project development plan, as shown on Figure 2-2.

A summary of the Project for the CP and HPS Phase II development are provided separately below. A more detailed discussion of the Project is included in Chapter II of the EIR.

Candlestick Point: This area is approximately 281 acres in size. Current land use in the CP area includes Candlestick Park stadium, and associated parking lots and access roadways. The area also includes several vacant privately owned parcels that are used primarily for stadium parking. Acquisition of these parcels is anticipated as part of the Project. Approximately 120 acres of the 154-acre Candlestick Point State Recreation Area (SRA) is also included within the Project and forms the south and east shoreline boundary.

The proposed Project for CP includes site preparation activities, including abatement, demolition of existing structures, and grading, and construction of residential units, parks and open space, retail space, community services, office space, hotel accommodations, and a performance arena. The development plan also includes a rebuild of Alice Griffith Housing which will provide upgraded units to existing residents.

Hunters Point Shipyard Phase II: The HPS Phase II area comprises 421 acres (dry-land) on the former Navy Parcels B, C, D and E. Navy Parcel F comprises approximately 440 acres of submerged lands in San Francisco Bay surrounding the central portion of the HPS Phase II area to the north, east and south. The entire HPS Phase II area is currently under the jurisdiction of the Navy. The HPS Phase II area includes many structures associated with ship repair, piers, dry-docks, storage, administrative, and other former Navy uses, largely from the World War II era. Most structures are vacant, although several former Navy buildings are currently leased and occupied. Current tenants at the HPS Phase II area include an estimated 252 artists located in studios on Parcels A and B, and a San Francisco Police Department (SFPD) facility on Parcel D-1 in Building 606. The proposed Project plan for this area includes new residential units, parks and open space, research and development (R&D), community services, artist studios and centers, neighborhood retail, and a new stadium for the San Francisco 49ers, a National Football League team. The stadium parking plan will accommodate parking for stadium events and will serve public recreational uses.

The EIR also examines variants to the Project:

- Variant 1 would include an additional 2.5 million gross square footage (gsf) of research and development space on the proposed stadium site. All other elements of the Project would remain the same.
- Variant 2 would redistribute 1,350 residential units to the proposed stadium site from Candlestick Point. All other elements of the Project would remain the same.
- A third variant (Variant 3) would include the same land use program and overall description as the Project, with different locations for the residential towers.
- Variant 4 assumes that a new stadium would be constructed and shared between the San Francisco 49ers and the Oakland Raiders football teams. The land use program would remain the same as the proposed Project.

Chapter IV of the EIR analyzes these Variants. Evaluation of the Variants in the EIR allows for consideration and approval of these variants without further environmental review.

2.2 Surrounding Area

The Project comprises an approximately 702-acre area east of U.S. 101 in the southeast area of the City and County of San Francisco and occupies the waterfront area from south of India Basin to Candlestick Cove (Figure 2-1 and Figure 2-2).

The CP area is immediately east of Executive Park, with the Bayview neighborhood to the north, the HPS Phase II to the northeast, and Candlestick Point State Recreation Area (SRA) along the Bay frontage generally to the east (Figure 2-1). The CP area is generally bounded by Hawes Street to the northwest and Jamestown Avenue to the southwest, the Candlestick Cove and South Basin areas of the Bay are to the south and east, respectively.

The HPS Phase II area is to the southeast of the Bayview Hunters Point neighborhood. As shown in Figure 2-1, the HPS Phase II area is generally bounded by San Francisco Bay to the north, east, and south. The south end of the western boundary extends from Yosemite Slough along Arelious Walker Drive to approximately Crisp Road, excluding the University of California San Francisco (UCSF) property. The northern boundary generally extends along Crisp Road and Spear Avenue. The northernmost end of the HPS Phase II area is contiguous with Earl Street.

Figure 2-3 shows the zoning information, obtained from the City of San Francisco, for areas in the immediate vicinity of the Project. To the west of the Project, the city areas are zoned mixed use residential and industrial. The area to the south is zoned for commercial or industrial use. The Project Area is bordered by the San Francisco Bay to the north and east.

2.3 Regulations and Guidance

The SFDPH (2008) has developed guidance for $PM_{2.5}$ that draws on a broad regulatory framework and a comprehensive body of scientific literature that has established strong correlations between $PM_{2.5}$ exposures and a number of adverse health effects. For example, under the Clean Air Act (USEPA), 1990, the USEPA regulates PM as a criteria air pollutant (USEPA, 2009), and has established national ambient air quality standards (NAAQS) for both particulate matter with a diameter less than ten microns (PM_{10}) (150 µg/m^3)[1] and $PM_{2.5}$ (15 or 35 µg/m^3)[2]. The State of California also regulates PM, and has ambient air quality standards (AAQS) for PM_{10} (20 or 50 µg/m^3)[3] and $PM_{2.5}$ (12 µg/m^3)[4] (ARB 2005a). ~~Of particular concern to the SFDPH is that $PM_{2.5}$ appears to have health effects below the NAAQS and AAQS as described by ARB (2008a) in their most recent examination of the relationship between particulate matter exposures and premature mortality.~~

Another information source that is key to the SFDPH guidance (SFDPH 2008) is ARB's 2005 guidance for land use planning (ARB 2005b). That guidance recommends against locating "sensitive land uses, including residential development" within 500 feet of a highway traveled by more than 100,000 vehicles a day (ARB 2005b). (The ARB guidance also addresses the location of sensitive land uses in the vicinity of distribution centers, railyards, and ports, but these sources are not of direct concern to the Project and are not addressed further.)

The SFDPH guidance was also developed to support compliance with the California Environmental Quality Act (CEQA), and to address specific goals of the City of San Francisco's General Plan which include:

> " …to reduce the level of pollutants in the air, to protect and improve public health, welfare, and quality of life…" (SFDPH 2008).

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[1] This is a 24-hour concentration that is not to be exceeded more than once per year on average over three years (USEPA 2009).

[2] 15 µg/m^{3}is an annual arithmetic mean concentration. Attainment is achieved if the three-year average of the weighted annual mean $PM_{2.5}$ concentrations from a single or multiple community-oriented monitors must not exceed 15.0 µg/m^3 (USEPA 2009). 35 µg/m^3 is a 24-hour concentration. Attainment is achieved if the three-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area does not exceed 35 µg/m^3 (USEPA 2009)

[3] 20 µg/m^3 is an annual arithmetic mean concentration of PM_{10}; 50 µg/m^3 is the 24-hour annual arithmetic mean concentration of PM_{10} (ARB 2005a).

[4] 12 µg/m^3 is an annual arithmetic mean concentration of $PM_{2.5}$ (ARB 2005a).

2.3.1 Development of an ~~SFDPH Criterion~~Action Level for $PM_{2.5}$

~~The SFDPH is concerned that individuals who live in the proximity of heavily-travelled roads or freeways will incur adverse health effects as a result of exposure to vehicle emissions. To minimize contributions to health impacts associated with locating new residential projects near roadway "hot spots", the SFDPH developed a strategy to assess and mitigate air pollution at these locations. Their strategy is based on the use of an annual average threshold concentration of $PM_{2.5}$ (0.2 µg/m^3) within a 150 meter zone of a new project as a means of assessing the potential for concern. The threshold concentration of $PM_{2.5}$ is meant to serve as a health-protective "proxy" or surrogate for pollutant exposures from vehicles i.e., $PM_{2.5}$ is not the only pollutant of concern. Instead, the $PM_{2.5}$ threshold serves as a concentration meant to protect the health of residents from all vehicle-associated emissions from a project.~~

Health effects of individual chemicals or of a mixture are typically evaluated by the use of a toxicity criterion. However, despite the establishment of NAAQS and AAQS for $PM_{2.5}$, no toxicity criterion has been developed by either the state or federal government. The reasons for this are complex, and are related both to how these criteria are developed, as well as the properties of $PM_{2.5}$. That is, toxicity criteria are typically derived for a chemical based on standardized exposures to known concentrations or doses of the material; effects (if any) can then be correlated to a specific quantity. However, for $PM_{2.5}$, its toxicity is at least partially dependent on the mixture of metals, polynuclear aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) or other chemicals sorbed to the surface of the particulate. This heterogeneity of $PM_{2.5}$ depends on the source of the particulate, and varies with the fuel type, engine type, dust, etc. that is the source of the $PM_{2.5}$. This variability precludes the derivation of a single representative toxicity criterion. Instead, epidemiologists have examined the relationship between $PM_{2.5}$ concentrations in ambient air and correlated these to effects within a population. Exposure to $PM_{2.5}$ has been linked to an increase in premature mortality, hospitalizations, cardiovascular events, and asthma attacks, among others (see ARB 2008a). The mathematical expression which relates changes in exposure to ambient concentrations of a pollutant, such as $PM_{2.5}$, to changes in an adverse effect such as premature mortality is known as a concentration-response function.

The concentration-response function incorporates a term for relative risk, which describes the incremental increase in effect for a given concentration of a pollutant i.e., a 1.4% increase in the annual incidence of premature mortality per 1.0 µg /m^3 increase in $PM_{2.5}$. The SFDPH criterion for $PM_{2.5}$ of 0.2 µg/m^3 is based on these concepts (SFDPH 2008). The SFDPH (2008) guidance provides specific rationale for selection of the $PM_{2.5}$ threshold concentration as follows:

- "*A threshold of 0.2 µg/m^3 represents about 8-10% of the intra-urban range of PM 2.5 ambient concentration based on available and reliable monitoring data in San Francisco.*
- *A change in ambient concentration of $PM_{2.5}$ by 0.2 µg/m^3, independent of other vehicle pollutants would result in significant forecasted health impacts.*

- *Based on a recent study of intra-urban pollution in Los Angeles, a 0.2 μg/m³ increase in PM 2.5 would result in a 0.28% increase in non-injury mortality or an increase of about twenty-one excess death per 1,000,000 population per year from non-injury causes in San Francisco (Jerrett et al. 2005). This effect is well above the one-in-a-million lifetime de minimus risk threshold for premature death considered insignificant by most regulatory agencies (Asante-Duah 2002).*
- *Applying the health effects assessment methodology and Concentration Response Functions in the ARB Staff Report on AAQS for PM published in 2002, a 0.2 μg/m³ increase in $PM_{2.5}$ affecting a population of 100,000 adults would result in about 20 extra premature deaths per year (ARB 2002). This effect is well above the one-in-a-million lifetime de minimus risk threshold for premature death considered insignificant by most regulatory agencies (Asante-Duah 2002).*
- *A 0.2 μg/m³ increase in $PM_{2.5}$ would also result in ~ 160 days per year with respiratory symptoms, 108 days with work limitations, and 577 days with minor activity limitations in the same adult population."*

The Bay Area Air Quality Management District (BAAQMD) does not currently recommend a threshold of significance for determining impacts associated with localized exposures to $PM_{2.5}$, but is addressing this issue in its draft CEQA guidelines (BAAQMD 2009b). California ARB also has not established a health-protective threshold for $PM_{2.5}$.

The 0.2 ug/m³ identified level is in accord with proposed CEQA guidelines developed by BAAQMD for $PM_{2.5}$.[5] According to BAAQMD, "emissions from a new source or emissions affecting a new receptor would be considered significant where ground-level concentrations of $PM_{2.5}$ from any source would result in an average annual increase greater than 0.3 μg/m³."[6] This determination is based on the lower range of a US EPA proposed Significant Impact Level (SIL) for stationary sources, which is interpreted by the US EPA as the level of ambient impact that is considered to represent a "significant contribution" to regional nonattainment. The BAAQMD goes on to indicate that the US EPA did not design this threshold for addressing community risks and hazards, but it was designed to protect human public health at a regional level by helping an area to maintain the NAAQS. The BAAQMD determined this SIL to be a reasonable goal at the local scale and, therefore, a useful reference for comparison. The BAAQMD states that this proposed threshold (0.3 μg/m³) is consistent with the SFDPH threshold of 0.2 μg/m³. The BAAQMD reached that conclusion based on an ARB report that determined an increase in mortality from a 0.3 μg/m³ increment of $PM_{2.5}$ was consistent with the estimated increase in

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5 Bay Area Air Quality Management District, *California Environmental Quality Act Guidelines Update: Proposed Thresholds of Significance*, December 7, 2009.

6 Bay Area Air Quality Management District, *California Environmental Quality Act Air Quality Guidelines: Proposed Thresholds of Significance*, December 7, 2009, page 43.

mortality assumed by SFDPH in identifying the 0.2 ug/m^3~~.~~ increment. BAAQMD further states that "On balance, the Air District estimates that the SFDPH threshold and the [District proposed threshold of 0.3 μg/m^3], in combination with the cumulative threshold for $PM_{2.5}$, will afford similar levels of health protection." As discussed at the end of this section, BAAQMD is recommending a cumulative threshold for $PM_{2.5}$ of 0.8 μg/m^3, which is the mid-range US EPA proposed SIL.

Based on these proposed thresholds, the most stringent limit, 0.2 μg/m^3, was chosen as a conservative action level for judging significance in this analysis.

~~2.3.2 Application of SFDPH Criterion for $PM_{2.5}$~~

~~If exposure to $PM_{2.5}$ from Project traffic is below the threshold of 0.2 μg /m^3 (or if traffic exposures are "fully mitigated"), no further analysis of health effects is required (SFDPH 2008). However, if $PM_{2.5}$ concentrations exceed 0.2 μg/m^3, then SFDPH guidance suggests estimating $PM_{2.5}$-related effects on "excess" (or premature) mortality. SFDPH guidance (SFDPH 2008) provides a simplified version of a $PM_{2.5}$ concentration-response function designed to provide a rapid means of estimating excess mortality from $PM_{2.5}$ exposures. The equation suggested by the SFDPH to estimate excess mortality from $PM_{2.5}$ is:~~

~~$$\text{Excess Mortality}_{\text{Traffic-attributable PM2.5}} = (\text{Concentration}_{\text{Traffic-attributable PM2.5}}) \times (\text{Incidence Non-Injury Mortality}) \times (\text{Relative Risk}_{PM2.5}) \quad \text{(Eq. 1)}$$~~

~~Where:~~

~~$\text{Concentration}_{\text{Traffic-attributable PM2.5}}$~~	~~=~~	~~Concentration of $PM_{2.5}$ generated by Project sources;~~
~~Incidence Non-injury Mortality~~	~~=~~	~~Annual mortality incidence from all non-injury causes; and~~
~~$\text{Relative Risk}_{PM2.5}$~~	~~=~~	~~0.014, or a 1.4% increase in annual mortality incidence per 1.0 μg/m^3 increase in $PM_{2.5}$ (based on Jerrett et al. 2005).~~

3 Chemical Selection

As this analysis follows SFDPH guidance (2008) for evaluating roadways exposure, ~~specifies that while~~ the assessment methodologies contained in that document are specific to $PM_{2.5}$, that $PM_{2.5}$ is used as a "proxy" i.e., as a surrogate, for vehicle-related pollutant emissions and associated exposure to these chemicals. Consistent with this framework, analysis of potential Project-associated emissions focuses solely on $PM_{2.5}$.

4 Estimated $PM_{2.5}$ Concentrations in Air

4.1 Roads Evaluated

The Project is situated such that there are several major thoroughfares which Project-related traffic would use to access neighboring freeways and other areas of San Francisco. The traffic throughputs for roads of potential concern were assessed and determined~~,~~ based upon Project-related traffic volume and expected impact. Those thoroughfares modeled include Third Street, Innes Avenue/Hunters Point Boulevard /Evans Avenue, Palou Avenue, Gilman Avenue/Paul Avenue, and Harney Way. Those thoroughfares are identified in the traffic report as primary or secondary roads which connect the proposed Project site and major arterials to U.S. 101. In addition, Evans Avenue/Hunters Point Boulevard /Evans Avenue, and Harney Way were selected since they have been identified as streets with significant truck traffic and thus are expected to yield more $PM_{2.5}$ compared to other roads. Furthermore, Palou Avenue, Gilman Avenue/Paul Avenue were selected since there are residences in the vicinity of these roads where individuals may incur exposure to $PM_{2.5.}$

4.2 Emissions Estimation

Emission factors and traffic volumes were calculated for each hour of the weekday for all vehicles in order to estimate $PM_{2.5}$ emissions. Weekend traffic conditions were assumed to be the same as weekday conditions. This approach is expected to yield more conservative estimates of $PM_{2.5}$ concentrations, since weekday traffic volumes are generally greater than on the weekend. Three categories of emissions were taken into account: 1) running emissions from exhaust, 2) running emissions from tire wear and brake wear, and 3) idling or queuing emissions from exhaust. There are no emissions of $PM_{2.5}$ during idling (queuing) from tire wear and brake wear.

Information to estimate emissions for the Project-related traffic on each of the modeled thoroughfares, including peak hour traffic volumes, peak hour number of idling cars, and average speeds, was taken directly from the traffic report developed in support of the EIR (CHS Consulting Group et al. 2009).

$PM_{2.5}$ emissions from vehicle exhaust and tire wear and brake wear were estimated using emission factors generated by the ARB's EMFAC 2007 and modified to account for the On-Road Heavy-Duty Diesel Vehicles (In-Use) Regulation (the ARB Regulation, or the Regulation) that was approved by the ARB on December 11, 2008, which affects emissions for vehicles larger than 14,000 pounds gross vehicular weight (ARB 2008b). EMFAC is a mathematical model that was developed to calculate emission rates from motor vehicles that operate on highways, freeways, and local roads in California and is used by ARB to project changes in future emissions of on-road mobile sources. The most recent version of this model, EMFAC 2007, incorporates local motor vehicle data, information and estimates regarding the distribution of VMT by speed, and number of starts per day.

Annual average emission factors were generated using the average temperature and relative humidity for the Project area, as calculated from the meteorological data, discussed in Section 4.6 below. EMFAC allows the estimation of emissions for in-use fleets from 1970 through 2040. The traffic report's future traffic scenario provides estimates of traffic conditions for 2030, and in-use fleet emissions were estimated for that year. EMFAC 2007 does not yet include impacts for the new ARB Regulation mentioned above; therefore, the emission reduction percentage developed for the ARB rulemaking process was applied to the EMFAC-derived emission factors, as discussed below, to account for the impact of the Regulation on project-related emissions.

4.2.1 Emission Factors

Using EMFAC, $PM_{2.5}$ emission factors (in g/vehicle-mile for running emissions, and in g/vehicle-idling hour for idling emissions) were estimated for calendar year 2030 based on the vehicle fleets of San Francisco County for vehicles of all model years. The traffic report (CHS Consulting Group et al. 2009) provided a.m. and p.m. peak hour speeds along about half of the roadway segments modeled; the average peak hour speed was 21.4 miles per hour (mph) with a standard deviation of 2.4 mph. Thus, for all roadway segments, the emission factors corresponding to travel speed of 20 mph (in g/vehicle-mile) were used for running emissions, while emission factors corresponding to 0 mph (in g/vehicle-idling hour) were used for idling emissions.

EMFAC also presents the fraction of trips that each vehicle class makes on roads in San Francisco County at each hour of the weekday. The emission factors from each vehicle class were multiplied by these hourly trip fractions, then summed across all applicable vehicle classes for each hour to estimate hourly emission factors. The applicable vehicle classes for each modeled thoroughfare were determined by whether truck restrictions are designated in the traffic report (CHS Consulting Group et al. 2009). The traffic report identifies truck restrictions that prevent trucks weighing over 6,000 pounds from driving on segments of Gilman Avenue and Palou Avenue (CHS Consulting Group et al. 2009). For these segments, heavy-duty trucks were excluded from the emission factor estimates. For all other roads modeled, the emission factors were used for all vehicle classes and all model years.

Finally, the ratio of the 2025 projected $PM_{2.5}$ emissions under ARB Regulation to the baseline $PM_{2.5}$ emissions without Regulation[7] was used to scale down running emissions for regulated vehicle classes including mid heavy-duty trucks, heavy heavy-duty trucks, school buses, and other buses. For this scaling, the year 2025 was used in absence of 2030 data. Hourly running emission factors in grams per vehicle-mile for all modeled roadway segments are shown in Table 4-1. Since the ARB Regulation is not explicitly applicable to idling emissions, idling emissions were not scaled using the ratio.

[7] The emission inventory was developed by ARB to assist the rulemaking process. http://www.arb.ca.gov/regact/2008/truckbus08/truckbus08.htm

Hourly idling emission factors in grams per vehicle-idling hour for all modeled roadway segments are presented in Table 4-1.

4.2.2 Traffic Volume

Hourly peak a.m. and hourly peak p.m. traffic volumes were obtained for each modeled roadway segment from the traffic report (CHS Consulting Group et al. 2009). As mentioned above, EMFAC generates trips-per-day by vehicle-class by hour for San Francisco. All trips for each hour of the day were summed, and then the hourly trip fractions were calculated. For segments with truck restrictions, the hourly total trips were modified so as to exclude trips made by heavy-duty trucks, then recalculated the hourly trip fractions.

To estimate daily trips, the average of the AM peak hour trips was divided by the appropriate a.m. peak hour trip fraction and the p.m. peak hour trips divided by the appropriate p.m. peak hour trip fraction. To divide the daily trips into hourly trips for each road segment, the segment's daily trips were multiplied by the calculated appropriate hourly trip fractions. For the peak a.m. and peak p.m. hours, the actual estimates from the traffic study were used.

The hourly traffic volumes on all modeled road segments are shown in Table 4-2.

4.2.3 Queuing

Queuing emissions were estimated for all intersections along the modeled thoroughfares, which, according to the traffic report, have traffic signals or stop signs (CHS Consulting Group et al. 2009). Forty-one queues, or locations were identified where vehicles would idle at a traffic signal. No stop signs were identified as affecting traffic on the modeled roads.

To model queuing emissions, the methodology used in CAL3QHCR was followed while employing actual data from the traffic report (CHS Consulting Group et al. 2009). The traffic report provides information by ultimate direction through the intersection: left turn, through, or right turn. To estimate queue emissions per hour for each direction, the following equation was used:

> Queue Emissions (g/hr) = Idling Emission Factor (g/vehicle-hr) x Number of Vehicles Idling (vehicle) x Red & Yellow Phase per Cycle (sec/cycle) x Number of Cycles per Hour (cycle/hr) ÷ 3600 (sec/hr)

The idling emission factors (in g/vehicle-hr) were estimated using the methodology described in Section 4.1.1. For each queue, the number of vehicles idling per direction during the a.m. peak hour and the p.m. peak hour were obtained from the traffic report (CHS Consulting Group et al. 2009). The hourly traffic volumes, calculated as described in Section 4.1.2, were then used to determine the a.m. hour with the maximum number of vehicles. The ratio of hourly traffic volume to this a.m. peak hour traffic volume was then used to estimate the number of vehicles idling per direction during the a.m. hours (hours 24-11). The same approach was used for the p.m. hours (hours 12-23).

The queuing time per cycle was estimated to be equal to cycle time minus duration of the green light presented in the traffic report; this means that cars are assumed to queue during the yellow and red phases. The number of cycles per hour was calculated from the cycle time (seconds/cycle), provided in the traffic report (CHS Consulting Group et al. 2009).

In order to follow the "nominal free flow" methodology as used by CAL3QHCR, the queue emissions were converted from grams per hour to grams per vehicle-mile. The following formula was used for the conversion.

> Queue Emissions (g/vehicle-mile) = Queue Emissions (g/hr) ÷ Hourly Traffic Volume (vehicle/hr) ÷ (Average Queue Length (m) ÷ 1609.344 (m/mile))

The hourly traffic volumes were estimated using the methodology described in Section 4.1.2. The length of the queue in each direction for each hour, according to CAL3QHCR methodology, is estimated to be six meters for each vehicle idling in that direction for the given hour, with a minimum of six meters used. To estimate an average length across the entire day, the hourly queue length was multiplied by the hourly emission factors and summed across all hours. This approach gives queue emissions in grams per vehicle-mile for every hour of the day on all roadway segments, allowing the queuing emissions to be modeled as running emissions.

4.3 Refined Air Dispersion Modeling

The concentration of $PM_{2.5}$ from vehicular emissions was characterized by developing exposure point concentrations at residential receptors surrounding the thoroughfares evaluated. This analysis was conducted by estimating the average annual airborne concentrations of $PM_{2.5}$ that will result from emissions from the Project-related traffic and by conducting air dispersion modeling of those emissions.

To estimate ambient air concentrations, a Gaussian air dispersion model, approved by the USEPA and ARB for use in preparing environmental documentation for transportation projects, was used. CAL3QHCR is a refined version of USEPA's CAL3QHC, which is a multi-source model developed in 1990 to estimate air concentrations of vehicle emissions near roadway intersections. CAL3QHC is based on the same line-source dispersion algorithm used in CALINE3, and CAL3QHCR adds the ability to evaluate multiple-year meteorological observations rather than evaluating only the worst-case meteorological assumptions. CAL3QHCR uses a meteorological data set that incorporates representative hourly surface and twice-daily upper air data for estimating the dispersion of emissions through the atmosphere.

In addition to the observed meteorological data set, the model uses the roadway geometries, receptor locations, vehicular emission factors (from EMFAC), signal timing (if applicable), and intersection configuration. The GIS shapefile developed by the SFDPH for their CAL3QHCR model setup as basis of the SFDPH land use guidance was requested. That shapefile presents roadway geometries, vehicular traffic volume and emission factors. The roadway geometries were used along with refinements (i.e., dividing roads into two directions, adding Project-related vehicular traffic volume and emission factors) whenever applicable in order to estimate $PM_{2.5}$ concentrations due to Project-related traffic.

Annual average concentrations were calculated for all receptors. No differentiation was made for potential differences in daytime versus nighttime traffic, or for daytime and nighttime exposure. Both free flowing traffic and queuing at intersections were evaluated.

4.3.1 Modeled Pollutants and Averaging Periods

$PM_{2.5}$ emissions were modeled using one year of meteorological data. Using those data, a one-year average concentration was calculated.

4.3.2 Modeling Sources

Emissions from all Project-related traffic on the selected thoroughfares was modeled. Those road segments were represented in CAL3QHCR by a series of straight line segments, each with constant height, width, hourly traffic volume, and hourly emission rates. Widths of the segments under consideration were determined from aerial photographs, and heights were set to zero meters as discussed in the terrain section below. For all running emissions, the mixing zone was set to the road width (along the direction of traffic flow) plus three meters on each side to account for wake effects. For all queuing emissions, the mixing zone was set to the road width since there are no wake effects while idling. Tables 4-3 and 4-4 summarize the source parameters used as inputs in CAL3QHCR for running emissions and queuing emissions, respectively. Figures 4-1 and 4-2 show the location of the travel lanes modeled for running emissions and queuing emissions, respectively.

4.3.3 Terrain

The terrain surrounding the selected thoroughfares was evaluated using National Elevation Dataset (NED) files from the United States Geological Survey (USGS). The area is generally flat with roads ranging from three to 50 meters in elevation and surrounding area ranging from three to 80 meters in elevation; the majority of the roads are at elevations between three and 30 meters with only one segment on Palou Avenue rising above 50 meters. CAL3QHCR limits sources to be placed at elevations of ±10 meters, while receptors can be placed at any elevation. Due to the generally flat nature of the area, all sources were modeled at 0 meters with all receptors at 1.8 meters as recommended by CAL3QHCR documentation.

4.3.4 Meteorological Data

Details regarding the meteorological data used for modeling are presented in Attachment V.

4.3.5 Receptor Locations

Residential receptors were evaluated along the modeled thoroughfares~~, as recommended in the SFDPH land use guidance (SFDPH 2008)~~. A three-tiered approach was employed to determine the location of these residential receptors. First two receptor grids were placed alongside the thoroughfares that were modeled: 1) a coarse grid of receptors spaced 50 meters apart positioned from the edge of the mixing area to 250 meters from the roadway and 2) a fine grid consisting of receptors spaced 10-meters from the edge of the mixing area to 50 meters from the roadway. San Francisco zoning maps obtained from the City and County of San Francisco Planning Department[8] were then overlaid on the receptor grids to identify receptors within residential zones. Finally, visual screening was conducted on Google Street View to indentify possible residential buildings in commercial and/or industrial zones. The modeled residential receptors are shown in Figure 4-3. Land use zoning in relation to modeled roads is shown in Figure 4-4. Sensitive receptors, such as schools and hospitals, within one mile of the site were also modeled and are summarized in Table 4-5.

4.4 Results of Emissions Estimations

The results of the dispersion modeling are shown in Figure 4-5. All modeled $PM_{2.5}$ concentrations are at or below 0.2 µg/m^3. The highest modeled concentrations occur at intersections and along roads that do not have a truck restriction. The maximum modeled $PM_{2.5}$ concentration is 0.2 µg/m^3, which occurs on the northern edge of Innes Avenue, west of Arelious Walker Drive. As can also be seen in Figure 4-5, $PM_{2.5}$ concentrations are dominated by running emissions.

[8] City and County of San Francisco Planning Department zoning maps are available at http://www.municode.com/Resources/gateway.asp?pid=14145&sid=5

5 Risk Characterization

Modeled concentrations of $PM_{2.5}$ attributable to Project traffic do not exceed the ~~SFDPH (2008) threshold concentration of~~ 0.2 µg/m^3 action level (Figure 4-5). In general, the areas most impacted by Project-associated $PM_{2.5}$ concentrations are major intersections, such as those at 3rd Street and (1) Palou Avenue and (2) Gilman Avenue/Paul Avenue (Figure 4-5). The maximum $PM_{2.5}$ concentration in residential areas is 0.2 µg/m^3, which meets the action level discussed previously, indicating that ~~by comparison to the SFDPH (2008) threshold,~~ residents in the areas impacted by Project traffic are not expected to experience adverse health effects above the proposed significance level.

This evaluation utilized a number of conservative assumptions in modeling $PM_{2.5}$ concentrations which provide support for the determination that adverse effects of exposure to $PM_{2.5}$ are not likely. These conservative assumptions include:

- The peak traffic speed emission factor (grams/mile) from EMFAC2007 was used for all traffic. Since the traffic speed during non-peak hours would be expected to yield lower emissions than during peak hours, this approach yielded higher modeled concentrations of $PM_{2.5}$ than using separate emission factors for peak and non-peak times.
- Weekday traffic volumes were assumed to occur 365 days per year. This approach is expected to yield more conservative estimates of $PM_{2.5}$ concentrations, since weekday traffic volumes are generally greater than on the weekend.
- It was assumed that vehicles idle for the entire duration of the yellow and red phases of a traffic light. This results in higher estimated $PM_{2.5}$ concentrations than the more realistic assumption that idling occurs only during some or all of the red light phase.
- The ARB (2008b) regulation for On-Road Heavy-Duty Diesel Vehicles (In-Use) was applied to queuing emissions only. This assumption yields higher concentrations of $PM_{2.5}$ than if the regulation had been applied to operating emissions as well.

6 Conclusions

Project-related traffic is predicted to yield concentrations of $PM_{2.5}$ that do not exceed the 0.2 μg/m^3 action level, ~~SFDPH (2008) concentration threshold for residential uses.~~ The maximum $PM_{2.5}$ concentration in residential areas is below the 0.2 μg/m^3 action level, ~~,~~ indicating that ~~by comparison to the SFDPH (2008) threshold,~~ residents in the areas impacted by Project traffic are not expected to experience adverse health effects above the proposed level of significance.

7 Uncertainties

7.1 Method of Emission Estimation

Emission factors were estimated based on the vehicle fleets of San Francisco County, which may differ than the vehicle mix along the thoroughfares evaluated. EMFAC 2007's emission factors for the year 2030 were used and adjusted to account for the ARB Regulation. To account for the ARB regulation, the expected emissions reductions for the year 2025 were used in lieu of 2030 data. Additionally, the emission factors for 2030 contain uncertainties related to future advances in vehicle technology. Similarly, vehicle volumes were estimated based on the traffic report (CHS Consulting Group et al. 2009), which makes estimates of future Project-related vehicle volumes. As the traffic report results are based on a traffic model that contains uncertainties, the vehicle volumes used also contain uncertainties.

Further, peak hour traffic and peak hour number of idling vehicles from the traffic report were used together with the default hour of day fraction of trips to calculate the hourly traffic volume and hourly idling vehicle volumes. The hour of day fraction of trips for the projected area could differ from the default values provided in EMFAC for 2030 for the San Francisco County, thus bringing additional uncertainties.

Finally, ARB's EMFAC provides weekday trip distribution. Weekday traffic volume and number of idling vehicles from the traffic report were used in this analysis and applied to 365 days of the modeled year. However, weekend traffic conditions could differ significantly from weekday traffic conditions.

Together, all of the uncertainties above influence the emissions estimation.

7.2 Estimation of Exposure Concentrations

There are a number of uncertainties associated with the estimation of $PM_{2.5}$ concentrations from air dispersion modeling of potential emissions from the Project. This section briefly describes some of those uncertainties.

7.2.1 Estimates from Air Dispersion Models

As discussed in Section 4, the USEPA-recommended dispersion model CAL3QHCR was used to estimate annual average $PM_{2.5}$ concentrations due to Project-related traffic at the hypothetical receptor locations. This model uses the Gaussian plume equation to calculate ambient air concentrations from vehicular emission sources. For this model, the magnitude of error for the maximum concentration is estimated to range from 10 to 40% (USEPA 2005a). Therefore, modeled exposure concentrations used in this assessment represent approximate exposure concentrations.

7.2.2 Source Representation

The source parameters (*i.e.*, road elevation and width) used to model emissions are sources of uncertainty. As CAL3QHCR limits source elevations to ±10 meters and as the area is generally flat, road elevations were assumed to be uniformly 0 meters. Widths were estimated using aerial photographs and could contain uncertainties related to human error. Therefore, exposure concentrations used in this assessment represent approximate exposure concentrations.

7.2.3 Meteorological Data Selection

Uncertainty also exists in the meteorological data used in the CAL3QHCR air dispersion model. Onsite meteorological data, which should be representative of the meteorological condition of the modeled roadway segments, was used. However, buildings that are near the roads and which may potentially block some of the winds were not considered. Additionally, CALINE-3, a model on which CAL3QHCR is based, is highly sensitive to extremely low mixing heights (USEPA 1995). Since a 300-meter constant mixing height is used in the metrological data (By Area Air Quality Management District 2009a), some potentially extreme conditions occurring when the mixing height is below 100 meters are lost.

8 References

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Tables

Table 4-1
Summary of Emission Factors
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	2.21E-02	*2.03E-02*	7.06E-03	*6.97E-03*	3.01E-02	*1.69E-03*	0.00E+00	*0.00E+00*
2	2.15E-02	*2.03E-02*	7.09E-03	*6.97E-03*	3.24E-02	*1.19E-03*	0.00E+00	*0.00E+00*
3	3.16E-02	*2.27E-02*	7.38E-03	*6.99E-03*	1.42E-01	*1.27E-02*	0.00E+00	*0.00E+00*
4	2.13E-02	*2.05E-02*	7.14E-03	*6.97E-03*	2.40E-02	*5.46E-04*	0.00E+00	*0.00E+00*
5	2.04E-02	*2.03E-02*	7.11E-03	*6.97E-03*	1.97E-02	*1.66E-04*	0.00E+00	*0.00E+00*
6	2.44E-02	*2.07E-02*	7.11E-03	*6.97E-03*	4.70E-02	*2.72E-03*	0.00E+00	*0.00E+00*
7	2.19E-02	*2.06E-02*	7.01E-03	*6.97E-03*	1.69E-02	*3.12E-03*	0.00E+00	*0.00E+00*
8	2.07E-02	*2.01E-02*	6.99E-03	*6.97E-03*	8.79E-03	*1.21E-03*	0.00E+00	*0.00E+00*
9	2.39E-02	*2.04E-02*	7.06E-03	*6.97E-03*	4.37E-02	*3.43E-03*	0.00E+00	*0.00E+00*
10	3.48E-02	*2.19E-02*	7.33E-03	*6.99E-03*	1.66E-01	*1.39E-02*	0.00E+00	*0.00E+00*
11	3.21E-02	*2.15E-02*	7.27E-03	*6.98E-03*	1.36E-01	*1.04E-02*	0.00E+00	*0.00E+00*
12	2.89E-02	*2.10E-02*	7.19E-03	*6.98E-03*	1.00E-01	*7.13E-03*	0.00E+00	*0.00E+00*
13	2.54E-02	*2.05E-02*	7.10E-03	*6.97E-03*	6.14E-02	*3.97E-03*	0.00E+00	*0.00E+00*
14	2.46E-02	*2.04E-02*	7.09E-03	*6.97E-03*	5.39E-02	*3.39E-03*	0.00E+00	*0.00E+00*
15	2.52E-02	*2.05E-02*	7.10E-03	*6.97E-03*	6.03E-02	*3.84E-03*	0.00E+00	*0.00E+00*
16	2.60E-02	*2.07E-02*	7.11E-03	*6.97E-03*	6.66E-02	*4.96E-03*	0.00E+00	*0.00E+00*
17	2.45E-02	*2.05E-02*	7.08E-03	*6.97E-03*	5.09E-02	*3.73E-03*	0.00E+00	*0.00E+00*
18	2.19E-02	*2.02E-02*	7.02E-03	*6.97E-03*	2.24E-02	*1.96E-03*	0.00E+00	*0.00E+00*
19	2.16E-02	*2.01E-02*	7.01E-03	*6.97E-03*	1.84E-02	*1.28E-03*	0.00E+00	*0.00E+00*
20	2.13E-02	*2.01E-02*	7.00E-03	*6.97E-03*	1.54E-02	*1.01E-03*	0.00E+00	*0.00E+00*
21	2.10E-02	*2.00E-02*	7.01E-03	*6.97E-03*	1.46E-02	*8.07E-04*	0.00E+00	*0.00E+00*
22	2.02E-02	*1.99E-02*	6.99E-03	*6.97E-03*	5.77E-03	*2.03E-04*	0.00E+00	*0.00E+00*
23	2.04E-02	*2.00E-02*	7.00E-03	*6.97E-03*	9.77E-03	*3.91E-04*	0.00E+00	*0.00E+00*
24	2.02E-02	*1.99E-02*	7.00E-03	*6.97E-03*	8.36E-03	*2.51E-04*	0.00E+00	*0.00E+00*

Notes:
1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust; non-exhaust refers to running emissions from tire and brake wear.
3. Exhaust refers to idling emissions from vehicle exhaust; non-exhaust refers to idling emissions from tire and brake wear.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 4-2
Summary of Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Fraction of Trip/Day, All Vehicles[1]	Fraction of Trip/Day, *No HD Vehicles*[2]	3rd Street Segments					
			101 Ramp to 12		12 to 11		11 to 10	
			Southbound	Northbound	Southbound	Northbound	Southbound	Northbound
1	0.0080	*0.0084*	0	21	0	21	27	21
2	0.0040	*0.0041*	0	11	0	11	14	11
3	0.0020	*0.0015*	0	5	0	5	7	5
4	0.0016	*0.0017*	0	4	0	4	6	4
5	0.0027	*0.0028*	0	7	0	7	9	7
6	0.0044	*0.0045*	0	12	0	12	15	12
7	0.0174	*0.0191*	0	46	0	46	60	46
8	0.0512	*0.0567*	0	137	0	136	176	135
9	0.0545	*0.0563*	0	145	0	145	187	143
10	0.0625	*0.0480*	0	146	0	145	179	154
11	0.0617	*0.0512*	0	165	0	164	211	162
12	0.0795	*0.0723*	0	212	0	212	273	209
13	0.0837	*0.0831*	0	251	0	251	334	234
14	0.0688	*0.0692*	0	184	0	183	236	181
15	0.0744	*0.0738*	0	198	0	198	255	196
16	0.0792	*0.0779*	0	211	0	211	271	208
17	0.0732	*0.0743*	0	195	0	195	251	193
18	0.0730	*0.0786*	0	195	0	194	250	192
19	0.0587	*0.0638*	0	157	0	156	201	154
20	0.0466	*0.0509*	0	124	0	124	160	123
21	0.0312	*0.0340*	0	83	0	83	107	82
22	0.0267	*0.0295*	0	71	0	71	91	70
23	0.0190	*0.0208*	0	51	0	51	65	50
24	0.0160	*0.0175*	0	43	0	43	55	42

Hour	Fraction of Trip/Day, All Vehicles[1]	Fraction of Trip/Day, *No HD Vehicles*[2]	3rd Street Segments					
			10 to 9		9 to 8		8 to 56	
			Southbound	Northbound	Southbound	Northbound	Southbound	Northbound
1	0.0080	*0.0084*	24	24	38	39	55	61
2	0.0040	*0.0041*	12	12	19	20	27	31
3	0.0020	*0.0015*	6	6	9	10	13	15
4	0.0016	*0.0017*	5	5	8	8	11	13
5	0.0027	*0.0028*	8	8	13	13	18	21
6	0.0044	*0.0045*	13	13	21	22	30	34
7	0.0174	*0.0191*	52	52	83	85	119	133
8	0.0512	*0.0567*	153	152	243	251	350	392
9	0.0545	*0.0563*	163	162	259	267	372	417
10	0.0625	*0.0480*	164	163	231	293	268	507
11	0.0617	*0.0512*	185	183	293	302	421	472
12	0.0795	*0.0723*	238	236	377	390	543	609
13	0.0837	*0.0831*	281	279	485	428	784	602
14	0.0688	*0.0692*	206	205	327	338	470	527
15	0.0744	*0.0738*	222	221	353	365	508	569
16	0.0792	*0.0779*	237	235	376	388	541	606
17	0.0732	*0.0743*	219	218	348	359	500	561
18	0.0730	*0.0786*	219	217	347	358	499	559
19	0.0587	*0.0638*	176	174	279	288	401	449
20	0.0466	*0.0509*	139	139	221	229	318	357
21	0.0312	*0.0340*	93	93	148	153	213	239
22	0.0267	*0.0295*	80	79	127	131	182	204
23	0.0190	*0.0208*	57	56	90	93	130	145
24	0.0160	*0.0175*	48	48	76	78	109	122

Table 4-2
Summary of Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Fraction of Trip/Day, All Vehicles[1]	Fraction of Trip/Day, *No HD Vehicles*[2]	3rd Street Segments					
			56 to 7		7 to 6		6 to 5	
			Southbound	Northbound	Southbound	Northbound	Southbound	Northbound
1	0.0080	*0.0084*	55	58	52	58	47	49
2	0.0040	*0.0041*	28	29	26	29	23	24
3	0.0020	*0.0015*	13	14	13	14	11	12
4	0.0016	*0.0017*	11	12	11	12	10	10
5	0.0027	*0.0028*	18	20	17	19	16	16
6	0.0044	*0.0045*	30	32	29	32	26	27
7	0.0174	*0.0191*	120	127	113	125	102	106
8	0.0512	*0.0567*	351	373	333	368	299	310
9	0.0545	*0.0563*	374	397	354	391	318	330
10	0.0625	*0.0480*	269	487	259	477	317	368
11	0.0617	*0.0512*	423	449	401	443	360	374
12	0.0795	*0.0723*	546	579	516	571	464	482
13	0.0837	*0.0831*	788	566	740	563	552	521
14	0.0688	*0.0692*	472	501	447	494	402	417
15	0.0744	*0.0738*	510	541	483	534	434	451
16	0.0792	*0.0779*	543	576	514	569	462	480
17	0.0732	*0.0743*	502	533	476	526	427	444
18	0.0730	*0.0786*	501	532	474	525	426	443
19	0.0587	*0.0638*	403	427	381	422	343	356
20	0.0466	*0.0509*	320	339	303	335	272	282
21	0.0312	*0.0340*	214	227	203	224	182	189
22	0.0267	*0.0295*	183	194	173	192	156	162
23	0.0190	*0.0208*	130	138	123	136	111	115
24	0.0160	*0.0175*	110	116	104	115	93	97

Hour	Fraction of Trip/Day, All Vehicles[1]	Fraction of Trip/Day, *No HD Vehicles*[2]	3rd Street Segments					
			5 to 57		57 to 4		4 to 3	
			Southbound	Northbound	Southbound	Northbound	Southbound	Northbound
1	0.0080	*0.0084*	47	49	44	49	56	62
2	0.0040	*0.0041*	24	25	22	25	28	31
3	0.0020	*0.0015*	11	12	11	12	14	15
4	0.0016	*0.0017*	10	10	9	10	12	13
5	0.0027	*0.0028*	16	17	15	17	19	21
6	0.0044	*0.0045*	26	27	24	27	31	34
7	0.0174	*0.0191*	102	107	95	107	122	136
8	0.0512	*0.0567*	299	315	281	315	359	398
9	0.0545	*0.0563*	319	335	299	335	383	424
10	0.0625	*0.0480*	317	376	274	377	394	453
11	0.0617	*0.0512*	361	379	338	380	433	480
12	0.0795	*0.0723*	465	489	436	489	558	619
13	0.0837	*0.0831*	554	526	550	525	647	695
14	0.0688	*0.0692*	403	424	377	424	483	536
15	0.0744	*0.0738*	435	457	407	458	522	578
16	0.0792	*0.0779*	463	487	434	487	556	616
17	0.0732	*0.0743*	428	450	401	451	514	570
18	0.0730	*0.0786*	427	449	400	450	513	568
19	0.0587	*0.0638*	343	361	322	361	412	457
20	0.0466	*0.0509*	273	287	255	287	327	363
21	0.0312	*0.0340*	183	192	171	192	219	243
22	0.0267	*0.0295*	156	164	146	164	187	207
23	0.0190	*0.0208*	111	117	104	117	133	148
24	0.0160	*0.0175*	94	98	88	98	112	124

Table 4-2
Summary of Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Fraction of Trip/Day, All Vehicles[1]	Fraction of Trip/Day, *No HD Vehicles*[2]	Paul Ave/Gilman Ave Segments				Palou Ave Segments	
			34 to 9		9 to 18		*30 to 54*	
			Eastbound	*Westbound*	Eastbound	Westbound	*Eastbound*	*Westbound*
1	0.0080	*0.0084*	*52*	*64*	37	47	*43*	*40*
2	0.0040	*0.0041*	*25*	*31*	19	24	*21*	*20*
3	0.0020	*0.0015*	*9*	*12*	9	11	*8*	*7*
4	0.0016	*0.0017*	*10*	*13*	8	10	*9*	*8*
5	0.0027	*0.0028*	*17*	*21*	13	16	*14*	*13*
6	0.0044	*0.0045*	*28*	*34*	21	26	*23*	*22*
7	0.0174	*0.0191*	*118*	*145*	82	102	*97*	*92*
8	0.0512	*0.0567*	*204*	*480*	240	299	*434*	*225*
9	0.0545	*0.0563*	*348*	*430*	255	318	*287*	*272*
10	0.0625	*0.0480*	*297*	*366*	165	386	*245*	*232*
11	0.0617	*0.0512*	*316*	*390*	289	360	*261*	*247*
12	0.0795	*0.0723*	*447*	*551*	372	464	*369*	*349*
13	0.0837	*0.0831*	*728*	*564*	562	460	*212*	*472*
14	0.0688	*0.0692*	*427*	*527*	322	402	*353*	*333*
15	0.0744	*0.0738*	*456*	*563*	348	434	*376*	*356*
16	0.0792	*0.0779*	*481*	*594*	370	462	*398*	*376*
17	0.0732	*0.0743*	*459*	*566*	343	427	*379*	*358*
18	0.0730	*0.0786*	*486*	*600*	342	426	*401*	*379*
19	0.0587	*0.0638*	*394*	*487*	275	343	*326*	*308*
20	0.0466	*0.0509*	*314*	*388*	218	272	*259*	*245*
21	0.0312	*0.0340*	*210*	*259*	146	182	*174*	*164*
22	0.0267	*0.0295*	*182*	*225*	125	156	*151*	*142*
23	0.0190	*0.0208*	*128*	*158*	89	111	*106*	*100*
24	0.0160	*0.0175*	*108*	*133*	75	93	*89*	*84*

Hour	Fraction of Trip/Day, All Vehicles[1]	Fraction of Trip/Day, *No HD Vehicles*[2]	Palou Ave Segments				Evans Ave/Innes Ave Segments	
			54 to 55		*55 to 6*		47 to 46	
			Eastbound	*Westbound*	*Eastbound*	*Westbound*	Eastbound	Westbound
1	0.0080	*0.0084*	*38*	*33*	*41*	*35*	57	57
2	0.0040	*0.0041*	*18*	*16*	*20*	*17*	29	29
3	0.0020	*0.0015*	*7*	*6*	*7*	*6*	14	14
4	0.0016	*0.0017*	*8*	*7*	*8*	*7*	12	12
5	0.0027	*0.0028*	*13*	*11*	*14*	*12*	19	19
6	0.0044	*0.0045*	*20*	*18*	*22*	*19*	31	32
7	0.0174	*0.0191*	*86*	*76*	*93*	*80*	124	125
8	0.0512	*0.0567*	*380*	*186*	*396*	*193*	364	366
9	0.0545	*0.0563*	*253*	*225*	*276*	*236*	387	390
10	0.0625	*0.0480*	*215*	*192*	*235*	*201*	565	395
11	0.0617	*0.0512*	*230*	*205*	*250*	*214*	438	441
12	0.0795	*0.0723*	*324*	*289*	*354*	*303*	565	569
13	0.0837	*0.0831*	*189*	*392*	*233*	*414*	432	668
14	0.0688	*0.0692*	*310*	*276*	*338*	*290*	489	492
15	0.0744	*0.0738*	*331*	*295*	*361*	*309*	528	532
16	0.0792	*0.0779*	*350*	*312*	*381*	*327*	562	566
17	0.0732	*0.0743*	*333*	*297*	*363*	*311*	520	524
18	0.0730	*0.0786*	*353*	*314*	*385*	*330*	519	523
19	0.0587	*0.0638*	*286*	*255*	*312*	*267*	417	420
20	0.0466	*0.0509*	*228*	*203*	*249*	*213*	331	333
21	0.0312	*0.0340*	*153*	*136*	*166*	*143*	222	223
22	0.0267	*0.0295*	*132*	*118*	*144*	*124*	189	191
23	0.0190	*0.0208*	*93*	*83*	*102*	*87*	135	136
24	0.0160	*0.0175*	*78*	*70*	*86*	*73*	114	114

Table 4-2
Summary of Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Fraction of Trip/Day, All Vehicles[1]	Fraction of Trip/Day, *No HD Vehicles*[2]	Evans Ave/Innes Ave Segments					
			46 to 48		48 to 4		4 to 58	
			Eastbound	Westbound	Eastbound	Westbound	Eastbound	Westbound
1	0.0080	*0.0084*	54	52	34	33	11	11
2	0.0040	*0.0041*	27	26	17	16	6	5
3	0.0020	*0.0015*	13	13	8	8	3	3
4	0.0016	*0.0017*	11	11	7	7	2	2
5	0.0027	*0.0028*	18	18	11	11	4	4
6	0.0044	*0.0045*	30	29	18	18	6	6
7	0.0174	*0.0191*	118	113	73	71	24	24
8	0.0512	*0.0567*	346	333	215	208	70	69
9	0.0545	*0.0563*	368	355	229	221	75	74
10	0.0625	*0.0480*	546	359	336	235	118	79
11	0.0617	*0.0512*	416	402	259	250	85	84
12	0.0795	*0.0723*	537	518	334	323	109	108
13	0.0837	*0.0831*	398	609	252	364	72	121
14	0.0688	*0.0692*	465	448	289	279	95	93
15	0.0744	*0.0738*	502	484	312	302	102	101
16	0.0792	*0.0779*	534	516	332	321	109	107
17	0.0732	*0.0743*	494	477	307	297	101	99
18	0.0730	*0.0786*	493	476	306	296	100	99
19	0.0587	*0.0638*	396	382	246	238	81	80
20	0.0466	*0.0509*	315	304	196	189	64	63
21	0.0312	*0.0340*	211	203	131	127	43	42
22	0.0267	*0.0295*	180	174	112	108	37	36
23	0.0190	*0.0208*	128	124	80	77	26	26
24	0.0160	*0.0175*	108	104	67	65	22	22

Hour	Fraction of Trip/Day, All Vehicles[1]	Fraction of Trip/Day, *No HD Vehicles*[2]	Evans Ave/Innes Ave Segments		Harney Way Segments			
			58 to 16		29 to 59		59 to 60	
			Southbound	Northbound	Northbound	Westbound	Eastbound	Westbound
1	0.0080	*0.0084*	11	11	79	87	78	91
2	0.0040	*0.0041*	6	5	40	44	39	44
3	0.0020	*0.0015*	3	3	19	21	19	17
4	0.0016	*0.0017*	2	2	16	18	16	18
5	0.0027	*0.0028*	4	4	27	29	26	30
6	0.0044	*0.0045*	6	6	44	48	43	49
7	0.0174	*0.0191*	24	24	172	189	169	207
8	0.0512	*0.0567*	71	69	506	555	497	555
9	0.0545	*0.0563*	75	74	539	591	529	611
10	0.0625	*0.0480*	118	79	486	570	480	570
11	0.0617	*0.0512*	85	84	610	668	598	555
12	0.0795	*0.0723*	110	108	786	862	771	784
13	0.0837	*0.0831*	73	121	1004	907	980	901
14	0.0688	*0.0692*	95	93	681	746	668	749
15	0.0744	*0.0738*	103	101	735	806	721	800
16	0.0792	*0.0779*	109	107	783	858	768	845
17	0.0732	*0.0743*	101	99	724	793	710	805
18	0.0730	*0.0786*	101	99	722	792	708	852
19	0.0587	*0.0638*	81	80	581	636	569	692
20	0.0466	*0.0509*	64	63	461	505	452	551
21	0.0312	*0.0340*	43	42	309	339	303	369
22	0.0267	*0.0295*	37	36	264	289	259	320
23	0.0190	*0.0208*	26	26	188	206	184	225
24	0.0160	*0.0175*	22	22	158	173	155	190

Notes:

1. Hourly fraction of trips per day calculated from EMFAC total trips per hour for San Francisco County in 2030 were used to convert AM peak hour and PM peak hour traffic volumes into hourly traffic count. AM and PM peak hour traffic volumes were extracted from the Traffic Report. Detailed discussion of the methodology is presented in Appendix IV section 4.2.

2. The fractions of trips per day, excluding heavy-duty vehicles, are used for segments with truck restrictions which forbid trucks over 14,000 lbs. Those segments with truck restrictions are shown in *italics.*

Abbreviations:

HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 4-3
CAL3QHCR Source Parameters, Running Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
10 to 9 Northbound	Link_23	Above ground	553,238	4,175,107	553,267	4,175,189	0	14
	Link_106	Above ground	553,211	4,175,027	553,238	4,175,107	0	14.5
10 to 9 Southbound	Link_62	Above ground	553,229	4,175,112	553,200	4,175,030	0	14.5
	Link_78	Above ground	553,255	4,175,192	553,229	4,175,112	0	12
101 Ramp to 12 Northbound	Link_9	Above ground	553,058	4,174,718	553,106	4,174,787	0	12
11 to 10 Northbound	Link_91	Above ground	553,181	4,174,941	553,211	4,175,027	0	14
11 to 10 Southbound	Link_77	Above ground	553,200	4,175,030	553,189	4,175,003	0	14.5
	Link_83	Above ground	553,189	4,175,003	553,170	4,174,947	0	12
12 to 11 Northbound	Link_8	Above ground	553,106	4,174,787	553,152	4,174,858	0	12
	Link_29	Above ground	553,152	4,174,858	553,181	4,174,941	0	12.5
12 to 11 Southbound	Link_84	Above ground	553,170	4,174,947	553,142	4,174,864	0	12
	Link_103	Above ground	553,142	4,174,864	553,095	4,174,794	0	13
29 to 59 Northbound	Link_157	Above ground	553,692	4,173,849	553,871	4,173,865	0	14.5
	Link_158	Above ground	553,871	4,173,865	554,079	4,173,943	0	13.5
29 to 59 Westbound	Link_161	Above ground	553,868	4,173,873	553,688	4,173,857	0	14.5
	Link_162	Above ground	554,074	4,173,951	553,868	4,173,873	0	14.5
30 to 54 Eastbound	Link_25	Above ground	554,633	4,175,790	554,659	4,175,772	0	13.5
	Link_26	Above ground	554,494	4,175,888	554,633	4,175,790	0	13.5
	Link_88	Above ground	554,329	4,176,005	554,494	4,175,888	0	13.5
30 to 54 Westbound	Link_141	Above ground	554,498	4,175,893	554,332	4,176,010	0	13.5
	Link_142	Above ground	554,663	4,175,777	554,637	4,175,795	0	12.5
	Link_143	Above ground	554,637	4,175,795	554,498	4,175,893	0	13.5

Table 4-3
CAL3QHCR Source Parameters, Running Emissions
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San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
34 to 9 Eastbound	Link_7	Above ground	553,259	4,175,187	553,426	4,175,074	0	12
	Link_18	Above ground	554,253	4,174,490	554,419	4,174,377	0	15.5
	Link_19	Above ground	554,088	4,174,609	554,253	4,174,490	0	16
	Link_20	Above ground	554,036	4,174,646	554,088	4,174,609	0	15
	Link_21	Above ground	553,922	4,174,725	554,036	4,174,646	0	14
	Link_22	Above ground	553,755	4,174,842	553,922	4,174,725	0	12
	Link_24	Above ground	553,426	4,175,074	553,592	4,174,958	0	12
	Link_28	Above ground	553,592	4,174,958	553,755	4,174,842	0	12
34 to 9 Westbound	Link_122	Above ground	554,040	4,174,651	553,926	4,174,730	0	16
	Link_123	Above ground	553,926	4,174,730	553,759	4,174,847	0	16
	Link_124	Above ground	553,759	4,174,847	553,595	4,174,963	0	16
	Link_125	Above ground	554,423	4,174,382	554,256	4,174,495	0	14.5
	Link_126	Above ground	553,430	4,175,079	553,260	4,175,193	0	15
	Link_129	Above ground	553,595	4,174,963	553,430	4,175,079	0	15
	Link_130	Above ground	554,256	4,174,495	554,091	4,174,614	0	15.5
	Link_133	Above ground	554,091	4,174,614	554,040	4,174,651	0	17.5
4 to 3 Northbound	Link_92	Above ground	553,958	4,177,533	553,980	4,177,616	0	14.5
	Link_99	Above ground	553,931	4,177,442	553,958	4,177,533	0	12
4 to 3 Southbound	Link_105	Above ground	553,962	4,177,595	553,946	4,177,539	0	13
	Link_121	Above ground	553,946	4,177,539	553,921	4,177,447	0	11.5
4 to 58 Eastbound	Link_115	Above ground	553,877	4,177,473	553,925	4,177,439	0	12
	Link_116	Above ground	553,197	4,177,952	553,877	4,177,473	0	15
4 to 58 Westbound	Link_119	Above ground	553,881	4,177,478	553,204	4,177,954	0	15
	Link_120	Above ground	553,927	4,177,451	553,881	4,177,478	0	14.5

Table 4-3
CAL3QHCR Source Parameters, Running Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
46 to 48 Eastbound	Link_5	Above ground	554,924	4,176,316	555,002	4,176,261	0	14.25
	Link_6	Above ground	555,002	4,176,261	555,168	4,176,145	0	14.25
	Link_10	Above ground	554,703	4,176,889	554,854	4,176,783	0	13
	Link_11	Above ground	554,913	4,176,630	554,905	4,176,539	0	13.5
	Link_12	Above ground	554,907	4,176,666	554,913	4,176,630	0	13.5
	Link_13	Above ground	554,854	4,176,783	554,907	4,176,666	0	13.5
	Link_14	Above ground	554,905	4,176,539	554,894	4,176,440	0	14.5
	Link_15	Above ground	554,898	4,176,346	554,924	4,176,316	0	14.5
	Link_16	Above ground	554,888	4,176,389	554,898	4,176,346	0	14.5
	Link_17	Above ground	554,894	4,176,440	554,888	4,176,389	0	14.5
46 to 48 Westbound	Link_144	Above ground	555,172	4,176,151	555,007	4,176,268	0	15.5
	Link_145	Above ground	554,930	4,176,322	554,905	4,176,350	0	13.5
	Link_146	Above ground	554,905	4,176,350	554,896	4,176,389	0	13.5
	Link_147	Above ground	554,896	4,176,389	554,902	4,176,439	0	13.5
	Link_148	Above ground	555,007	4,176,268	554,929	4,176,323	0	13.5
	Link_149	Above ground	554,902	4,176,439	554,912	4,176,537	0	13.5
	Link_151	Above ground	554,913	4,176,538	554,921	4,176,631	0	13.5
	Link_152	Above ground	554,921	4,176,631	554,915	4,176,668	0	13.5
	Link_153	Above ground	554,915	4,176,668	554,858	4,176,790	0	13.5
	Link_154	Above ground	554,858	4,176,790	554,709	4,176,896	0	15
47 to 46 Eastbound	Link_104	Above ground	555,168	4,176,145	555,334	4,176,028	0	14.5
47 to 46 Westbound	Link_150	Above ground	555,339	4,176,034	555,172	4,176,151	0	15.5

Table 4-3
CAL3QHCR Source Parameters, Running Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
48 to 4 Eastbound	Link_4	Above ground	554,539	4,177,004	554,703	4,176,889	0	12.8
	Link_31	Above ground	553,925	4,177,439	554,042	4,177,355	0	13
	Link_34	Above ground	554,042	4,177,355	554,206	4,177,240	0	13
	Link_93	Above ground	554,206	4,177,240	554,539	4,177,004	0	16
48 to 4 Westbound	Link_1	Above ground	554,709	4,176,896	554,618	4,176,961	0	12.8
	Link_2	Above ground	554,618	4,176,961	554,595	4,176,986	0	12.8
	Link_3	Above ground	554,595	4,176,986	554,548	4,177,018	0	12.8
	Link_85	Above ground	554,548	4,177,018	554,215	4,177,253	0	16
	Link_98	Above ground	554,051	4,177,368	553,927	4,177,451	0	18
	Link_100	Above ground	554,215	4,177,253	554,051	4,177,368	0	16
5 to 57 Northbound	Link_40	Above ground	553,764	4,176,826	553,788	4,176,913	0	14.5
	Link_43	Above ground	553,740	4,176,739	553,764	4,176,826	0	14.5
	Link_46	Above ground	553,716	4,176,649	553,740	4,176,739	0	14.5
	Link_47	Above ground	553,693	4,176,563	553,716	4,176,649	0	14.5
	Link_108	Above ground	553,788	4,176,913	553,812	4,177,001	0	12.5
5 to 57 Southbound	Link_41	Above ground	553,778	4,176,920	553,754	4,176,832	0	14.5
	Link_42	Above ground	553,754	4,176,832	553,730	4,176,745	0	14.5
	Link_45	Above ground	553,730	4,176,745	553,706	4,176,656	0	14.5
	Link_48	Above ground	553,706	4,176,656	553,683	4,176,569	0	14.5
	Link_109	Above ground	553,801	4,177,007	553,778	4,176,920	0	12.5
54 to 55 Eastbound	Link_89	Above ground	554,165	4,176,121	554,329	4,176,005	0	13.5
	Link_90	Above ground	553,998	4,176,238	554,165	4,176,121	0	13.5
54 to 55 Westbound	Link_139	Above ground	554,168	4,176,126	554,002	4,176,243	0	13.5
	Link_140	Above ground	554,332	4,176,010	554,168	4,176,126	0	13

Table 4-3
CAL3QHCR Source Parameters, Running Emissions
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San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
55 to 6 Eastbound	Link_96	Above ground	553,662	4,176,475	553,833	4,176,355	0	11.5
	Link_97	Above ground	553,833	4,176,355	553,998	4,176,238	0	12.5
55 to 6 Westbound	Link_137	Above ground	553,836	4,176,360	553,665	4,176,480	0	13.5
	Link_138	Above ground	554,002	4,176,243	553,836	4,176,360	0	14.5
56 to 7 Northbound	Link_44	Above ground	553,526	4,175,948	553,550	4,176,037	0	12
	Link_54	Above ground	553,598	4,176,213	553,622	4,176,300	0	14.5
	Link_58	Above ground	553,574	4,176,126	553,598	4,176,213	0	14.5
	Link_59	Above ground	553,567	4,176,103	553,574	4,176,126	0	14.5
	Link_60	Above ground	553,550	4,176,037	553,567	4,176,103	0	14.5
56 to 7 Southbound	Link_55	Above ground	553,611	4,176,304	553,587	4,176,216	0	14.5
	Link_56	Above ground	553,587	4,176,216	553,563	4,176,129	0	14.5
	Link_57	Above ground	553,563	4,176,129	553,557	4,176,105	0	14.5
	Link_63	Above ground	553,540	4,176,041	553,515	4,175,951	0	12
	Link_64	Above ground	553,557	4,176,105	553,540	4,176,041	0	14.5
57 to 4 Northbound	Link_30	Above ground	553,884	4,177,264	553,907	4,177,351	0	13.5
	Link_32	Above ground	553,907	4,177,351	553,931	4,177,442	0	12
	Link_36	Above ground	553,860	4,177,176	553,884	4,177,264	0	13
	Link_38	Above ground	553,836	4,177,089	553,860	4,177,176	0	12
	Link_94	Above ground	553,824	4,177,045	553,836	4,177,089	0	12
	Link_95	Above ground	553,812	4,177,001	553,824	4,177,045	0	13.5
57 to 4 Southbound	Link_33	Above ground	553,921	4,177,447	553,897	4,177,356	0	12
	Link_35	Above ground	553,897	4,177,356	553,873	4,177,270	0	14
	Link_37	Above ground	553,873	4,177,270	553,849	4,177,182	0	13
	Link_39	Above ground	553,849	4,177,182	553,825	4,177,095	0	14
	Link_107	Above ground	553,825	4,177,095	553,801	4,177,007	0	12

Table 4-3
CAL3QHCR Source Parameters, Running Emissions
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San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
58 to 16 Northbound	Link_117	Above ground	553,204	4,177,954	553,102	4,178,207	0	15
58 to 16 Southbound	Link_118	Above ground	553,096	4,178,204	553,197	4,177,952	0	15
59 to 60 Eastbound	Link_155	Above ground	553,545	4,173,721	553,652	4,173,828	0	15.5
	Link_156	Above ground	553,652	4,173,828	553,692	4,173,849	0	14.5
59 to 60 Westbound	Link_159	Above ground	553,646	4,173,835	553,539	4,173,727	0	15.5
	Link_160	Above ground	553,688	4,173,857	553,646	4,173,835	0	14.5
6 to 5 Northbound	Link_50	Above ground	553,669	4,176,475	553,693	4,176,563	0	15.5
6 to 5 Southbound	Link_49	Above ground	553,683	4,176,569	553,659	4,176,482	0	14.5
7 to 6 Northbound	Link_51	Above ground	553,646	4,176,388	553,669	4,176,475	0	14.5
	Link_101	Above ground	553,622	4,176,300	553,646	4,176,388	0	14.5
7 to 6 Southbound	Link_52	Above ground	553,659	4,176,482	553,635	4,176,394	0	14.5
	Link_53	Above ground	553,635	4,176,394	553,611	4,176,304	0	14.5
8 to 56 Northbound	Link_65	Above ground	553,475	4,175,777	553,504	4,175,862	0	14.5
	Link_69	Above ground	553,446	4,175,693	553,475	4,175,777	0	14.5
	Link_70	Above ground	553,417	4,175,612	553,446	4,175,693	0	14.5
	Link_71	Above ground	553,386	4,175,526	553,417	4,175,612	0	12
	Link_113	Above ground	553,515	4,175,906	553,526	4,175,948	0	12.5
	Link_114	Above ground	553,504	4,175,862	553,515	4,175,906	0	12
8 to 56 Southbound	Link_66	Above ground	553,515	4,175,951	553,493	4,175,869	0	12
	Link_67	Above ground	553,493	4,175,869	553,464	4,175,783	0	12
	Link_68	Above ground	553,464	4,175,783	553,435	4,175,700	0	14.5
	Link_72	Above ground	553,406	4,175,616	553,376	4,175,533	0	12
	Link_110	Above ground	553,435	4,175,700	553,406	4,175,616	0	12.5

Table 4-3
CAL3QHCR Source Parameters, Running Emissions
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San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
9 to 18 Eastbound	Link_61	Above ground	552,942	4,175,275	553,019	4,175,252	0	10.5
	Link_75	Above ground	553,171	4,175,208	553,259	4,175,187	0	10.5
	Link_76	Above ground	552,804	4,175,315	552,866	4,175,297	0	10.5
	Link_79	Above ground	553,079	4,175,235	553,171	4,175,208	0	9.5
	Link_80	Above ground	553,019	4,175,252	553,079	4,175,235	0	11
	Link_81	Above ground	552,866	4,175,297	552,942	4,175,275	0	10.5
	Link_82	Above ground	552,691	4,175,348	552,804	4,175,315	0	15.5
9 to 18 Westbound	Link_127	Above ground	553,260	4,175,193	553,172	4,175,214	0	12.5
	Link_128	Above ground	553,020	4,175,258	552,944	4,175,280	0	12.5
	Link_131	Above ground	552,805	4,175,321	552,693	4,175,354	0	12
	Link_132	Above ground	552,868	4,175,303	552,805	4,175,321	0	12.5
	Link_134	Above ground	553,172	4,175,214	553,080	4,175,240	0	12.5
	Link_135	Above ground	552,944	4,175,280	552,868	4,175,303	0	12.5
	Link_136	Above ground	553,080	4,175,240	553,020	4,175,258	0	13
9 to 8 Northbound	Link_27	Above ground	553,298	4,175,276	553,328	4,175,359	0	14
	Link_86	Above ground	553,267	4,175,189	553,281	4,175,227	0	12.5
	Link_87	Above ground	553,281	4,175,227	553,298	4,175,276	0	12.5
	Link_111	Above ground	553,357	4,175,442	553,386	4,175,526	0	12
	Link_112	Above ground	553,328	4,175,359	553,357	4,175,442	0	14.5
9 to 8 Southbound	Link_73	Above ground	553,286	4,175,280	553,255	4,175,192	0	12
	Link_74	Above ground	553,315	4,175,363	553,286	4,175,280	0	14.5
	Link_102	Above ground	553,376	4,175,533	553,315	4,175,363	0	12

Notes:
1. Segments are identified by the bounding intersections, using the intersection numbering developed in Figure 26A of the Traffic Report, and by the direction of traffic flow.
2. CAL3QHCR limits relative elevations to a range of -10 meters to +10 meters. Here, the elevations are fairly flat. Therefore, the site is assigned an elevation of 0 meters.
3. As defined in CAL3QHCR, mixing zone width for a given free flow link is calculated by adding 6 meters to the width of the road. The width of the road is obtained by visual observation of high-resolution aeiral photograph.

Abbreviations:
CAL3QHCR: a steady-state Gaussian dispersion model
UTMx: X coordinate in Universal Transverse Mercator coordinate system, zone 10N
UTMy: Y coordinate in Universal Transverse Mercator coordinate system, zone 10N

Sources:
CHS Consulting Group et al. 2009. Bayview Waterfront Project Transportation Study: Preliminary Draft 1 Report.

Table 4-4
CAL3QHCR Source Parameters, Queuing Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
10 to 9 Northbound	Link_5	Above ground	553248.4	4175125.8	553266.7	4175189.2	0	8
10 to 9 Southbound	Link_15	Above ground	553209.1	4175055.7	553200.3	4175030.2	0	8.5
101 Ramp to 12 Northbound	Link_3	Above ground	553059.5	4174720.4	553105.8	4174786.9	0	6
11 to 10 Northbound	Link_22	Above ground	553199.4	4174994.8	553210.8	4175026.8	0	8
11 to 10 Southbound	Link_20	Above ground	553183.5	4174986.0	553170.0	4174947.3	0	6
12 to 11 Northbound	Link_7	Above ground	553167.8	4174895.8	553181.1	4174942.0	0	6.5
12 to 11 Southbound	Link_26	Above ground	553145.1	4174862.5	553094.0	4174792.2	0	7
29 to 59 Northbound	Link_43	Above ground	554041.4	4173928.8	554078.8	4173942.9	0	7.5
29 to 59 Westbound	Link_45	Above ground	553703.3	4173858.6	553688.1	4173857.3	0	8.5
30 to 54 Eastbound	Link_6	Above ground	554639.9	4175785.7	554659.5	4175771.9	0	7.5
30 to 54 Westbound	Link_40	Above ground	554433.7	4175938.4	554332.3	4176009.8	0	7.5
34 to 9 Eastbound	Link_4	Above ground	554398.6	4174390.9	554419.3	4174376.9	0	9.5
34 to 9 Westbound	Link_36	Above ground	553334.6	4175160.2	553260.4	4175192.7	0	9
4 to 3 Northbound	Link_23	Above ground	553938.7	4177459.9	553985.5	4177635.7	0	8.5
4 to 3 Southbound	Link_35	Above ground	553965.0	4177612.3	553921.0	4177447.0	0	5.5
4 to 58 Eastbound	Link_31	Above ground	553907.5	4177451.1	553925.4	4177438.3	0	6
4 to 58 Westbound	Link_34	Above ground	553232.5	4177934.3	553203.8	4177954.5	0	9
46 to 48 Eastbound	Link_2	Above ground	555151.2	4176156.0	555167.6	4176144.5	0	8.25
46 to 48 Westbound	Link_41	Above ground	554788.8	4176839.1	554729.3	4176881.4	0	9
48 to 4 Eastbound	Link_1	Above ground	554666.8	4176914.5	554702.7	4176889.2	0	6.8
48 to 4 Westbound	Link_25	Above ground	553974.4	4177426.1	553927.4	4177450.8	0	12
5 to 57 Northbound	Link_28	Above ground	553786.8	4176914.8	553812.1	4177001.2	0	6.5
5 to 57 Southbound	Link_9	Above ground	553706.6	4176657.9	553682.6	4176569.1	0	8.5
54 to 55 Eastbound	Link_21	Above ground	554251.2	4176059.6	554328.8	4176004.9	0	7.5
54 to 55 Westbound	Link_39	Above ground	554051.5	4176207.7	554001.6	4176242.8	0	7.5
55 to 6 Eastbound	Link_24	Above ground	553946.7	4176274.2	553998.1	4176237.9	0	6.5
55 to 6 Westbound	Link_38	Above ground	553771.4	4176405.1	553665.1	4176479.9	0	7.5

Table 4-4
CAL3QHCR Source Parameters, Queuing Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
56 to 7 Northbound	Link_14	Above ground	553598.6	4176213.3	553621.6	4176300.3	0	8.5
56 to 7 Southbound	Link_16	Above ground	553533.5	4176018.0	553515.0	4175950.5	0	6
57 to 4 Northbound	Link_8	Above ground	553895.3	4177307.0	553931.1	4177442.4	0	6
57 to 4 Southbound	Link_27	Above ground	553824.9	4177093.5	553801.3	4177006.7	0	6
58 to 16 Northbound	Link_32	Above ground	553164.2	4178052.5	553102.3	4178206.5	0	9
58 to 16 Southbound	Link_33	Above ground	553116.8	4178151.2	553197.4	4177951.8	0	9
59 to 60 Eastbound	Link_42	Above ground	553669.3	4173836.8	553692.2	4173849.1	0	8.5
59 to 60 Westbound	Link_44	Above ground	553646.5	4173835.1	553632.4	4173820.9	0	9.5
6 to 5 Northbound	Link_11	Above ground	553669.0	4176476.1	553693.5	4176565.8	0	9.5
6 to 5 Southbound	Link_10	Above ground	553682.5	4176568.7	553658.3	4176478.9	0	8.5
7 to 6 Northbound	Link_12	Above ground	553647.2	4176385.5	553668.9	4176475.9	0	8.5
7 to 6 Southbound	Link_13	Above ground	553625.5	4176362.3	553611.1	4176304.1	0	8.5
8 to 56 Northbound	Link_30	Above ground	553503.7	4175868.8	553526.5	4175947.6	0	6.5
8 to 56 Southbound	Link_17	Above ground	553392.3	4175577.9	553376.1	4175532.8	0	6
9 to 18 Eastbound	Link_19	Above ground	552691.2	4175349.6	553259.4	4175186.7	0	4.5
9 to 18 Westbound	Link_37	Above ground	552945.0	4175280.2	552692.6	4175354.0	0	6
9 to 8 Northbound	Link_29	Above ground	553367.4	4175471.9	553386.3	4175525.6	0	6
9 to 8 Southbound	Link_18	Above ground	553273.7	4175250.3	553255.3	4175192.1	0	6

Notes:

1. Segments are identified by the bounding intersections, using the intersection numbering developed in Figure 26A of the Traffic Report, and by the direction of traffic flow.
2. CAL3QHCR limits relative elevations to a range of -10 meters to +10 meters. Here, the elevations are fairly flat. Therefore, the site is assigned an elevation of 0 meters.
3. As defined in CAL3QHCR, mixing zone width for a given queue link is equal to the width of the road. The width of the road is obtained by visual observation of high-resolution aeiral photograph.

Abbreviations:

CAL3QHCR: a steady-state Gaussian dispersion model

UTMx: X coordinate in Universal Transverse Mercator coordinate system, zone 10N

UTMy: Y coordinate in Universal Transverse Mercator coordinate system, zone 10N

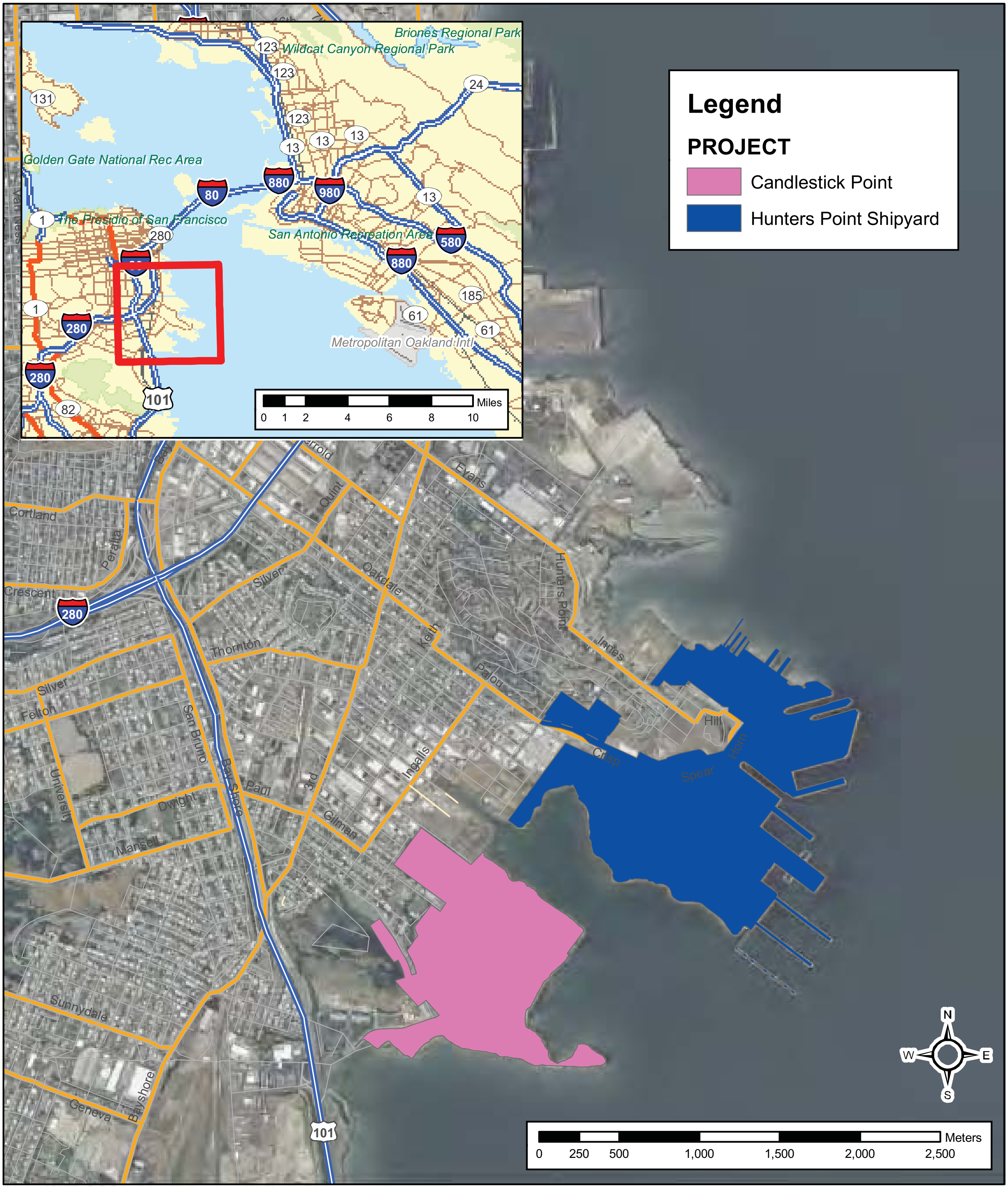
Sources:

CHS Consulting Group et al. 2009. Bayview Waterfront Project Transportation Study: Preliminary Draft 1 Report.

Table 4-5
Summary of Sensitive Receptors
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Facility	Address	City	State	Zip	Type	UTMX	UTMY
Bayview Essential School Of Music, Art, And Social Justice	1195 Hudson Ave.	San Francisco	CA	94124	School	554,459	4,176,382
Bayview Hunters Point Foundation Third St. Clinic	4301 Third Street	San Francisco	CA	94124	Hospital	553,819	4,176,989
Bret Harte Elementary	1035 Gilman Ave.	San Francisco	CA	94124-3710	School	553,855	4,174,760
Burnett Children Center	1520 Oakdale Ave.	San Francisco	CA	94124	School	553,851	4,176,470
Charles Drew College Preparatory Academy	50 Pomona Ave.	San Francisco	CA	94124-2344	School	553,432	4,176,226
Child's Time	3061 San Bruno Avenue	San Francisco	CA	94134	Childcare	552,737	4,175,268
El Dorado Elementary	70 Delta St.	San Francisco	CA	94134	School	552,261	4,174,761
EOC - Busy Bee	548 Delta Street	San Francisco	CA	94134	Childcare	552,046	4,174,192
EOC - Martin Luther King Child Care Center	200 Cashmere	San Francisco	CA	94124	Childcare	554,119	4,176,788
EOC - Soujourner Truth Child Care Center	1 Cashmere	San Francisco	CA	94124	Childcare	554,430	4,176,649
Frandelja Enrichment Center (Preschool)	950 Gilman Street	San Francisco	CA	94124	Childcare	553,991	4,174,701
George Washington Carver Elementary	1360 Oakdale Ave.	San Francisco	CA	94124-2724	School	554,074	4,176,310
Kipp Bayview Academy	1060 Key Ave.	San Francisco	CA	94124	School	553,176	4,174,859
Malcolm X Academy	350 Harbor Rd.	San Francisco	CA	94124-2474	School	554,582	4,176,461
Martha Hills Learning Center - Preschool	1044 Jamestown Avenue	San Francisco	CA	94124	Childcare	553,381	4,174,820
Muhammad University Of Islam	5048 Third Street	San Francisco	CA	94124	School	553,607	4,176,356
North East Medical Services-Leland Avenue	82 Leland Avenue	San Francisco	CA	94134	Hospital	552,421	4,174,022
Our Lady Of The Visitacion Elementary	785 Sunnydale Avenue	San Francisco	CA	94134	School	552,032	4,173,809
Phillip And Sala Burton Academic High	400 Mansell St.	San Francisco	CA	94134	School	552,421	4,174,988
S. R. Martin College Preparatory	5 Thomas Mellon Circle, Suite 225	San Francisco	CA	94134	School	553,552	4,173,936
SFCCD - Grace Child Development Center - Preschool	1551 Newcomb	San Francisco	CA	94124	Childcare	553,840	4,176,545
SFSU - Hunter's View Head Start	125 West Point Road	San Francisco	CA	94124	Childcare	554,535	4,176,681
SFSU - Southeast Headstart Center	1300 Phelps Avenue	San Francisco	CA	94124	Childcare	553,425	4,176,843
Southeast Families United/Mission Head Start	1337 Evans Avenue	San Francisco	CA	94124	Childcare	554,319	4,177,143
Visitacion Valley Child And Family Dev. Center	103 Tucker Avenue	San Francisco	CA	94134	Childcare	552,335	4,174,457
Visitacion Valley Community Center	50 Raymond Avenue	San Francisco	CA	94134	Childcare	552,514	4,174,066
Whitney Young Child Dev. Ctr. - Preschool	100 Whitney Young Circle	San Francisco	CA	94124	Childcare	554,215	4,176,579

Figures



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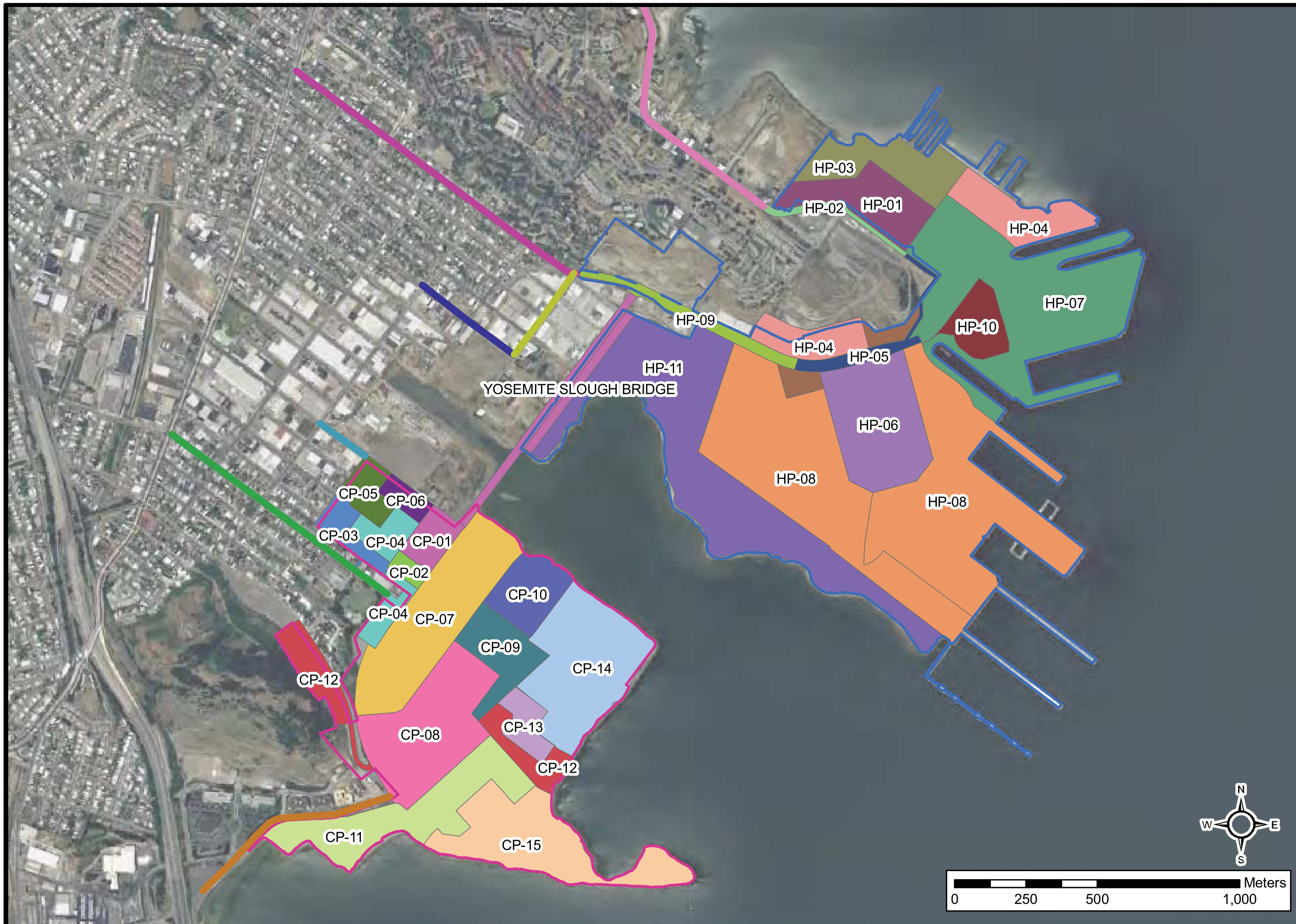
Project Site Vicinity Map
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure

2-1

Drafter: EH   Date: 09/17/2009

Contract Number: 0320816A



Legend

Road Improvement Construction

- Carroll Ave
- Gilman Ave
- Harney Way
- Hunter's Point Blvd
- Ingall St
- Palou Ave
- Thomas Ave

PROJECT

- Candlestick Point
- Hunters Point Shipyard

Note:
1. CP, HP designations reflect proposed construction phases.
2. Alice Griffith Housing area is represented by CP-01 through CP-06.

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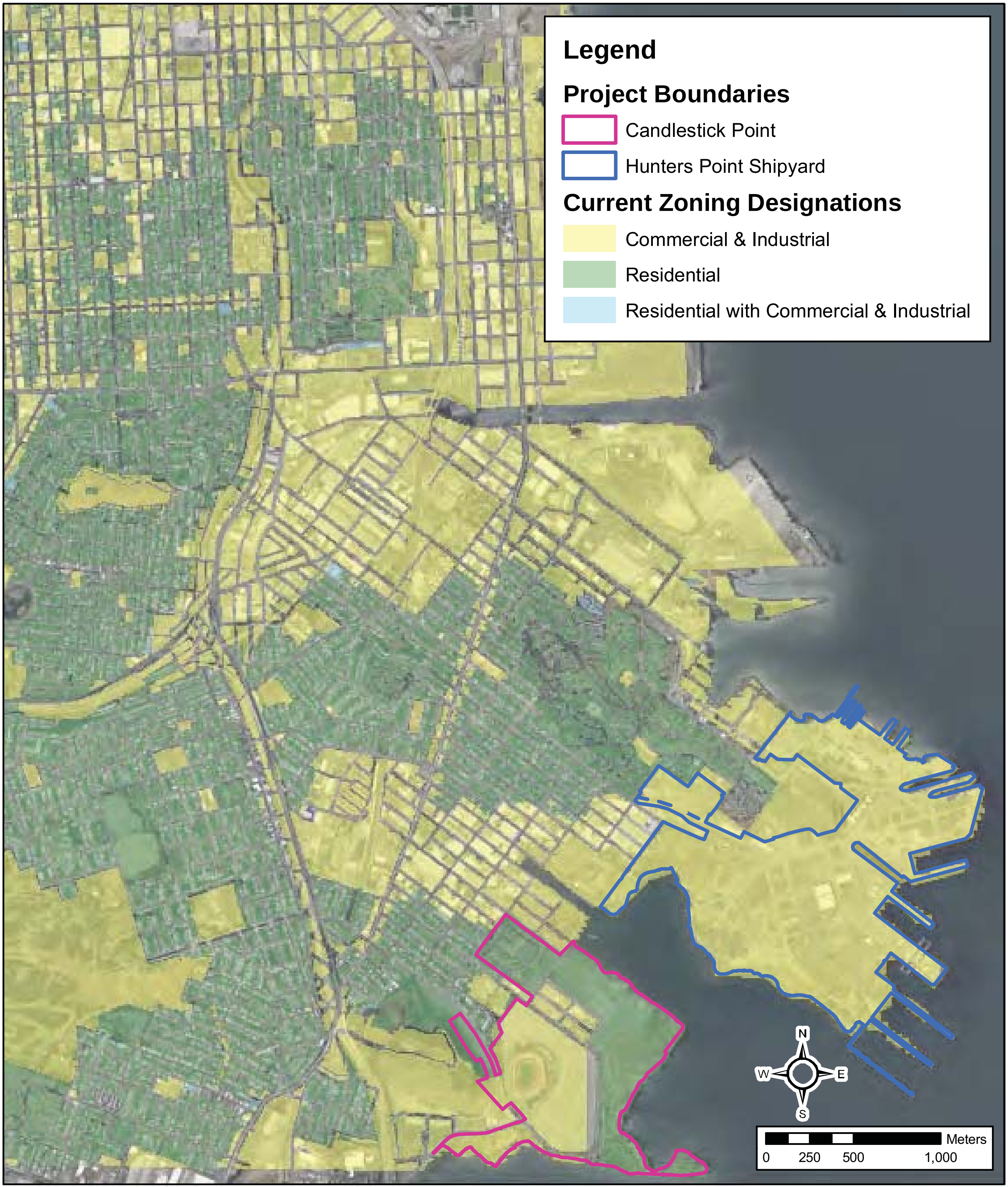
Project Overview
Candlestick Point - Hunters Point Shipyard Phase II
Development Plan
San Francisco, California

Drafter: EH | Date: 09/21/2009 | Contract Number: 0320816A | Approved: | Revised:

Figure **2-2**



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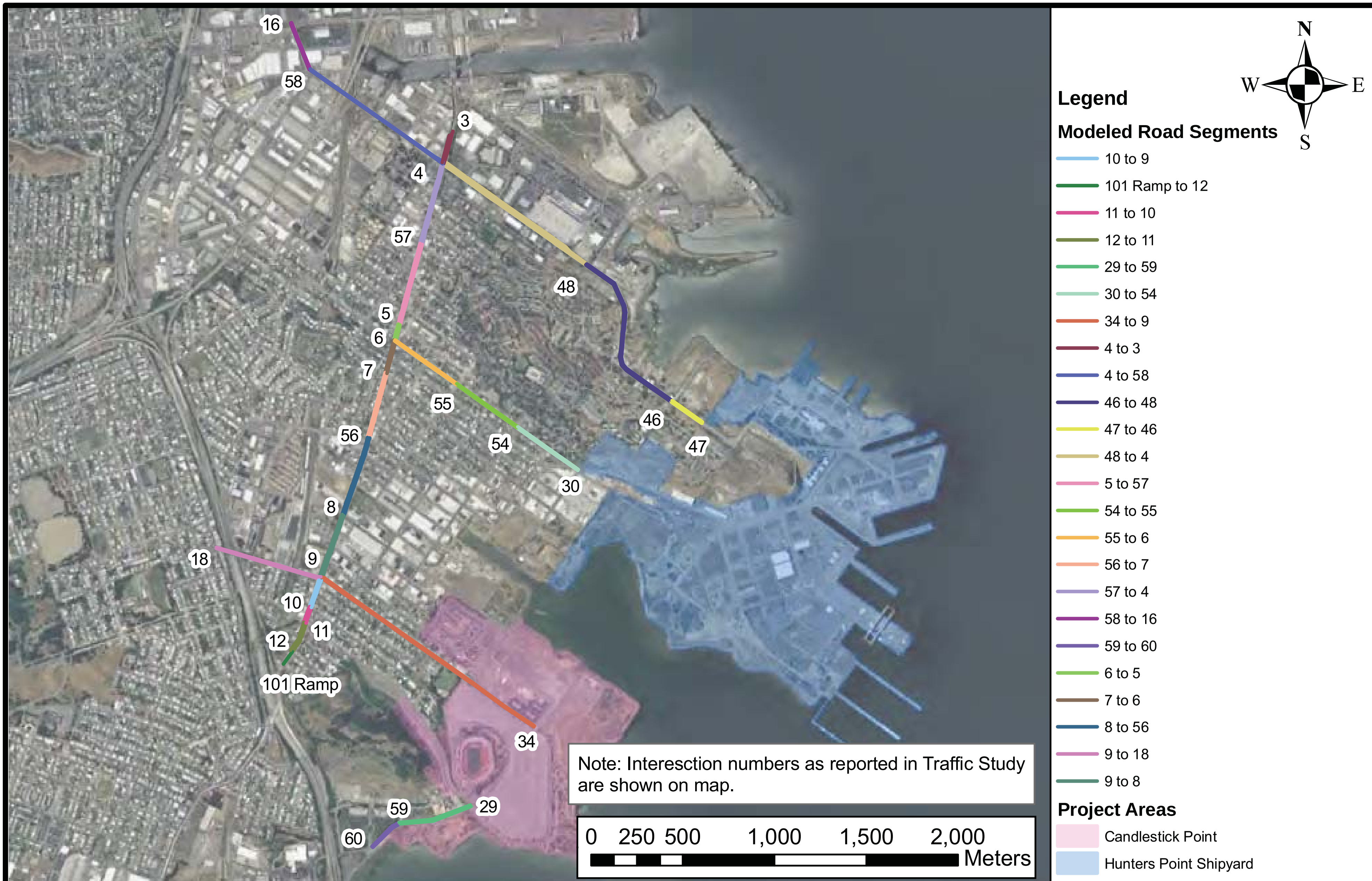
Surrounding Land Use
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure
2-3

Drafter: EH Date: 09/17/2009 Contract Number: 0320816A

DRAFT



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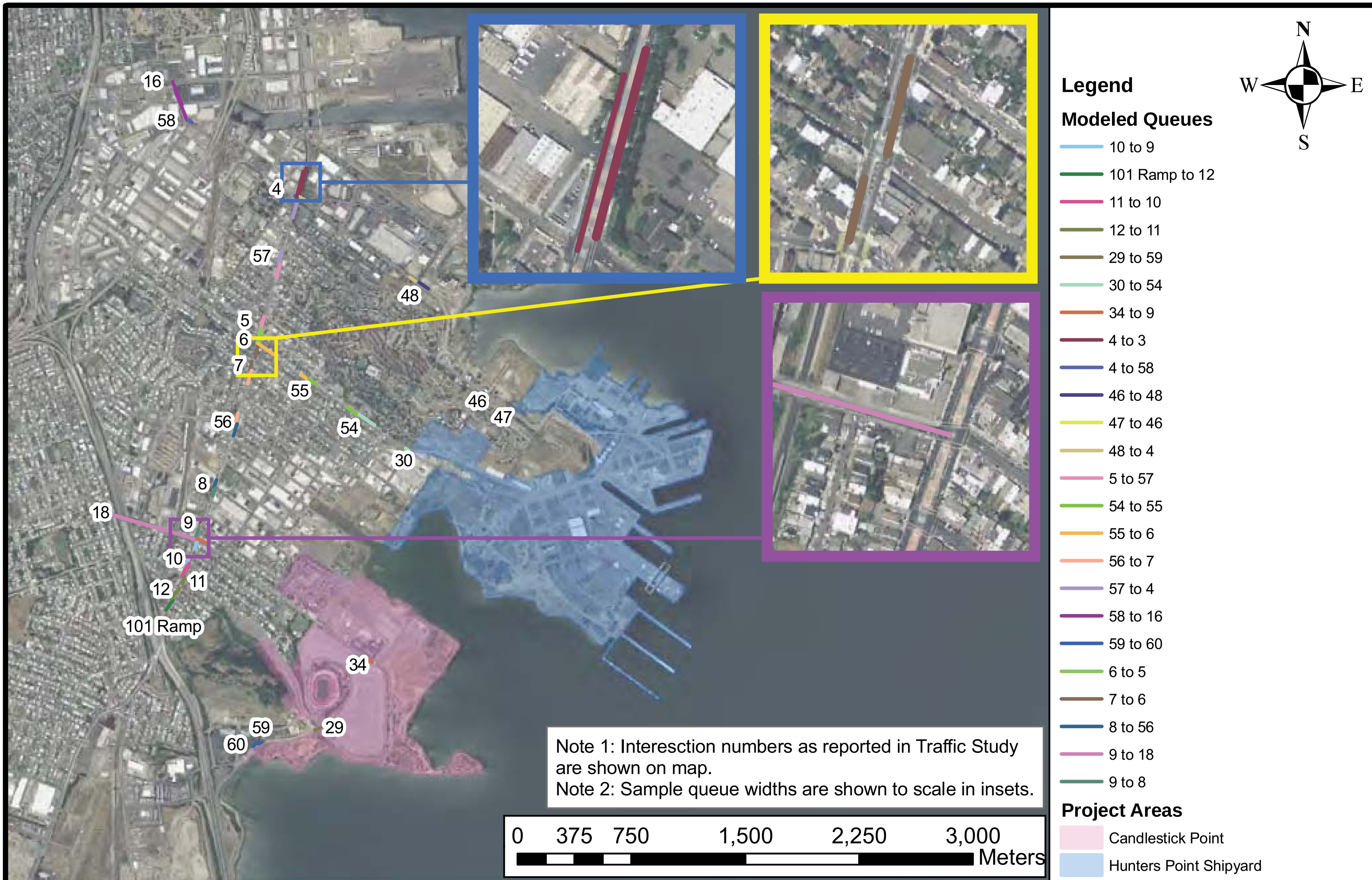
Location of Travel Lanes Modeled, Running Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure **4-1**

Drafter: KD Date: 7/29/2009 Contract Number: 03-20816A Approved: Revised:

DRAFT



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Location of Modeled Queues
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure **4-2**

Drafter: KD | Date: 7/29/2009 | Contract Number: 03-20816A | Approved: | Revised:

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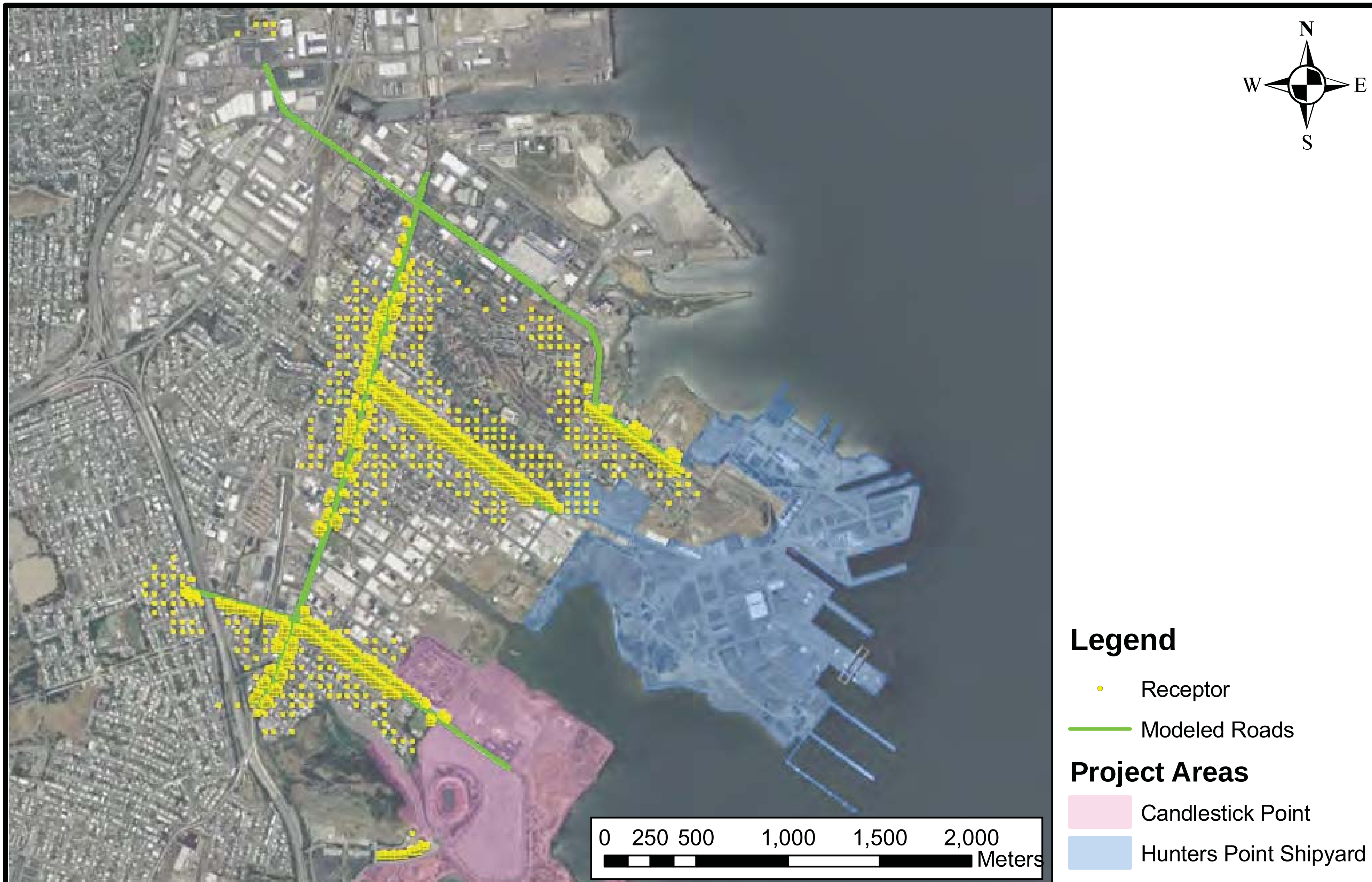

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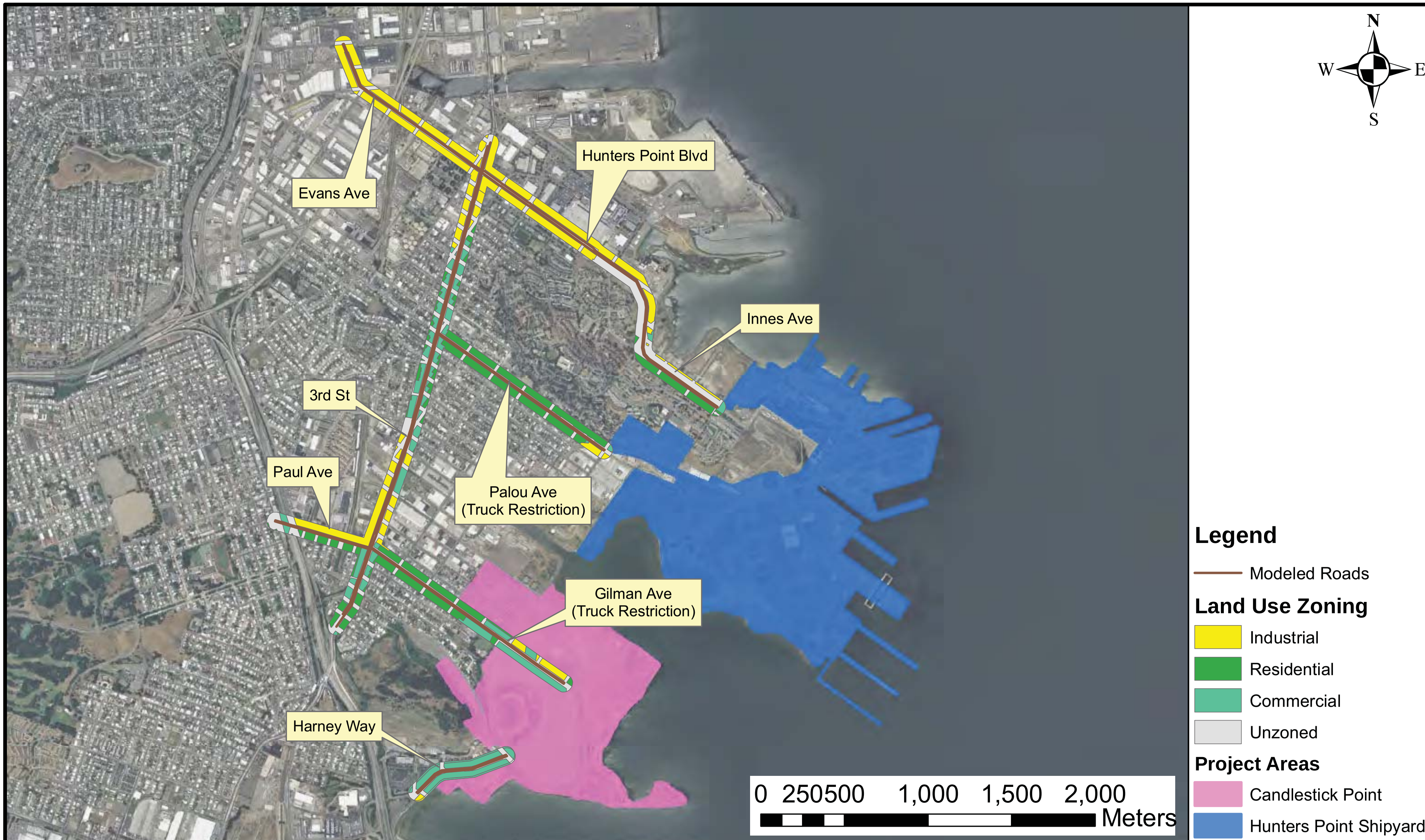
Location of Modeled Residential Receptors
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure **4-3**

Drafter: KD Date: 7/29/2009 Contract Number: 03-20816A Approved: Revised:

DRAFT



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Land Use Zoning in Relation to Modeled Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure **4-4**

Drafter: KD Date: 7/23/2009 Contract Number: 03-20816A Approved: Revised:

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Modeled Concentrations of PM2.5
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Drafter: KD Date: 7/23/2009 Contract Number: 03-20816A Approved: Revised:

Figure **4-5**

Appendix H4

ENVIRON, Community Hazards and San Francisco Health Code Article 38 Analyses Candlestick Point–Hunters Point Shipyard Phase II Redevelopment Project, May 2010

ENVIRON

May 4, 2010

Mr. Michael Rice
Post, Buckley, Schuh & Jerrigan, Inc.
353 Sacramento Street, Suite 1000
San Francisco, CA 94111

Re: Community Hazards and San Francisco Health Code Article 38 Analyses
Candlestick Point–Hunters Point Shipyard Phase II Redevelopment Project

Dear Mr. Rice:

At the request of Post, Buckley, Schuh & Jerrigan, Inc. (PBS&J), ENVIRON International Corporation (ENVIRON) previously conducted four human health risk analyses (HHRAs) in support of the Draft Environmental Impact Report (DEIR) process for the Candlestick Point – Hunter's Point Shipyard Phase II Redevelopment Project ("Project"). These HHRAs included evaluation of Construction Emissions, Airborne Contaminated Soil, Emissions from Stationary Sources and Traffic/Vehicular Emissions. In this letter report, we present three additional evaluations for the Project: 1) an analysis of onsite residential receptors that addresses single source and cumulative community hazard impacts pursuant to the proposed Bay Area Air Quality Management District (BAAQMD) California Environmental Quality Act (CEQA) guidance; 2) at the request of the San Francisco Planning Department, a cumulative analysis of offsite residential receptors; and 3) evaluation of the Project for compliance with *San Francisco Health Code* Article 38.

The remainder of this letter is divided into five sections. Section 1.0 outlines the Project background. Section 2.0 presents the community hazard analysis of single sources on onsite residential receptors. Section 3.0 presents the cumulative analysis of community hazards for onsite residential receptors including source identification and emissions estimation, air dispersion modeling, risk analysis and risk characterization. Section 4.0 presents the cumulative analysis for offsite residential receptors. Section 5.0 describes the evaluation of the Project for compliance with *San Francisco Health Code* Article 38. Section 6.0 summarizes the conclusions from these evaluations.

1.0 Background

Details of the Project have been provided in the Project Description included in Chapter II of the DEIR prepared by PBS&J. Based on information provided in this source, the Project will consist of the development of two areas collectively referred to as the Candlestick Point-Hunters Point Shipyard Phase II Development Plan (the "Project"). The description of the Project is organized under two major sub-components: Candlestick Point (CP) and Hunters Point Shipyard Phase II (HPS Phase II). The Project comprises an approximately 702-acre area.

The Project proposed by Lennar Urban includes a mixed-use community with a range of residential, retail, office, research and development, civic and community uses, and parks and recreational open space. In addition, a major component would be a new stadium for the San Francisco 49ers, a National Football League (NFL) team. Necessary infrastructure improvements (including several roadway modifications) are also proposed in support of the Project development plan.

The Project construction activities are anticipated to occur over an approximately 20 year period, beginning in 2011 and concluding in 2031 with full operation by 2032.

A more detailed discussion of the Project is included in Chapter II of the DEIR.

2.0 Community Hazard Analysis – Single Source

The community hazard analysis addresses single source and cumulative impacts pursuant to proposed BAAQMD CEQA Guidelines ("Draft BAAQMD CEQA Guidelines"). By the time the DEIR was released on November 12, 2009, the BAAQMD had released several versions of draft guidelines and significance thresholds in September 2009, October 7, 2009 (thresholds only), and November 2, 2009. The BAAQMD also released accompanying documents that support the basis for the significance thresholds in October 2009 and November 2, 2009. After release of the Draft EIR, updated draft guidelines were released on December 7, 2009.[1] Throughout the process the significance thresholds and methodology have changed and the BAAQMD continues to evaluate and revise these documents and the recommended approaches used to quantify impacts from a project. The BAAQMD is still conducting public workshops in May 2010 and taking public comment, and it is expected to release revised thresholds and basis documents in advance of the June 2010 Board meeting. For the purpose of this analysis, the December 7, 2009 thresholds and methodologies are used to make significance determinations as well as materials released during public workshops in April 2010.[2]

In the December 7, 2009, guidance[3] and accompanying threshold basis document,[4] the BAAQMD proposed a single source cancer risk, non-cancer hazard index, and $PM_{2.5}$ [particulate matter less than 2.5 microns in diameter] threshold, considering whether new sensitive receptors would be exposed to Toxic Air Contaminants (TACs) and $PM_{2.5}$ concentrations exceeding thresholds from any single source within 1,000 feet of the Project. The thresholds are:

- An excess cancer risk level of more than 10 in one million or a chronic or acute hazard index (HI) greater than 1.0 for TACs
- An incremental increase of greater than 0.3 micrograms per cubic meter ($\mu g/m^3$) annual average $PM_{2.5}$.

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1 BAAQMD, 2009b. *California Environmental Quality Act Air Quality Guidelines*, December 7.

2 BAAQMD, 2010. CEQA Guidelines Update, Public Workshop Slides, Oakland, CA, April 26.

3 Bay Area Air Quality Management District, *California Environmental Quality Act Guidelines*, December 7, 2009.

4 Bay Area Air Quality Management District, *California Environmental Quality Act Guidelines Update: Proposed Thresholds of Significance*, December 7, 2009.

When siting a new receptor, the BAAQMD recommends the Lead Agency examine existing or future proposed sources of TAC and/or $PM_{2.5}$ emissions that would adversely affect new receptors. These impacts include impacts from existing individual stationary sources and impacts from individual freeways or major roadways. The BAAQMD has provided more recent examples of how to conduct these single sources analyses. [5]

2.1 Stationary Sources

As discussed further in Section 3.1.1, according to the BAAQMD database, there are a total of three listed sources of TAC and $PM_{2.5}$ emissions within 1,000 feet of the Project boundary, all of which are diesel-fueled generators. These sources include the Griffith pump station, UCSF/Hunters Point Facility, and Bayview Greenwaste Facility. ENVIRON requested and received from the BAAQMD the daily emissions estimates and source parameters for use in modeling of these three sources. A discussion of the approaches used to model emissions from these facilities and estimate risks, hazards and $PM_{2.5}$ concentration is presented in detail in Section 3 of this technical letter.

For these stationary sources (diesel generators), ENVIRON conservatively assumed that $PM_{2.5}$ emissions can be represented by diesel particulate emissions (DPM) emissions.

Screening Level Single-Source Cancer Risk, Non-cancer Hazard Index (HI) and PM2.5 Concentration from Offsite Sources within 1000 Feet of Project Sensitive Receptors

Source	High End Cancer Risk (in a million)	Single-Source Cancer Risk Threshold (in a million)	Chronic Non-Cancer HI (-)	Single-Source Chronic Non-Cancer HI (-)	Annual Average $PM_{2.5}$ Concentration (ug/m^3)	Single-Source $PM_{2.5}$ Threshold (ug/m^3)
Griffith Pump Station	0.003	10	$2.2*10^{-6}$	1.0	$1.1*10^{-5}$	0.3
UCSF/Hunters Point	0.02		$1.5*10^{-5}$		$7.6*10^{-5}$	
Bayview Greenwaste – Current	135		$8.5*10^{-2}$		0.42	
Bayview Greenwaste – ATCM Compliant	1.2		$7.7*10^{-4}$		$3.8*10^{-3}$	
Note: Analysis based on BAAQMD, CEQA Guidelines Update, Public Workshop Slides, Oakland, CA, April 26, 2010.						

As the table above demonstrates, only the Bayview Greenwaste Facility currently exceeds the cancer risk and $PM_{2.5}$ thresholds. Depending on the classification and permit status of diesel engine at the Bayview Greenwaste Facility, it is reasonable to expect that by the time new Project sensitive receptors will be located next to the facility (by 2013, at the earliest), this facility will be operating in compliance with the California Air Resources Board (ARB) Airborne Toxic

[5] BAAQMD, 2010. CEQA Guidelines Update, Public Workshop Slides, Oakland, CA, April 26.

Control Measure (ATCM) for Stationary Compression-Ignition Engines Rule.[6] As the table indicates, with compliance with the ATCM, the estimated cancer risks, non-cancer hazards, and annual average $PM_{2.5}$ concentration from this source would be below the indicated thresholds.

2.2 Freeway/Major Roadway Sources

In their draft CEQA Air Quality Guidelines and as discussed in public workshops, the BAAQMD recommends the evaluation of all roadways with daily traffic greater than 10,000 vehicles within 1,000 feet of the Project boundary as sources of $PM_{2.5}$.[7] The roadways evaluated for the single-source on-site residential receptor analysis are portions of Carroll Avenue; Innes Avenue; Arelious Walker Avenue; Gilman Avenue; Jamestown Avenue; and Harney Way.[8]

Screening Level Single-Source PM2.5 Concentration from Roadways with Traffic >10,000 Vehicles per Day within 1000 Feet of Project Sensitive Receptors

Roadway	Future Cumulative Traffic Volume (vehicles per day)	Location of Roadway Relative to On-site Sensitive Receptor[a]	Minimum Distance to Sensitive Receptor (feet)[b,c]	BAAQMD Screening $PM_{2.5}$ Concentration (ug/m^3)b	Single-Source $PM_{2.5}$ Threshold (ug/m^3)
Harney Way	36,400	West	100	0.26	0.3
Arelious Walker	25,300	West	100	0.21	
Jamestown	15,000	North	100	0.16	
Gilman	25,000	North	100	0.25	
Carroll	10,300	South	100	0.16	
Innes	24,000	West	100	0.21	

[a]With the exception of Harney and Arelious Walker, all streets run in a northwest-southeast configuration. As a conservative measure, it was assumed that the roadways were east-west directional, which correspond to the maximum impacts in the BAAQMD screening tables.

[b]100 feet is the minimum distance presented in the BAAQMD screening table.

[c]BAAQMD, CEQA Guidelines Update, Public Workshop Slides, Oakland, CA, April 26, 2010.

6 BAAQMD's reported emissions are consistent with a source operating as a prime engine; however, the permit to operate has language to indicate it is classified as a standby emergency generator. The ARB has issued ATCMs to address both stationary prime/emergency diesel engines as well as portable equipment:
* Amended Airborne Toxic Control Measure for Stationary Compression Ignition Engines, effective October 18, 2007.
* Airborne Toxic Control Measure For Diesel Particulate Matter From Portable Engines Rated At 50 Horsepower And Greater, effective September 12, 2007.

7 To date, the BAAQMD has only provided screening level guidance for PM2.5 in their CEQA Guidelines Update, Public Workshop Slides, Oakland, CA, April 26, 2010.

8 CHS Consulting Group, Fehr & Peers, LCW Consulting 2009. Bayview Waterfront Project Transportation Study: Preliminary Draft 1 Report. Prepared for City of San Francisco Planning Department.

As the table above demonstrates, concentrations of $PM_{2.5}$ at the minimum screening distance (100 feet) from these roadways would be below the indicated thresholds. It is recognized that Project receptors could be located less than 100 feet from roadways, which is not addressed by the BAAQMD screening tables. As discussed in Section 5 of this technical letter, any new sensitive receptors on the Project which exceed a $PM_{2.5}$ concentration of 0.2 μg/m^3 from cumulative traffic would be required to install filtration under *San Francisco Health Code* Article 38. As such, compliance with Article 38 will ensure that no cumulative exposures above 0.2 μg/m^3 would be experienced by new receptors in the Project site and, therefore, the BAAQMD threshold of 0.3 μg/m^3 would not be exceeded.

3.0 Community Hazard Analysis – Cumulative Sources

As proposed in the Draft BAAQMD CEQA Guidelines, a cumulative impacts analysis would "examine TAC and/or $PM_{2.5}$ sources that are located within 1,000 feet of a proposed project site." "A project would have a cumulative significant impact if the aggregate total of all past, present, and foreseeable future sources within a 1,000 foot radius (or beyond where appropriate) from the fence line of a source, or from the location of a receptor, plus the contribution from the project, exceeds the following:

- An excess cancer risk level of more than 100 in one million or a chronic or acute [hazard index] HI greater than 1.0 for TACs; or
- 0.8 μg/m^3 annual average PM2.5."

During a meeting attended by representatives from ENVIRON, the City of San Francisco Planning Department, and BAAQMD on January 13, 2010, the District stated that the cumulative impacts analysis described in the Draft BAAQMD CEQA Guidelines should consist of an evaluation of cancer risks and noncancer hazards associated with offsite sources within a 1,000 foot radius of the Project and potential impacts of those sources on onsite residents only, assuming 70 years of exposure. This cumulative analysis was completed based on the BAAQMD's guidance coupled with information provided by the BAAQMD to ENVIRON regarding the emission sources requiring analysis within the 1,000 foot radius of the Project.

3.1 Source Identification and Emissions Estimation

3.1.1 Stationary Sources

To perform a cumulative impacts analysis, sources of TACs and $PM_{2.5}$ within a 1,000 foot radius of the proposed Project were identified. According to Draft BAAQMD CEQA Guidelines, "sources of TACs include, but are not limited to, land uses such as freeways and high volume roadways, truck distribution centers, ports, rail yards, refineries, chrome plating facilities, dry cleaners using perchloroethylene, and gasoline dispensing facilities." Non-permitted TAC and $PM_{2.5}$ sources (such as facilities that host a high volume of diesel truck activity) were also considered by taking into account roadway traffic that would be most affected by these sources.

In December 2009, BAAQMD Staff provided the City of San Francisco Planning Department with a listing of facilities in southeastern San Francisco with currently permitted sources of TAC emissions. According to this database, ENVIRON determined there are three listed sources within 1,000 feet of the Project boundary, all of which were diesel-fueled generators. ENVIRON requested and received from the BAAQMD the daily emissions estimates and source parameters for use in modeling of these three sources. For these stationary sources (diesel generators), ENVIRON conservatively assumed that DPM emissions are equivalent to $PM_{2.5}$ exhaust emissions. Emission rates and source parameters of these three sources used in modeling are summarized in Table 1.

In BAAQMD's Draft CEQA Air Quality Guidelines, there is discussion of several possible non-permitted sources of $PM_{2.5}$ and TACs that may contribute a large amount of emissions. These include freeways, distribution centers, warehouses, rail yards, ports, and truck stops. In the draft CEQA guidelines, the BAAQMD recommends the evaluation of all roadways with daily traffic greater than 10,000 vehicles within 1,000 feet of a project boundary.

3.1.2 Traffic/Vehicular Sources

Consistent with the description above, ENVIRON evaluated all roads and intersections within 1,000 feet of the Project that have traffic information available from the traffic report performed by CHS Consulting Group et al in 2009.[9] The cumulative analysis includes existing traffic plus future projections including Project-related traffic.

The roadways evaluated for this cumulative analysis are portions of Egbert Avenue, Carroll Avenue, Thomas Avenue, Revere Avenue, Palou Avenue, and Innes Avenues east of 3rd Street; Arelious Walker Avenue between Harney Way and Van Dyke Avenue; Ingalls Avenue between Palou and Egbert Avenues; Gilman, Jamestown and Ingerson Avenues; and Harney Way. Arelious Walker between Harvey Way and Van Dyke Avenue, and Ingalls Avenue from Palou Avenue to Egbert Avenue, were included, though they did not have predicted traffic volumes greater than 10,000 vehicles per day. ENVIRON had previously evaluated health impacts of Jamestown Avenue, and Ingerson Avenue using a semi-quantitative approach, and also included both roadways in the current evaluation.

ENVIRON considered vehicular running emissions of $PM_{2.5}$ from exhaust and non-exhaust, DPM, total organic gases (TOG) from gasoline vehicle exhaust and non-exhaust, and TOG from diesel vehicle exhaust. Vehicular queuing emissions of $PM_{2.5}$ from exhaust, DPM, TOG from diesel vehicle exhaust, and TOG from gasoline vehicle exhaust and non-exhaust were also considered.

Vehicular emission factors used in the cumulative analysis were generated in the same way that the $PM_{2.5}$ emission factors were generated in technical analyses supporting the DEIR (see Appendix H3, Attachment IV of the DEIR) with PM_{10} emission factors for exhaust of diesel vehicles generated from EMFAC to represent DPM emission factors. TOG emission factors generated from EMFAC for catalytic gasoline vehicles, including exhaust emissions, and evaporative emissions were extracted. Similar to the approach taken in the DEIR, differences between emissions of catalytic and non-catalytic gasoline vehicles were not considered, and all gasoline vehicles were assumed to be equipped with catalytic converters.

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9 Several roadways presented in the CHS Consulting Group report had traffic volumes slightly less than 10,000 vehicles per day. As a conservative measure, all roadways, regardless of traffic volume, were included in this analysis.

ENVIRON used queuing data from the traffic study, as was done in the technical analyses supporting the DEIR (see Appendix H3, Attachment IV of the DEIR). The traffic study did not provide all necessary queuing data for intersection 33 (where Egbert Avenue crosses Ingalls Street); ENVIRON used intersection 32 (where Carroll Avenue crosses Ingalls Street) queuing data absent this information, based on the similarity of the intersection locations to the Project site, and to nearly freeway (i.e., US-101), and the similarities of land use pattern surrounding the those intersections. Both intersections have four-way stop signs and are located on Ingalls Avenue, separated by only two blocks.

Emission factors for vehicular running and queuing operations are summarized in Tables 2a through 2h.

3.2 Air Dispersion Modeling

3.2.1 Stationary Sources

ENVIRON performed air dispersion modeling using methodology consistent with that used in Appendix H, Attachment I, of the DEIR, with a few modifications, discussed below.

In addition to emissions estimates for each stationary source, BAAQMD provided source parameters needed for air dispersion modeling. Additionally, ENVIRON examined aerial photographs to obtain heights of buildings in close vicinity to each source under evaluation.

Building downwash algorithms incorporated into AERMOD account for the plume dispersion effects of the aerodynamic wakes and eddies produced by buildings and structures; building downwash algorithms were used. Based on BAAQMD's Draft CEQA Air Quality Guidelines, in order to evaluate health impacts of offsite sources to onsite receptors, ENVIRON created a receptor grid with 20 meter spacing, which covers the future onsite residential development proposed. Three receptor grids were created based on the future land use map of the proposed Project. The onsite residential receptors included in the evaluation are shown on Figure 1. Note that even though the receptor grids cover the designated residential areas, each individual receptor does not necessarily fall on the actual location of the future residential buildings. For example, one receptor could be at the yard or parking lot of the residential area. Therefore concentrations calculated for each receptor should be viewed in the context of concentrations calculated for the neighboring receptors.

The locations of the three stationary sources considered in this cumulative impact analysis are presented on Figure 2.

3.2.2 Traffic/Vehicular Sources

ENVIRON used methodologies consistent with Appendix H, Attachment IV, of the DEIR, with a few updates, summarized here.

ENVIRON refined the methodology regarding terrain. In the Draft EIR, roads were set to zero meter elevations (e.g., ground level), with all receptors at 1.8 meters as recommended by CAL3QHCR documentation. In this updated analysis, ENVIRON used National Elevation Dataset (NED) files from the United States Geological Survey (USGS) to estimate elevations for roadways and receptors. ENVIRON estimated the height of each roadway using the average elevation within five meters of the road read from the NED file. CAL3QHCR restricts roadway heights to be within -10 meters to 10 meters. Since the lowest roadway under evaluation is approximately 3.3 meters, ENVIRON subtracted 13.3 meters from each roadway elevation so that the lowest roadway elevation was at -10 meters. All receptor elevations were determined using the surface elevations from NED files plus 1.8 meters to represent the CAL3QHCR-recommended breathing height, before being adjusted by subtracting 13.3 meters. This approach ensured that the relative height between roadway segments and receptors in the model reflect the actual conditions, with the exception that for roads with average elevations above 10 meters after this adjustment, ENVIRON set the elevation to 10 meters. This further adjustment suppressed the vertical distance between some of the roadways and most receptors and thus will lead to more conservative results. The only exception is the cluster of elevated residential receptors located on the hillside of Bayview Park, in which case, due to the adjustment described above, the modeled difference in elevation was greater than the actual distance in elevation. The effect is not significant; however, as estimated $PM_{2.5}$ concentrations at locations closer (both horizontally and vertically) to the roadways are much lower than significance thresholds. Therefore, due to their increased distance, the estimated concentrations at these hillside receptors will be lower still.

Additionally, ENVIRON refined the hourly traffic volumes for each roadway depending on the pollutant being modeled. ENVIRON used the hourly diesel and gasoline fractions of total trips in San Francisco County from EMFAC to calculate hourly traffic volumes for diesel and gasoline vehicles, respectively. For the $PM_{2.5}$ models, the hourly traffic volumes from all vehicles were used, as was done in the DEIR. Hourly traffic volumes from diesel vehicles were used for the DPM and diesel vehicle TOG models. Similarly, hourly traffic volumes from gasoline vehicles were used for the gasoline vehicle TOG models. ENVIRON updated the receptors in the cumulative analysis, as well. Onsite receptors identical to those used in the stationary source air dispersion modeling domain were used.

The locations of the traffic/vehicular sources considered in this cumulative impact analysis are presented on Figure 2. The hourly traffic volumes of the modeled roadway segments are presented in Tables 3a through 3c. The vehicular source parameters representing running and queuing operations of the traffic are presented in Table 4 and 5.

3.3 Risk Analysis

3.3.1 Identification of Chemicals of Concern

TACs and $PM_{2.5}$ emitted from all stationary and traffic/vehicular sources were considered in this cumulative analysis.

For traffic-related impacts, the chemicals of concern evaluated were chosen in accordance with the indicator chemical approach that is consistent with OEHHA guidance.[10] DPM from diesel exhaust along with several indicator chemicals associated with gasoline exhaust were evaluated. A United States Environmental Protection Agency (USEPA) guidance document[11]

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10 California Environmental Protection Agency (Cal/EPA). 2003. *Air Toxics Hot Spots Program Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.* Office of Environmental Health Hazard Assessment. August.

11 USEPA. 2002. *Technical Description of the Toxics Module for MOBILE 6.2 and Guidance on its Use for Emission Inventory Preparation.* Air and Radiation. EPA420-R-02-029. November.

identifies acetaldehyde; benzene; 1,3-butadiene; formaldehyde; acrolein; and methyl-t-butyl ether (MTBE) as the chemicals that dominate risk from mobile sources, based on the results of the USEPA's National-Scale Air Toxics Assessment. ENVIRON included all indicator chemicals except MTBE as it is no longer present in gasoline formulations sold in California. Potential carcinogenic effects, as well as acute and chronic noncancer hazard HIs, from exposure to these compounds were evaluated.

3.3.2 Exposure Assessment

As previously discussed, the BAAQMD guidance[12] was that the cumulative analysis described in the Draft BAAQMD CEQA Guidelines should consist of an evaluation of risk associated with offsite stationary and traffic/vehicular sources within a 1,000 foot radius of the Project and potential impacts of those sources on on-site residents, assuming 70 years of exposure.

For this cumulative analysis, ENVIRON identified residential receptors based on the proposed residential land uses identified for the Project in the DEIR. As previously discussed, the receptor locations considered in this cumulative analysis are presented in Figure 1.

Only the inhalation exposure pathway was considered in this cumulative analysis for TACs emitted from stationary and traffic/vehicular sources. As previously discussed, $PM_{2.5}$ was evaluated using the 0.8 $\mu g/m^3$ Threshold of Significance proposed in the Draft BAAQMD CEQA Guidelines. Selection of additional pathways for a multipathway analysis is specific to the chemical and land use designations in the area potentially impacted by the Project. The California Environmental Protection Agency (Cal/EPA)[13] has identified chemicals that must be evaluated in a multipathway analysis and none of the TACs evaluated in this cumulative analysis are listed by Cal/EPA as a multipathway chemical. Thus, ENVIRON only conducted an evaluation of inhalation exposures.

The residential exposure parameters used in this cumulative impact analysis are consistent with those used in the DEIR, with the exception of the exposure duration. As requested by the BAAQMD, exposures were evaluated over a 70 year lifetime for residents.

The exposure assumptions used for evaluating inhalation exposures to TACs for residential populations are presented in Table 6.

3.3.3 Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories – cancer and noncancer endpoints. Toxicity values used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

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12 Meeting between representatives from ENVIRON, PBS&J, and BAAQMD on January 13, 2010. San Francisco, California.

13 California Environmental Protection Agency (Cal/EPA). 2003. *Air Toxics Hot Spots Program Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.* Office of Environmental Health Hazard Assessment. August.

Consistent with the methodology used in the DEIR and Cal/EPA risk assessment guidance, ENVIRON used current Cal/EPA toxicity values for TACs to estimate cancer risks associated with exposure to emissions resulting from the Project. Specifically, toxicity values were obtained from the Cal/EPA *OEHHA Table of Approved Cancer Potency Factors*[14] (CPFs) and *OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary*[15] and are presented in Table 7.

3.3.4 Risk Characterization Methods

The results of this cumulative analysis are presented as estimated excess lifetime cancer risks, noncancer hazard indices, and modeled $PM_{2.5}$ concentrations which are then compared to the applicable proposed Thresholds of Significance in the Draft BAAQMD CEQA Guidelines. The methodology used to estimate excess lifetime cancer risks, noncancer HIs, and modeled $PM_{2.5}$ concentrations is described below.

Cancer risk estimates represent the probability of cancer (presented as a probability per million people) related to potential exposures to TAC emissions quantified in this cumulative analysis. Noncancer HIs are represented as the ratio between the estimated TAC exposure-point concentrations and associated RELs identified as part of the toxicity assessment. The excess lifetime cancer risks and noncancer HIs estimated in this evaluation are then compared to Thresholds of Significance proposed in the Draft BAAQMD CEQA Guidelines to determine if any significant impacts can be associated with sources located within a 1,000 foot radius of the Project, as identified by the BAAQMD.

The cancer risks and noncancer HIs are estimated for the maximally impacted individual resident (MEIR). The MEIR is defined in the context of this evaluation as the onsite residential location with the highest estimated acute, chronic, or cancer health impact based on the proposed residential land uses identified for the Project.

The methodology used to estimate cancer risks and chronic noncancer HIs as presented in the DEIR were also used in this cumulative analysis. However, acute effects were not evaluated as part of the analysis conducted for the DEIR.

The potential for acute effects was evaluated by comparing the annual one-hour maximum concentrations with the acute RELs. Acute hazard quotients (HQs) were estimated for those chemicals for which an REL was available. The equation used to calculate acute HQs is as follows:

$$HQ_i = \frac{C_i}{REL_i}$$

Where:

HQ_i	=	Acute hazard quotient for chemical_i
C_i	=	One-hour maximum air concentration for chemical_i ($\mu g/m^3$)
REL_i	=	Acute noncancer reference exposure level for chemical_i ($\mu g/m^3$)

14 California Environmental Protection Agency (Cal/EPA). 2009. *Table of Approved Cancer Potency Factors, Toxicity Criteria Database*. July 21.

15 California Environmental Protection Agency (Cal/EPA). 2008. *OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary.* Office of Environmental Health Hazard Assessment. December 18.

ENVIRON conservatively summed the chemical-specific HQs to obtain an acute HI as follows:

$$HI = \sum HQ_i$$

Target organ segregation for acute effects was not conducted because the acute HI for all chemicals is well below the Threshold of Significance of one for acute effects proposed in the Draft BAAQMD CEQA Guidelines. The acute HIs presented in this cumulative analysis conservatively overestimates the true one hour maximum at any one time because one hour maximum air concentrations were summed regardless of time of occurrence (i.e., hour of year) which can differ by source.

3.4 Risk Characterization

This section compares the estimated excess lifetime cancer risks, noncancer HIs, and $PM_{2.5}$ concentrations for the MEIR to the Thresholds of Significance proposed in the Draft BAAQMD CEQA Guidelines.

3.4.1 Cancer Risks and Noncancer Hazards Estimated for Stationary and Traffic/Vehicular Sources of TACs

As shown in Table 8, the cancer risk associated with all stationary and traffic/vehicular sources for the MEIR under the existing scenario in which it is assumed that the Bay-View Greenwaste Management facility operates as it does today, is 148 in a million (148×10^{-6}) assuming high-end exposure assumptions (exposure duration of 70 years). The MEIR is located within the boundary of the Alice Griffith Housing Area and is approximately 340 feet from the Bay-view Greenwaste Facility. Approximately 97% of the cancer risk, or 143 in a million (143×10^{-6}), can be attributed to a diesel generator located at the Bay-View Greenwaste Management facility. The estimated cancer risks for the onsite MEIR assuming average exposures is slightly lower than those estimated using high-end exposure assumptions.

It is unlikely that the diesel generator currently at the site will continue to operate for the full 70 years beyond the 2030 initiation of the 70 year risk duration (i.e. ending at year 2100). It is more likely that this diesel generator will be replaced by a generator that has much lower emissions, due strictly to age, if not Reasonably Achievable Control Technology (RACT) requirements. A replacement generator would not be permitted emissions at the level at which the generator is currently operating, rather it would have to comply with BAAQMD or California Air Resources Board (ARB) regulations in effect at the time of replacement.

Under the scenario in which it is assumed that the Bay-View Greenwaste Management facility operates in accordance with the ARB Airborne Toxic Control Measure (ATCM) for Stationary Compression-Ignition Engines, emissions from the diesel generator located at the Bay-View Greenwaste Management facility are reduced by approximately 99% due to the application of an ATCM compliant diesel generator. This reduction in DPM emissions significantly reduces the estimated cancer risks at the MEIR. Under the ATCM compliance scenario, the estimated cancer risk for the MEIR is 43 in a million (43×10^{-6}) assuming high-end exposure assumptions. In addition, the MEIR under the ATCM compliance scenario is located near the intersection of Gilman Avenue and Arelious Walker Drive. The estimated cancer risk for the onsite MEIR assuming average exposures is slightly lower than those estimated using high-end exposure assumptions. The results for the ATCM compliance scenario are presented in Table 8.

As shown on Table 8, the estimated chronic and acute noncancer HIs for all onsite residents are 0.1 and 0.23 or below under the scenario in which Bay-View Greenwaste Management does not comply with the ATCM, respectively. Estimated chronic and acute noncancer HIs are even lower under the ATCM compliance scenario.

3.4.2 $PM_{2.5}$ Originating from Stationary and Traffic/Vehicular Sources

The concentration of $PM_{2.5}$ at the MEIR and attributable to stationary and traffic/vehicular sources (0.5 µg/m^3) does not exceed the Threshold of Significance $PM_{2.5}$ concentration of 0.8 µg/m^3 proposed in the Draft BAAQMD CEQA Guidelines.

The $PM_{2.5}$ concentration is further reduced to 0.4 µg/m^3 under the ATCM compliance scenario.

4.0 Evaluation of Offsite Receptors

At the request of the San Francisco Planning Department, ENVIRON also evaluated the cumulative risks (cancer risks, acute and chronic noncancer hazard indices, and $PM_{2.5}$ concentrations) for offsite residential receptors within the 1,000 foot radius, assuming a 70 year exposure. The methodology used for this evaluation was the same as that used to evaluate the cumulative risks for the onsite residential receptors. Offsite residential receptors evaluated are shown on Figure 3.

As shown in Table 9, the estimated cancer risk associated with all stationary and traffic/vehicular sources for the MEIR under the scenario in which the Bay-View Greenwaste Management facility operates as it does today is 88 in a million (88×10^{-6}), assuming high-end exposure assumptions. The MEIR is located near the Gilman Avenue and Arelious Walker Drive intersection. Approximately 91% of the cancer risk, or 80 in a million (80×10^{-6}), can be attributed to a traffic/vehicular sources. The estimated cancer risks for the offsite MEIR assuming average exposures is slightly lower than those estimated using high-end exposure assumptions.

Under the scenario in which the Bay-View Greenwaste Management facility operates in compliance with the ARB's ATCM rule, emissions from the diesel generator located at the Bay-View Greenwaste Management facility are reduced by approximately 99% due to the application of an ATCM compliant diesel generator. This reduction in DPM emissions results in the same location of MEIR and slightly reduces the estimated cancer risks at the MEIR. Under the mitigated scenario, the estimated cancer risk for the MEIR is 80 in a million (80×10^{-6}) assuming high-end exposure assumptions. In addition, the MEIR under the ATCM- compliant scenario is located near the intersection of Gilman Avenue and Arelious Walker Drive. The estimated cancer risk for the offsite MEIR, assuming average exposures, is slightly lower than those estimated using high-end exposure assumptions. The results for the ATCM-compliant scenario are presented in Table 9.

As shown on Table 9, the estimated chronic and acute noncancer HIs for all offsite residents are 0.11 and 0.31 or below under the existing scenario in which the Bay-View Greenwaste Management facility operates as it does today, respectively. As expected, since the MEIR is relatively far from the modeled stationary sources, estimated chronic and acute noncancer HIs are only slightly lower than or equal to the values under the ATCM-compliant scenario.

Under the existing scenario, the concentration of $PM_{2.5}$ at the MEIR and attributable to stationary and traffic/vehicular sources (0.74 µg/m^3) does not exceed the Threshold of Significance $PM_{2.5}$ concentration of 0.8 µg/m^3 proposed in the Draft BAAQMD CEQA Guidelines.

The $PM_{2.5}$ concentration is further reduced to 0.72 µg/m^3 under the ATCM-compliant scenario.

5.0 Compliance with San Francisco Health Code Article 38

The potential health impacts from $PM_{2.5}$ associated with traffic were evaluated for compliance with *San Francisco Health Code* Article 38. The *San Francisco Health Code* Article 38 requires an air quality assessment to evaluate the concentration of $PM_{2.5}$ from local roadway traffic sources that may impact new structures containing ten or more dwelling units. If the air quality assessment indicates the estimated concentration of $PM_{2.5}$ at the site attributable to all roadway vehicle emissions within 500 feet (approximately 150 meters) of the project would be greater than 0.2 µg/m^3 (micrograms per cubic meter), Section 3807 requires development on the site to be designed or relocated to avoid exposure greater than 0.2 µg/m^3, or a ventilation system to be installed that would be capable of removing 80 percent of ambient $PM_{2.5}$ from habitable areas of the residential units.

Roadways evaluated in this analysis include portions of Egbert and Carroll Avenues east of 3rd Street; Arelious Walker between Harney Way and Carroll Avenue; Gilman, Jamestown and Ingerson Avenues; and Harney Way.

Exceedances of 0.2 µg/m^3 are located at future residential sites located near the following roadways:

- Approximately 30 meters from the intersection of Harney Way and Arelious Walker
- Approximately 15 meters from the intersection of Gilman and Arelious Walker
- Approximately 15 meters on each side of Arelious Walker just east of Alice Griffith

Under SF Health Code Section 3807, one of the following actions is required: (1) residential uses must be designed or located on the site in a way that would avoid residential exposures above a $PM_{2.5}$ concentration of 0.2 µg.m^3, or (2) a ventilation system must be installed at the site that would be capable of removing greater than 80% of ambient $PM_{2.5}$ from habitable areas of dwelling units.

6.0 Conclusions

In summary, the results of the single-source community hazards analysis indicate that potential excess cancer risks to onsite residents are below 10 in a million for TACs emitted from offsite stationary and traffic/vehicular sources within a 1,000 foot radius of the Project assuming that the Bay-View Greenwaste Management facility comes into compliance with the ARB's ATCM rule before 2013. The estimated acute and chronic noncancer hazard indices are below one for all receptors evaluated in this cumulative analysis under both the ATCM compliant and ATCM non-compliant scenarios. In addition, the $PM_{2.5}$ concentrations for onsite residents are below the single-source $PM_{2.5}$ concentration of 0.3 μg/m^3 proposed in the Draft BAAQMD CEQA Guidelines.

Additionally, the results of the cumulative community hazards analysis indicate that potential excess cancer risks to onsite residents are below 100 in a million for TACs emitted from offsite stationary and traffic/vehicular sources within a 1,000 foot radius of the Project assuming that the Bay-View Greenwaste Management facility comes into compliance with the ARB's ATCM rule before 2013. The estimated acute and chronic noncancer hazard indices are below one for all receptors evaluated in this cumulative analysis under both the ATCM compliant and ATCM non-compliant scenarios. In addition, the $PM_{2.5}$ concentrations for onsite residents are below the $PM_{2.5}$ concentration of 0.8 μg/m^3 proposed in the Draft BAAQMD CEQA Guidelines.

At the request of the San Francisco Planning Department, ENVIRON also evaluated the potential cumulative impacts within the 1,000 radius for offsite residential receptors. For the offsite residential receptors, under both the ATCM non-compliant and compliant scenarios, the estimated excess cancer risks are below 100 in a million, the estimated acute and chronic noncancer hazard indices are below one, and the cumulative $PM_{2.5}$ concentrations are below 0.8 μg/m^3.

For San Francisco Article 38, all future traffic/vehicular sources are predicted to yield concentrations of $PM_{2.5}$ that exceed the San Francisco Health Code Article 38 $PM_{2.5}$ action level at residential sites in three areas. The estimated cumulative traffic $PM_{2.5}$ concentrations at some onsite residential locations directly adjacent to Arelious Walker could exceed the San Francisco Health Code Article 38. Consequently, residential development at these locations would be required by SF Health Code Section 3807 to either locate the residential units in a way to avoid the residential exposure or install ventilation systems that will remove 80% of $PM_{2.5}$ from habitable areas of the dwelling units.

Please feel free to contact us if you have any questions about this analysis. Thank you for the opportunity to assist you with this matter.

Sincerely,

Shari B. Libicki, PhD
Principal

Elizabeth A. Miesner, MS
Principal

Attachments:

Table 1: Point Source Parameters and Emission Factors
Table 2a: Summary of Vehicular PM2.5 Emission Factors, Arterial Roads
Table 2b: Summary of Vehicular DPM Emission Factors, Arterial Roads
Table 2c: Summary of Vehicular Diesel TOG Emission Factors, Arterial Roads
Table 2d: Summary of Vehicular Gasoline TOG Emission Factors, Arterial Roads
Table 2e: Summary of Vehicular PM2.5 Emission Factors, Local Roads
Table 2f: Summary of Vehicular DPM Emission Factors, Local Roads
Table 2g: Summary of Vehicular Diesel TOG Emission Factors, Local Roads
Table 2h: Summary of Vehicular Gasoline TOG Emission Factors, Local Roads
Table 3a: Summary of All Traffic Volumes by Modeled Road Segment
Table 3b: Summary of Diesel Traffic Volumes by Modeled Road Segment
Table 3c: Summary of Gasoline Traffic Volumes by Modeled Road Segment
Table 4: CAL3QHCR Source Parameters, Running Emissions
Table 5: CAL3QHCR Source Parameters, Queuing Emissions
Table 6: Onsite Residential Exposure Assumptions for Carcinogens
Table 7: Carcinogenic and Noncarcinogenic Toxicity Values
Table 8: Summary of Estimated Cancer Risks and Noncancer Hazard Indices (HIs) at the Onsite Maximally Exposed Individual Resident (MEIR)
Table 9: Summary of Estimated Cancer Risks and Noncancer Hazard Indices (HIs) at the Offsite Maximally Exposed Individual Resident (MEIR)

Figure 1: Onsite Residential Receptors for Cumulative Analysis
Figure 2: Sources Modeled in Cumulative Analysis
Figure 3: Offsite Residential Receptors for Cumulative Analysis

T A B L E S

Table 1
Point Source Parameters and Emission Factors
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Source	UTMx	UTMy	Elevation (m)	Type	DPM Emission Rate (g/s)		Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)
					Unmitigated	Mitigated				
Griffith Pump Station	554508.51	4175459.84	5.42	Point	7.61E-06		2.44	644.26	51.74	0.15
Bay-View Greenwaste Management	553923.36	4175152.73	5.77	Point	1.10E-02	9.94E-05	1.83	644.26	51.74	0.08
UCSF/Hunters Point	554798.27	4175754.88	8.01	Point	3.61E-05		2.44	644.26	51.74	0.15

Abbreviations:
DPM = diesel particulate matter
g = gram
K = Kelvin
m = meter
s = second

Table 2a
Summary of Vehicular PM2.5 Emission Factors, Arterial Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	1.42E-02	*1.28E-02*	7.06E-03	*6.97E-03*	3.01E-02	*1.69E-03*	0.00E+00	*0.00E+00*
2	1.37E-02	*1.28E-02*	7.09E-03	*6.97E-03*	3.24E-02	*1.19E-03*	0.00E+00	*0.00E+00*
3	2.13E-02	*1.45E-02*	7.38E-03	*6.99E-03*	1.42E-01	*1.27E-02*	0.00E+00	*0.00E+00*
4	1.36E-02	*1.30E-02*	7.14E-03	*6.97E-03*	2.40E-02	*5.46E-04*	0.00E+00	*0.00E+00*
5	1.30E-02	*1.28E-02*	7.11E-03	*6.97E-03*	1.97E-02	*1.66E-04*	0.00E+00	*0.00E+00*
6	1.59E-02	*1.31E-02*	7.11E-03	*6.97E-03*	4.70E-02	*2.72E-03*	0.00E+00	*0.00E+00*
7	1.40E-02	*1.31E-02*	7.01E-03	*6.97E-03*	1.69E-02	*3.12E-03*	0.00E+00	*0.00E+00*
8	1.32E-02	*1.27E-02*	6.99E-03	*6.97E-03*	8.79E-03	*1.21E-03*	0.00E+00	*0.00E+00*
9	1.55E-02	*1.29E-02*	7.06E-03	*6.97E-03*	4.37E-02	*3.43E-03*	0.00E+00	*0.00E+00*
10	2.36E-02	*1.40E-02*	7.33E-03	*6.99E-03*	1.66E-01	*1.39E-02*	0.00E+00	*0.00E+00*
11	2.16E-02	*1.37E-02*	7.27E-03	*6.98E-03*	1.36E-01	*1.04E-02*	0.00E+00	*0.00E+00*
12	1.92E-02	*1.33E-02*	7.19E-03	*6.98E-03*	1.00E-01	*7.13E-03*	0.00E+00	*0.00E+00*
13	1.67E-02	*1.30E-02*	7.10E-03	*6.97E-03*	6.14E-02	*3.97E-03*	0.00E+00	*0.00E+00*
14	1.61E-02	*1.29E-02*	7.09E-03	*6.97E-03*	5.39E-02	*3.39E-03*	0.00E+00	*0.00E+00*
15	1.65E-02	*1.30E-02*	7.10E-03	*6.97E-03*	6.03E-02	*3.84E-03*	0.00E+00	*0.00E+00*
16	1.71E-02	*1.31E-02*	7.11E-03	*6.97E-03*	6.66E-02	*4.96E-03*	0.00E+00	*0.00E+00*
17	1.59E-02	*1.30E-02*	7.08E-03	*6.97E-03*	5.09E-02	*3.73E-03*	0.00E+00	*0.00E+00*
18	1.41E-02	*1.28E-02*	7.02E-03	*6.97E-03*	2.24E-02	*1.96E-03*	0.00E+00	*0.00E+00*
19	1.38E-02	*1.27E-02*	7.01E-03	*6.97E-03*	1.84E-02	*1.28E-03*	0.00E+00	*0.00E+00*
20	1.36E-02	*1.27E-02*	7.00E-03	*6.97E-03*	1.54E-02	*1.01E-03*	0.00E+00	*0.00E+00*
21	1.34E-02	*1.26E-02*	7.01E-03	*6.97E-03*	1.46E-02	*8.07E-04*	0.00E+00	*0.00E+00*
22	1.28E-02	*1.26E-02*	6.99E-03	*6.97E-03*	5.77E-03	*2.03E-04*	0.00E+00	*0.00E+00*
23	1.29E-02	*1.26E-02*	7.00E-03	*6.97E-03*	9.77E-03	*3.91E-04*	0.00E+00	*0.00E+00*
24	1.28E-02	*1.26E-02*	7.00E-03	*6.97E-03*	8.36E-03	*2.51E-04*	0.00E+00	*0.00E+00*

Notes:

1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Draft EIR Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust; non-exhaust refers to running emissions from tire and brake wear.
3. Exhaust refers to idling emissions from vehicle exhaust; non-exhaust refers to idling emissions from tire and brake wear.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:

EIR: Environmental Impact Report
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 2b
Summary of Vehicular DPM Emission Factors, Arterial Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	4.87E-02	*1.69E-01*	0.00E+00	*0.00E+00*	7.27E-01	*1.46E-01*	0.00E+00	*0.00E+00*
2	3.76E-02	*1.77E-01*	0.00E+00	*0.00E+00*	7.46E-01	*9.91E-02*	0.00E+00	*0.00E+00*
3	3.29E-02	*1.96E-01*	0.00E+00	*0.00E+00*	7.27E-01	*0.00E+00*	0.00E+00	*0.00E+00*
4	5.88E-02	*1.75E-01*	0.00E+00	*0.00E+00*	6.36E-01	*1.55E-01*	0.00E+00	*0.00E+00*
5	4.71E-02	*1.83E-01*	0.00E+00	*0.00E+00*	6.45E-01	*6.51E-02*	0.00E+00	*0.00E+00*
6	7.56E-02	*1.40E-01*	0.00E+00	*0.00E+00*	7.48E-01	*4.51E-01*	0.00E+00	*0.00E+00*
7	9.04E-02	*1.52E-01*	0.00E+00	*0.00E+00*	7.27E-01	*5.54E-01*	0.00E+00	*0.00E+00*
8	8.45E-02	*1.56E-01*	0.00E+00	*0.00E+00*	6.96E-01	*4.00E-01*	0.00E+00	*0.00E+00*
9	7.63E-02	*1.31E-01*	0.00E+00	*0.00E+00*	7.79E-01	*5.80E-01*	0.00E+00	*0.00E+00*
10	7.34E-02	*1.09E-01*	0.00E+00	*0.00E+00*	7.99E-01	*7.18E-01*	0.00E+00	*0.00E+00*
11	7.59E-02	*1.11E-01*	0.00E+00	*0.00E+00*	7.97E-01	*6.93E-01*	0.00E+00	*0.00E+00*
12	7.56E-02	*1.16E-01*	0.00E+00	*0.00E+00*	7.94E-01	*6.46E-01*	0.00E+00	*0.00E+00*
13	7.62E-02	*1.23E-01*	0.00E+00	*0.00E+00*	7.86E-01	*5.69E-01*	0.00E+00	*0.00E+00*
14	7.71E-02	*1.28E-01*	0.00E+00	*0.00E+00*	7.80E-01	*5.25E-01*	0.00E+00	*0.00E+00*
15	7.53E-02	*1.24E-01*	0.00E+00	*0.00E+00*	7.85E-01	*5.61E-01*	0.00E+00	*0.00E+00*
16	7.69E-02	*1.26E-01*	0.00E+00	*0.00E+00*	7.87E-01	*6.02E-01*	0.00E+00	*0.00E+00*
17	7.62E-02	*1.31E-01*	0.00E+00	*0.00E+00*	7.81E-01	*5.59E-01*	0.00E+00	*0.00E+00*
18	7.95E-02	*1.55E-01*	0.00E+00	*0.00E+00*	7.25E-01	*3.69E-01*	0.00E+00	*0.00E+00*
19	8.62E-02	*1.62E-01*	0.00E+00	*0.00E+00*	6.65E-01	*1.62E-01*	0.00E+00	*0.00E+00*
20	8.29E-02	*1.64E-01*	0.00E+00	*0.00E+00*	6.63E-01	*1.49E-01*	0.00E+00	*0.00E+00*
21	7.44E-02	*1.60E-01*	0.00E+00	*0.00E+00*	7.04E-01	*1.96E-01*	0.00E+00	*0.00E+00*
22	8.02E-02	*1.68E-01*	0.00E+00	*0.00E+00*	6.33E-01	*1.05E-01*	0.00E+00	*0.00E+00*
23	6.08E-02	*1.75E-01*	0.00E+00	*0.00E+00*	6.40E-01	*5.05E-02*	0.00E+00	*0.00E+00*
24	6.76E-02	*1.77E-01*	0.00E+00	*0.00E+00*	5.75E-01	*1.91E-02*	0.00E+00	*0.00E+00*

Notes:
1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Draft EIR Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust.
3. Exhaust refers to idling emissions from vehicle exhaust.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:
EIR: Environmental Impact Report
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 2c
Summary of Vehicular Diesel TOG Emission Factors, Arterial Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	1.54E-01	*5.50E-01*	0.00E+00	*0.00E+00*	3.54E+00	*6.57E-01*	0.00E+00	*0.00E+00*
2	1.41E-01	*5.92E-01*	0.00E+00	*0.00E+00*	3.60E+00	*4.46E-01*	0.00E+00	*0.00E+00*
3	1.49E-01	*6.95E-01*	0.00E+00	*0.00E+00*	3.69E+00	*0.00E+00*	0.00E+00	*0.00E+00*
4	1.94E-01	*5.71E-01*	0.00E+00	*0.00E+00*	4.14E+00	*6.98E-01*	0.00E+00	*0.00E+00*
5	1.88E-01	*6.25E-01*	0.00E+00	*0.00E+00*	4.04E+00	*2.93E-01*	0.00E+00	*0.00E+00*
6	1.48E-01	*3.57E-01*	0.00E+00	*0.00E+00*	3.69E+00	*2.03E+00*	0.00E+00	*0.00E+00*
7	1.93E-01	*4.13E-01*	0.00E+00	*0.00E+00*	3.55E+00	*2.55E+00*	0.00E+00	*0.00E+00*
8	1.98E-01	*4.56E-01*	0.00E+00	*0.00E+00*	3.38E+00	*1.84E+00*	0.00E+00	*0.00E+00*
9	1.37E-01	*3.03E-01*	0.00E+00	*0.00E+00*	3.56E+00	*2.63E+00*	0.00E+00	*0.00E+00*
10	1.21E-01	*1.67E-01*	0.00E+00	*0.00E+00*	3.60E+00	*3.23E+00*	0.00E+00	*0.00E+00*
11	1.23E-01	*1.84E-01*	0.00E+00	*0.00E+00*	3.59E+00	*3.12E+00*	0.00E+00	*0.00E+00*
12	1.25E-01	*2.13E-01*	0.00E+00	*0.00E+00*	3.57E+00	*2.91E+00*	0.00E+00	*0.00E+00*
13	1.30E-01	*2.62E-01*	0.00E+00	*0.00E+00*	3.55E+00	*2.56E+00*	0.00E+00	*0.00E+00*
14	1.34E-01	*2.92E-01*	0.00E+00	*0.00E+00*	3.53E+00	*2.36E+00*	0.00E+00	*0.00E+00*
15	1.30E-01	*2.68E-01*	0.00E+00	*0.00E+00*	3.54E+00	*2.52E+00*	0.00E+00	*0.00E+00*
16	1.32E-01	*2.71E-01*	0.00E+00	*0.00E+00*	3.55E+00	*2.72E+00*	0.00E+00	*0.00E+00*
17	1.36E-01	*3.06E-01*	0.00E+00	*0.00E+00*	3.53E+00	*2.53E+00*	0.00E+00	*0.00E+00*
18	1.76E-01	*4.53E-01*	0.00E+00	*0.00E+00*	3.31E+00	*1.69E+00*	0.00E+00	*0.00E+00*
19	2.02E-01	*5.20E-01*	0.00E+00	*0.00E+00*	3.08E+00	*7.29E-01*	0.00E+00	*0.00E+00*
20	2.03E-01	*5.29E-01*	0.00E+00	*0.00E+00*	3.09E+00	*6.72E-01*	0.00E+00	*0.00E+00*
21	1.76E-01	*5.01E-01*	0.00E+00	*0.00E+00*	3.27E+00	*8.81E-01*	0.00E+00	*0.00E+00*
22	2.18E-01	*5.55E-01*	0.00E+00	*0.00E+00*	3.02E+00	*4.70E-01*	0.00E+00	*0.00E+00*
23	2.07E-01	*5.99E-01*	0.00E+00	*0.00E+00*	3.21E+00	*2.27E-01*	0.00E+00	*0.00E+00*
24	2.46E-01	*6.13E-01*	0.00E+00	*0.00E+00*	2.96E+00	*8.59E-02*	0.00E+00	*0.00E+00*

Notes:
1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Draft EIR Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust; non-exhaust refers to running evaporative emissions.
3. Exhaust refers to idling emissions from vehicle exhaust; non-exhaust refers to idling evaporative emissions.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:
EIR: Environmental Impact Report
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 2d
Summary of Vehicular Gasoline TOG Emission Factors, Arterial Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	3.93E-02	*3.75E-02*	4.93E-02	*4.80E-02*	1.05E+00	*5.08E-02*	1.48E+00	*1.44E+00*
2	3.82E-02	*3.74E-02*	4.84E-02	*4.80E-02*	1.29E+00	*3.51E-02*	1.45E+00	*1.44E+00*
3	5.22E-02	*3.91E-02*	5.60E-02	*4.92E-02*	6.15E+00	*4.64E-01*	1.68E+00	*1.47E+00*
4	3.65E-02	*3.74E-02*	4.94E-02	*4.80E-02*	1.10E+00	*0.00E+00*	1.48E+00	*1.44E+00*
5	3.64E-02	*3.74E-02*	4.95E-02	*4.79E-02*	1.17E+00	*0.00E+00*	1.49E+00	*1.44E+00*
6	3.75E-02	*3.74E-02*	4.88E-02	*4.80E-02*	6.68E-01	*1.10E-02*	1.47E+00	*1.44E+00*
7	3.75E-02	*3.74E-02*	4.81E-02	*4.80E-02*	1.53E-01	*1.38E-02*	1.44E+00	*1.44E+00*
8	3.75E-02	*3.73E-02*	4.81E-02	*4.79E-02*	1.13E-01	*7.96E-03*	1.44E+00	*1.44E+00*
9	3.83E-02	*3.74E-02*	4.89E-02	*4.80E-02*	7.68E-01	*3.23E-02*	1.47E+00	*1.44E+00*
10	4.25E-02	*3.79E-02*	5.30E-02	*4.83E-02*	3.89E+00	*1.73E-01*	1.59E+00	*1.45E+00*
11	4.03E-02	*3.77E-02*	5.20E-02	*4.82E-02*	3.07E+00	*1.08E-01*	1.56E+00	*1.45E+00*
12	4.05E-02	*3.76E-02*	5.10E-02	*4.81E-02*	2.34E+00	*9.71E-02*	1.53E+00	*1.44E+00*
13	3.89E-02	*3.74E-02*	4.96E-02	*4.80E-02*	1.27E+00	*4.78E-02*	1.49E+00	*1.44E+00*
14	3.87E-02	*3.74E-02*	4.96E-02	*4.80E-02*	1.30E+00	*4.51E-02*	1.49E+00	*1.44E+00*
15	3.88E-02	*3.74E-02*	4.96E-02	*4.80E-02*	1.32E+00	*4.68E-02*	1.49E+00	*1.44E+00*
16	3.94E-02	*3.75E-02*	4.98E-02	*4.81E-02*	1.44E+00	*6.29E-02*	1.49E+00	*1.44E+00*
17	3.87E-02	*3.74E-02*	4.94E-02	*4.80E-02*	1.10E+00	*4.30E-02*	1.48E+00	*1.44E+00*
18	3.87E-02	*3.74E-02*	4.88E-02	*4.80E-02*	6.73E-01	*3.75E-02*	1.46E+00	*1.44E+00*
19	3.89E-02	*3.74E-02*	4.87E-02	*4.80E-02*	6.06E-01	*3.69E-02*	1.46E+00	*1.44E+00*
20	3.84E-02	*3.74E-02*	4.86E-02	*4.80E-02*	5.17E-01	*2.78E-02*	1.46E+00	*1.44E+00*
21	3.79E-02	*3.73E-02*	4.85E-02	*4.79E-02*	4.47E-01	*1.66E-02*	1.45E+00	*1.44E+00*
22	3.72E-02	*3.73E-02*	4.82E-02	*4.79E-02*	2.19E-01	*1.68E-03*	1.45E+00	*1.44E+00*
23	3.76E-02	*3.73E-02*	4.85E-02	*4.79E-02*	4.45E-01	*1.14E-02*	1.45E+00	*1.44E+00*
24	3.73E-02	*3.73E-02*	4.86E-02	*4.79E-02*	5.17E-01	*8.20E-03*	1.46E+00	*1.44E+00*

Notes:

1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Draft EIR Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust; non-exhaust refers to running evaporative emissions.
3. Exhaust refers to idling emissions from vehicle exhaust; non-exhaust refers to idling evaporative emissions.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:

EIR: Environmental Impact Report
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 2e
Summary of Vehicular PM2.5 Emission Factors, Local Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	1.73E-02	*1.57E-02*	7.06E-03	*6.97E-03*	3.01E-02	*1.69E-03*	0.00E+00	*0.00E+00*
2	1.68E-02	*1.57E-02*	7.09E-03	*6.97E-03*	3.24E-02	*1.19E-03*	0.00E+00	*0.00E+00*
3	2.55E-02	*1.77E-02*	7.38E-03	*6.99E-03*	1.42E-01	*1.27E-02*	0.00E+00	*0.00E+00*
4	1.66E-02	*1.59E-02*	7.14E-03	*6.97E-03*	2.40E-02	*5.46E-04*	0.00E+00	*0.00E+00*
5	1.59E-02	*1.57E-02*	7.11E-03	*6.97E-03*	1.97E-02	*1.66E-04*	0.00E+00	*0.00E+00*
6	1.92E-02	*1.60E-02*	7.11E-03	*6.97E-03*	4.70E-02	*2.72E-03*	0.00E+00	*0.00E+00*
7	1.71E-02	*1.60E-02*	7.01E-03	*6.97E-03*	1.69E-02	*3.12E-03*	0.00E+00	*0.00E+00*
8	1.61E-02	*1.55E-02*	6.99E-03	*6.97E-03*	8.79E-03	*1.21E-03*	0.00E+00	*0.00E+00*
9	1.88E-02	*1.58E-02*	7.06E-03	*6.97E-03*	4.37E-02	*3.43E-03*	0.00E+00	*0.00E+00*
10	2.82E-02	*1.71E-02*	7.33E-03	*6.99E-03*	1.66E-01	*1.39E-02*	0.00E+00	*0.00E+00*
11	2.59E-02	*1.67E-02*	7.27E-03	*6.98E-03*	1.36E-01	*1.04E-02*	0.00E+00	*0.00E+00*
12	2.31E-02	*1.63E-02*	7.19E-03	*6.98E-03*	1.00E-01	*7.13E-03*	0.00E+00	*0.00E+00*
13	2.01E-02	*1.59E-02*	7.10E-03	*6.97E-03*	6.14E-02	*3.97E-03*	0.00E+00	*0.00E+00*
14	1.94E-02	*1.58E-02*	7.09E-03	*6.97E-03*	5.39E-02	*3.39E-03*	0.00E+00	*0.00E+00*
15	2.00E-02	*1.59E-02*	7.10E-03	*6.97E-03*	6.03E-02	*3.84E-03*	0.00E+00	*0.00E+00*
16	2.06E-02	*1.60E-02*	7.11E-03	*6.97E-03*	6.66E-02	*4.96E-03*	0.00E+00	*0.00E+00*
17	1.93E-02	*1.59E-02*	7.08E-03	*6.97E-03*	5.09E-02	*3.73E-03*	0.00E+00	*0.00E+00*
18	1.71E-02	*1.57E-02*	7.02E-03	*6.97E-03*	2.24E-02	*1.96E-03*	0.00E+00	*0.00E+00*
19	1.68E-02	*1.55E-02*	7.01E-03	*6.97E-03*	1.84E-02	*1.28E-03*	0.00E+00	*0.00E+00*
20	1.65E-02	*1.55E-02*	7.00E-03	*6.97E-03*	1.54E-02	*1.01E-03*	0.00E+00	*0.00E+00*
21	1.64E-02	*1.55E-02*	7.01E-03	*6.97E-03*	1.46E-02	*8.07E-04*	0.00E+00	*0.00E+00*
22	1.56E-02	*1.54E-02*	6.99E-03	*6.97E-03*	5.77E-03	*2.03E-04*	0.00E+00	*0.00E+00*
23	1.58E-02	*1.55E-02*	7.00E-03	*6.97E-03*	9.77E-03	*3.91E-04*	0.00E+00	*0.00E+00*
24	1.56E-02	*1.54E-02*	7.00E-03	*6.97E-03*	8.36E-03	*2.51E-04*	0.00E+00	*0.00E+00*

Notes:
1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Draft EIR Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust; non-exhaust refers to running emissions from tire and brake wear.
3. Exhaust refers to idling emissions from vehicle exhaust; non-exhaust refers to idling emissions from tire and brake wear.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:
EIR: Environmental Impact Report
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 2f
Summary of Vehicular DPM Emission Factors, Local Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	5.73E-02	*2.02E-01*	0.00E+00	*0.00E+00*	7.27E-01	*1.46E-01*	0.00E+00	*0.00E+00*
2	4.43E-02	*2.11E-01*	0.00E+00	*0.00E+00*	7.46E-01	*9.91E-02*	0.00E+00	*0.00E+00*
3	3.88E-02	*2.35E-01*	0.00E+00	*0.00E+00*	7.27E-01	*0.00E+00*	0.00E+00	*0.00E+00*
4	6.84E-02	*2.09E-01*	0.00E+00	*0.00E+00*	6.36E-01	*1.55E-01*	0.00E+00	*0.00E+00*
5	5.48E-02	*2.19E-01*	0.00E+00	*0.00E+00*	6.45E-01	*6.51E-02*	0.00E+00	*0.00E+00*
6	8.85E-02	*1.65E-01*	0.00E+00	*0.00E+00*	7.48E-01	*4.51E-01*	0.00E+00	*0.00E+00*
7	1.06E-01	*1.79E-01*	0.00E+00	*0.00E+00*	7.27E-01	*5.54E-01*	0.00E+00	*0.00E+00*
8	9.93E-02	*1.84E-01*	0.00E+00	*0.00E+00*	6.96E-01	*4.00E-01*	0.00E+00	*0.00E+00*
9	8.95E-02	*1.54E-01*	0.00E+00	*0.00E+00*	7.79E-01	*5.80E-01*	0.00E+00	*0.00E+00*
10	8.60E-02	*1.27E-01*	0.00E+00	*0.00E+00*	7.99E-01	*7.18E-01*	0.00E+00	*0.00E+00*
11	8.90E-02	*1.31E-01*	0.00E+00	*0.00E+00*	7.97E-01	*6.93E-01*	0.00E+00	*0.00E+00*
12	8.86E-02	*1.36E-01*	0.00E+00	*0.00E+00*	7.94E-01	*6.46E-01*	0.00E+00	*0.00E+00*
13	8.94E-02	*1.45E-01*	0.00E+00	*0.00E+00*	7.86E-01	*5.69E-01*	0.00E+00	*0.00E+00*
14	9.04E-02	*1.51E-01*	0.00E+00	*0.00E+00*	7.80E-01	*5.25E-01*	0.00E+00	*0.00E+00*
15	8.83E-02	*1.46E-01*	0.00E+00	*0.00E+00*	7.85E-01	*5.61E-01*	0.00E+00	*0.00E+00*
16	9.02E-02	*1.48E-01*	0.00E+00	*0.00E+00*	7.87E-01	*6.02E-01*	0.00E+00	*0.00E+00*
17	8.94E-02	*1.55E-01*	0.00E+00	*0.00E+00*	7.81E-01	*5.59E-01*	0.00E+00	*0.00E+00*
18	9.35E-02	*1.84E-01*	0.00E+00	*0.00E+00*	7.25E-01	*3.69E-01*	0.00E+00	*0.00E+00*
19	1.02E-01	*1.94E-01*	0.00E+00	*0.00E+00*	6.65E-01	*1.62E-01*	0.00E+00	*0.00E+00*
20	9.78E-02	*1.96E-01*	0.00E+00	*0.00E+00*	6.63E-01	*1.49E-01*	0.00E+00	*0.00E+00*
21	8.77E-02	*1.91E-01*	0.00E+00	*0.00E+00*	7.04E-01	*1.96E-01*	0.00E+00	*0.00E+00*
22	9.49E-02	*2.01E-01*	0.00E+00	*0.00E+00*	6.33E-01	*1.05E-01*	0.00E+00	*0.00E+00*
23	7.20E-02	*2.10E-01*	0.00E+00	*0.00E+00*	6.40E-01	*5.05E-02*	0.00E+00	*0.00E+00*
24	8.03E-02	*2.12E-01*	0.00E+00	*0.00E+00*	5.75E-01	*1.91E-02*	0.00E+00	*0.00E+00*

Notes:
1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Draft EIR Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust.
3. Exhaust refers to idling emissions from vehicle exhaust.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:
EIR: Environmental Impact Report
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 2g
Summary of Vehicular Diesel TOG Emission Factors, Local Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	1.81E-01	*6.58E-01*	0.00E+00	*0.00E+00*	3.54E+00	*6.57E-01*	0.00E+00	*0.00E+00*
2	1.65E-01	*7.09E-01*	0.00E+00	*0.00E+00*	3.60E+00	*4.46E-01*	0.00E+00	*0.00E+00*
3	1.75E-01	*8.33E-01*	0.00E+00	*0.00E+00*	3.69E+00	*0.00E+00*	0.00E+00	*0.00E+00*
4	2.27E-01	*6.83E-01*	0.00E+00	*0.00E+00*	4.14E+00	*6.98E-01*	0.00E+00	*0.00E+00*
5	2.20E-01	*7.48E-01*	0.00E+00	*0.00E+00*	4.04E+00	*2.93E-01*	0.00E+00	*0.00E+00*
6	1.73E-01	*4.25E-01*	0.00E+00	*0.00E+00*	3.69E+00	*2.03E+00*	0.00E+00	*0.00E+00*
7	2.26E-01	*4.88E-01*	0.00E+00	*0.00E+00*	3.55E+00	*2.55E+00*	0.00E+00	*0.00E+00*
8	2.33E-01	*5.41E-01*	0.00E+00	*0.00E+00*	3.38E+00	*1.84E+00*	0.00E+00	*0.00E+00*
9	1.60E-01	*3.58E-01*	0.00E+00	*0.00E+00*	3.56E+00	*2.63E+00*	0.00E+00	*0.00E+00*
10	1.41E-01	*1.96E-01*	0.00E+00	*0.00E+00*	3.60E+00	*3.23E+00*	0.00E+00	*0.00E+00*
11	1.44E-01	*2.16E-01*	0.00E+00	*0.00E+00*	3.59E+00	*3.12E+00*	0.00E+00	*0.00E+00*
12	1.46E-01	*2.52E-01*	0.00E+00	*0.00E+00*	3.57E+00	*2.91E+00*	0.00E+00	*0.00E+00*
13	1.52E-01	*3.11E-01*	0.00E+00	*0.00E+00*	3.55E+00	*2.56E+00*	0.00E+00	*0.00E+00*
14	1.57E-01	*3.47E-01*	0.00E+00	*0.00E+00*	3.53E+00	*2.36E+00*	0.00E+00	*0.00E+00*
15	1.52E-01	*3.18E-01*	0.00E+00	*0.00E+00*	3.54E+00	*2.52E+00*	0.00E+00	*0.00E+00*
16	1.54E-01	*3.20E-01*	0.00E+00	*0.00E+00*	3.55E+00	*2.72E+00*	0.00E+00	*0.00E+00*
17	1.59E-01	*3.63E-01*	0.00E+00	*0.00E+00*	3.53E+00	*2.53E+00*	0.00E+00	*0.00E+00*
18	2.07E-01	*5.39E-01*	0.00E+00	*0.00E+00*	3.31E+00	*1.69E+00*	0.00E+00	*0.00E+00*
19	2.39E-01	*6.21E-01*	0.00E+00	*0.00E+00*	3.08E+00	*7.29E-01*	0.00E+00	*0.00E+00*
20	2.40E-01	*6.32E-01*	0.00E+00	*0.00E+00*	3.09E+00	*6.72E-01*	0.00E+00	*0.00E+00*
21	2.08E-01	*5.99E-01*	0.00E+00	*0.00E+00*	3.27E+00	*8.81E-01*	0.00E+00	*0.00E+00*
22	2.58E-01	*6.64E-01*	0.00E+00	*0.00E+00*	3.02E+00	*4.70E-01*	0.00E+00	*0.00E+00*
23	2.45E-01	*7.17E-01*	0.00E+00	*0.00E+00*	3.21E+00	*2.27E-01*	0.00E+00	*0.00E+00*
24	2.91E-01	*7.34E-01*	0.00E+00	*0.00E+00*	2.96E+00	*8.59E-02*	0.00E+00	*0.00E+00*

Notes:
1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Draft EIR Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust; non-exhaust refers to running evaporative emissions.
3. Exhaust refers to idling emissions from vehicle exhaust; non-exhaust refers to idling evaporative emissions.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:
EIR: Environmental Impact Report
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 2h
Summary of Vehicular Gasoline TOG Emission Factors, Local Roads
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Hour	Running Emission Factor[1] (grams/vehicle-mile)				Idling Emission Factor[1] (grams/vehicle-idling hour)			
	Exhaust[2]		Non-Exhaust[2]		Exhaust[3]		Non-Exhaust[3]	
	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]	All Vehicles[4]	*No HD Vehicles*[5]
1	4.65E-02	*4.44E-02*	5.92E-02	*5.77E-02*	1.05E+00	*5.08E-02*	1.48E+00	*1.44E+00*
2	4.53E-02	*4.43E-02*	5.96E-02	*5.76E-02*	1.29E+00	*3.51E-02*	1.45E+00	*1.44E+00*
3	6.16E-02	*4.63E-02*	6.72E-02	*5.90E-02*	6.15E+00	*4.64E-01*	1.68E+00	*1.47E+00*
4	4.33E-02	*4.43E-02*	5.93E-02	*5.76E-02*	1.10E+00	*0.00E+00*	1.48E+00	*1.44E+00*
5	4.32E-02	*4.42E-02*	5.94E-02	*5.75E-02*	1.17E+00	*0.00E+00*	1.49E+00	*1.44E+00*
6	4.44E-02	*4.43E-02*	5.86E-02	*5.76E-02*	6.68E-01	*1.10E-02*	1.47E+00	*1.44E+00*
7	4.44E-02	*4.43E-02*	5.78E-02	*5.76E-02*	1.53E-01	*1.38E-02*	1.44E+00	*1.44E+00*
8	4.43E-02	*4.42E-02*	5.77E-02	*5.75E-02*	1.13E-01	*7.96E-03*	1.44E+00	*1.44E+00*
9	4.53E-02	*4.43E-02*	5.87E-02	*5.76E-02*	7.68E-01	*3.23E-02*	1.47E+00	*1.44E+00*
10	5.04E-02	*4.48E-02*	6.36E-02	*5.80E-02*	3.89E+00	*1.73E-01*	1.59E+00	*1.45E+00*
11	4.77E-02	*4.46E-02*	6.23E-02	*5.78E-02*	3.07E+00	*1.08E-01*	1.56E+00	*1.45E+00*
12	4.79E-02	*4.45E-02*	6.12E-02	*5.78E-02*	2.34E+00	*9.71E-02*	1.53E+00	*1.44E+00*
13	4.60E-02	*4.43E-02*	5.95E-02	*5.76E-02*	1.27E+00	*4.78E-02*	1.49E+00	*1.44E+00*
14	4.58E-02	*4.43E-02*	5.95E-02	*5.76E-02*	1.30E+00	*4.51E-02*	1.49E+00	*1.44E+00*
15	4.59E-02	*4.43E-02*	5.96E-02	*5.76E-02*	1.32E+00	*4.68E-02*	1.49E+00	*1.44E+00*
16	4.67E-02	*4.44E-02*	5.98E-02	*5.77E-02*	1.44E+00	*6.29E-02*	1.49E+00	*1.44E+00*
17	4.58E-02	*4.43E-02*	5.92E-02	*5.76E-02*	1.10E+00	*4.30E-02*	1.48E+00	*1.44E+00*
18	4.58E-02	*4.43E-02*	5.85E-02	*5.76E-02*	6.73E-01	*3.75E-02*	1.46E+00	*1.44E+00*
19	4.60E-02	*4.43E-02*	5.84E-02	*5.76E-02*	6.06E-01	*3.69E-02*	1.46E+00	*1.44E+00*
20	4.55E-02	*4.42E-02*	5.83E-02	*5.76E-02*	5.17E-01	*2.78E-02*	1.46E+00	*1.44E+00*
21	4.48E-02	*4.42E-02*	5.82E-02	*5.75E-02*	4.47E-01	*1.66E-02*	1.45E+00	*1.44E+00*
22	4.40E-02	*4.41E-02*	5.78E-02	*5.75E-02*	2.19E-01	*1.68E-03*	1.45E+00	*1.44E+00*
23	4.45E-02	*4.42E-02*	5.82E-02	*5.75E-02*	4.45E-01	*1.14E-02*	1.45E+00	*1.44E+00*
24	4.42E-02	*4.41E-02*	5.83E-02	*5.75E-02*	5.17E-01	*8.20E-03*	1.46E+00	*1.44E+00*

Notes:
1. The emission factors for each vehicle class were extracted from EMFAC2007 and were weighted by default hourly fraction of trip in EMFAC2007 to yield composite hourly emission factors. Detailed discussion of the methodology is presented in Draft EIR Attachment IV section 4.2.
2. Exhaust refers to running emissions from vehicle exhaust; non-exhaust refers to running evaporative emissions.
3. Exhaust refers to idling emissions from vehicle exhaust; non-exhaust refers to idling evaporative emissions.
4. The emission factors for all vehicles are used for road segments with no truck restrictions.
5. The emission factors for all vehicles, excluding heavy-duty vehicles, are used for road segments with truck restrictions which forbid trucks over 14,000 lbs. Those emission factors are shown in *italics.*

Abbreviations:
EIR: Environmental Impact Report
HD: heavy duty vehicle, and refers to vehicles with a gross vehicle rating of 10,001 pounds or more.

Table 3a
Summary of All Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

		Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Hour 24
Fraction of Trips/Day, All Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.017	0.051	0.055	0.062	0.062	0.080	0.084	0.069	0.074	0.079	0.073	0.073	0.059	0.047	0.031	0.027	0.019	0.016
Fraction of Trips/Day, All but HD Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.019	0.057	0.056	0.048	0.051	0.072	0.083	0.069	0.074	0.078	0.074	0.079	0.064	0.051	0.034	0.030	0.021	0.017
Segment	**Direction**	**Hourly Traffic Volume (Vehicles / Hour)**																							
101 Ramp to 12	Southbound	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101 Ramp to 12	Northbound	164	82	40	34	55	90	356	1,045	1,113	1,275	1,259	1,623	1,708	1,405	1,518	1,616	1,495	1,491	1,198	951	638	544	388	326
12 to 11	Southbound	13	7	3	3	4	7	29	85	90	104	102	132	139	114	123	131	121	121	97	77	52	44	32	27
12 to 11	Northbound	157	79	39	32	53	87	342	1,005	1,070	1,227	1,211	1,561	1,643	1,352	1,460	1,554	1,438	1,434	1,153	915	613	524	373	314
11 to 10	Southbound	164	82	40	34	55	90	356	1,046	1,114	1,276	1,260	1,625	1,710	1,407	1,519	1,618	1,496	1,492	1,200	952	638	545	388	327
11 to 10	Northbound	164	83	40	34	55	90	357	1,050	1,118	1,281	1,265	1,631	1,716	1,412	1,525	1,624	1,502	1,498	1,204	956	641	547	390	328
10 to 9	Southbound	155	78	38	32	52	85	336	988	1,052	1,205	1,190	1,534	1,615	1,328	1,435	1,528	1,413	1,409	1,133	899	603	515	367	309
10 to 9	Northbound	166	83	41	34	56	91	360	1,060	1,128	1,293	1,276	1,645	1,731	1,425	1,539	1,638	1,515	1,511	1,215	964	646	552	393	331
9 to 8	Southbound	180	90	44	37	60	99	391	1,150	1,224	1,402	1,385	1,785	1,878	1,546	1,669	1,777	1,644	1,640	1,318	1,046	701	599	427	359
9 to 8	Northbound	186	93	46	38	62	102	404	1,187	1,264	1,448	1,430	1,844	1,940	1,596	1,724	1,836	1,698	1,694	1,361	1,081	724	618	441	371
8 to 56	Southbound	197	99	48	40	66	108	428	1,258	1,339	1,535	1,515	1,953	2,056	1,691	1,827	1,945	1,799	1,794	1,442	1,145	768	655	467	393
8 to 56	Northbound	196	98	48	40	66	108	426	1,252	1,333	1,527	1,508	1,944	2,045	1,683	1,818	1,935	1,790	1,786	1,435	1,139	764	652	465	391
56 to 7	Southbound	199	100	49	41	67	109	432	1,269	1,351	1,548	1,529	1,971	2,074	1,706	1,843	1,962	1,815	1,810	1,455	1,155	774	661	471	396
56 to 7	Northbound	198	100	49	41	67	109	431	1,266	1,348	1,545	1,525	1,966	2,069	1,702	1,838	1,957	1,810	1,806	1,452	1,152	772	659	470	395
7 to 6	Southbound	209	105	51	43	70	115	454	1,334	1,420	1,627	1,606	2,071	2,179	1,793	1,937	2,062	1,907	1,903	1,529	1,214	814	695	495	417
7 to 6	Northbound	213	107	52	44	72	117	463	1,362	1,450	1,662	1,641	2,115	2,226	1,831	1,978	2,106	1,948	1,943	1,562	1,240	831	709	506	425
6 to 5	Southbound	207	104	51	42	70	114	450	1,324	1,409	1,615	1,594	2,056	2,163	1,780	1,922	2,047	1,893	1,888	1,518	1,205	808	689	491	413
6 to 5	Northbound	206	103	50	42	69	113	447	1,313	1,398	1,602	1,582	2,039	2,146	1,765	1,907	2,030	1,878	1,873	1,505	1,195	801	684	487	410
5 to 57	Southbound	203	102	50	42	68	111	440	1,294	1,378	1,579	1,559	2,010	2,115	1,740	1,879	2,001	1,850	1,846	1,484	1,178	790	674	480	404
5 to 57	Northbound	203	102	50	42	68	112	442	1,300	1,384	1,586	1,566	2,018	2,124	1,748	1,887	2,010	1,858	1,854	1,490	1,183	793	677	482	406
57 to 4	Southbound	198	99	48	40	66	109	429	1,262	1,344	1,540	1,520	1,960	2,063	1,697	1,833	1,952	1,805	1,801	1,447	1,149	770	657	468	394
57 to 4	Northbound	214	108	53	44	72	118	466	1,369	1,458	1,670	1,649	2,126	2,237	1,841	1,988	2,117	1,958	1,953	1,570	1,246	835	713	508	428
4 to 3	Southbound	218	110	54	45	73	120	474	1,394	1,484	1,700	1,679	2,164	2,277	1,874	2,024	2,155	1,993	1,988	1,598	1,269	850	726	517	435
4 to 3	Northbound	208	105	51	43	70	115	453	1,331	1,417	1,624	1,603	2,067	2,175	1,790	1,933	2,058	1,903	1,899	1,526	1,212	812	693	494	416
34 to 9	Eastbound	109	53	20	22	36	58	248	737	732	624	665	939	1,080	898	959	1,013	965	1,022	829	661	442	383	270	227
34 to 9	Westbound	100	49	18	20	33	54	228	679	674	575	612	865	995	828	883	933	889	941	764	609	407	353	249	209
9 to 18	Eastbound	118	59	29	24	40	65	257	755	804	922	910	1,173	1,234	1,016	1,097	1,168	1,080	1,078	866	688	461	393	280	236
9 to 18	Westbound	95	48	23	19	32	52	206	605	644	738	729	940	989	814	879	936	865	863	694	551	369	315	225	189
30 to 54	Eastbound	65	32	12	13	22	35	147	439	436	371	396	559	643	535	571	603	574	608	493	393	263	228	161	135
30 to 54	Westbound	63	31	12	13	21	34	144	427	424	361	385	544	625	520	555	586	559	592	480	383	256	222	156	132
54 to 55	Eastbound	66	32	12	13	22	36	151	449	446	380	405	572	658	547	584	617	588	622	505	402	269	234	164	138
54 to 55	Westbound	68	33	12	14	23	36	154	459	456	388	414	585	672	559	597	630	601	636	516	411	275	239	168	141
55 to 6	Eastbound	71	34	13	14	23	38	161	478	474	404	431	609	700	582	621	656	626	662	537	428	287	249	175	147
55 to 6	Westbound	71	34	13	14	23	38	161	478	475	404	431	609	700	582	622	656	626	662	537	428	287	249	175	147
6 to 5	Southbound	207	104	51	42	70	114	450	1,324	1,409	1,615	1,594	2,056	2,163	1,780	1,922	2,047	1,893	1,888	1,518	1,205	808	689	491	413
6 to 5	Northbound	206	103	50	42	69	113	447	1,313	1,398	1,602	1,582	2,039	2,146	1,765	1,907	2,030	1,878	1,873	1,505	1,195	801	684	487	410
47 to 46	Eastbound	84	42	21	17	28	46	184	540	575	659	650	838	882	726	784	835	772	770	619	491	329	281	200	169
47 to 46	Westbound	108	54	26	22	36	59	234	687	731	838	828	1,067	1,123	924	998	1,062	982	980	788	625	419	358	255	215
46 to 48	Eastbound	94	47	23	19	31	52	204	599	638	731	722	930	979	806	870	926	857	855	687	545	366	312	222	187
46 to 48	Westbound	160	81	39	33	54	88	348	1,024	1,090	1,249	1,233	1,590	1,673	1,377	1,487	1,583	1,464	1,461	1,174	932	625	533	380	320
48 to 4	Eastbound	148	74	36	30	50	81	322	946	1,007	1,154	1,140	1,469	1,546	1,272	1,374	1,463	1,353	1,350	1,085	861	577	493	351	296
48 to 4	Westbound	148	75	36	30	50	82	323	948	1,010	1,157	1,142	1,473	1,550	1,275	1,377	1,466	1,356	1,353	1,087	863	579	494	352	296
4 to 58	Eastbound	76	38	19	16	25	42	165	485	516	591	584	753	792	652	704	749	693	691	556	441	296	252	180	151
4 to 58	Westbound	77	39	19	16	26	43	168	495	527	604	596	768	808	665	718	765	707	706	567	450	302	258	184	155
58 to 16	Southbound	116	58	29	24	39	64	253	743	791	906	895	1,154	1,214	999	1,079	1,149	1,062	1,060	852	676	453	387	276	232
58 to 16	Northbound	171	86	42	35	57	94	371	1,090	1,160	1,329	1,313	1,692	1,781	1,465	1,582	1,685	1,558	1,555	1,249	992	665	567	404	340
29 to 59	Northbound	156	78	38	32	52	86	339	996	1,060	1,215	1,200	1,547	1,628	1,339	1,446	1,540	1,424	1,421	1,142	907	608	519	370	311
29 to 59	Westbound	136	68	33	28	46	75	296	869	925	1,060	1,046	1,349	1,420	1,168	1,261	1,343	1,242	1,239	996	791	530	452	322	271
59 to 60	Eastbound	165	83	40	34	55	91	358	1,052	1,120	1,284	1,268	1,634	1,720	1,415	1,528	1,627	1,505	1,501	1,207	958	642	548	391	329
59 to 60	Westbound	143	72	35	29	48	78	310	911	970	1,111	1,097	1,415	1,489	1,225	1,323	1,408	1,303	1,299	1,044	829	556	474	338	285
60 to 28	Eastbound	206	104	51	42	69	113	448	1,318	1,403	1,608	1,588	2,047	2,154	1,772	1,914	2,038	1,885	1,880	1,511	1,200	804	686	489	412
60 to 28	Westbound	226	114	55	46	76	124	491	1,444	1,537	1,761	1,739	2,242	2,359	1,941	2,097	2,232	2,065	2,060	1,655	1,314	881	752	536	451

Table 3a
Summary of All Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

		Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Hour 24
Fraction of Trips/Day, All Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.017	0.051	0.055	0.062	0.062	0.080	0.084	0.069	0.074	0.079	0.073	0.073	0.059	0.047	0.031	0.027	0.019	0.016
Fraction of Trips/Day, All but HD Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.019	0.057	0.056	0.048	0.051	0.072	0.083	0.069	0.074	0.078	0.074	0.079	0.064	0.051	0.034	0.030	0.021	0.017
Segment	**Direction**	**Hourly Traffic Volume (Vehicles / Hour)**																							
10 to East	Eastbound	8	4	1	2	3	4	18	52	52	44	47	67	77	64	68	72	68	73	59	47	31	27	19	16
10 to East	Westbound	18	9	3	4	6	10	41	122	121	103	110	155	179	149	159	167	160	169	137	109	73	63	45	38
11 to 29	Eastbound	53	26	10	11	18	29	122	362	359	306	326	461	530	441	470	497	473	501	407	324	217	188	132	111
11 to 29	Westbound	72	35	13	15	24	39	164	489	486	414	441	623	717	596	636	672	640	678	550	438	293	254	179	151
33 to 3rd Street	Eastbound	5	3	1	1	2	3	12	35	37	42	42	54	57	47	50	54	50	50	40	32	21	18	13	11
33 to 3rd Street	Westbound	3	2	1	1	1	2	7	21	23	26	26	33	35	29	31	33	31	31	25	20	13	11	8	7
33 to Project	Eastbound	9	4	2	2	3	5	19	55	59	67	66	86	90	74	80	85	79	79	63	50	34	29	20	17
33 to Project	Westbound	8	4	2	2	3	4	16	48	51	59	58	75	79	65	70	74	69	69	55	44	29	25	18	15
8 to 32	Eastbound	35	18	9	7	12	19	76	224	238	273	270	348	366	301	325	346	320	319	257	204	137	117	83	70
8 to 32	Westbound	44	22	11	9	15	24	95	278	296	339	335	432	454	374	404	430	398	397	319	253	170	145	103	87
32 to Project	Eastbound	83	41	20	17	28	45	179	527	561	643	635	819	862	709	766	815	754	752	605	480	322	275	196	165
32 to Project	Westbound	39	20	10	8	13	22	85	250	267	306	302	389	409	337	364	387	358	357	287	228	153	130	93	78
31 to 3rd Street	Eastbound	9	4	2	2	3	5	19	55	59	67	66	86	90	74	80	85	79	79	63	50	34	29	20	17
31 to 3rd Street	Westbound	11	6	3	2	4	6	25	73	77	89	87	113	119	98	105	112	104	104	83	66	44	38	27	23
31 to Project	Eastbound	40	20	10	8	13	22	87	256	272	312	308	397	418	344	371	395	366	365	293	233	156	133	95	80
31 to Project	Westbound	42	21	10	9	14	23	92	271	288	330	326	421	443	364	393	419	387	386	310	246	165	141	101	85
56 to East	Eastbound	31	16	8	6	11	17	68	200	213	245	241	311	328	270	291	310	287	286	230	182	122	104	74	63
56 to East	Westbound	25	12	6	5	8	14	54	157	168	192	190	245	257	212	229	243	225	225	181	143	96	82	58	49
34 to 29	Northbound	96	48	23	20	32	53	208	610	650	744	735	948	997	820	886	943	873	870	700	555	372	318	226	191
34 to 29	Southbound	104	52	25	21	35	57	226	664	706	809	799	1,030	1,084	892	964	1,026	949	947	761	604	405	346	246	207
34 to North	Northbound	98	49	24	20	33	54	214	629	669	767	757	976	1,027	845	913	972	899	897	721	572	384	327	233	196
34 to North	Southbound	95	48	23	19	32	52	206	606	645	740	730	941	991	815	880	937	867	865	695	552	370	316	225	189
54 to 31	Northbound	31	15	7	6	10	17	66	195	208	238	235	303	319	263	284	302	279	279	224	178	119	102	72	61
54 to 31	Southbound	32	16	8	7	11	18	69	203	217	248	245	316	332	273	295	314	291	290	233	185	124	106	75	64
31 to 32	Northbound	70	35	17	14	23	38	152	446	475	544	537	692	729	600	647	689	638	636	511	406	272	232	165	139
31 to 32	Southbound	66	33	16	14	22	36	144	423	450	516	510	657	691	569	614	654	605	604	485	385	258	220	157	132
32 to 33	Northbound	24	12	6	5	8	13	52	153	163	187	185	238	251	206	223	237	219	219	176	140	94	80	57	48
32 to 33	Southbound	24	12	6	5	8	13	53	154	164	188	186	240	252	208	224	239	221	220	177	141	94	80	57	48
7 to East	Eastbound	26	13	5	5	9	14	59	175	174	148	158	223	257	214	228	241	230	243	197	157	105	91	64	54
7 to East	Westbound	27	13	5	5	9	14	61	182	181	154	165	232	267	222	237	251	239	253	205	163	109	95	67	56
34 to Project	Eastbound	23	11	4	5	8	13	53	159	158	134	143	202	233	193	206	218	208	220	179	142	95	83	58	49
34 to Project	Westbound	13	6	2	3	4	7	29	86	85	73	78	110	126	105	112	118	113	119	97	77	52	45	31	27

Table 3b
Summary of Diesel Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

		Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Hour 24
Fraction of Trips/Day, All Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.017	0.051	0.055	0.062	0.062	0.080	0.084	0.069	0.074	0.079	0.073	0.073	0.059	0.047	0.031	0.027	0.019	0.016
Fraction of Trips/Day, All but HD Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.019	0.057	0.056	0.048	0.051	0.072	0.083	0.069	0.074	0.078	0.074	0.079	0.064	0.051	0.034	0.030	0.021	0.017
Diesel Scaling Factor, All Vehicles		0.030	0.047	0.062	0.040	0.032	0.072	0.027	0.014	0.055	0.190	0.159	0.108	0.071	0.058	0.069	0.073	0.059	0.018	0.010	0.010	0.015	0.009	0.011	0.007
Diesel Scaling Factor, All but HD Vehicles		0.003	0.003	0.005	0.005	0.003	0.007	0.006	0.003	0.006	0.017	0.014	0.009	0.006	0.006	0.006	0.007	0.006	0.003	0.002	0.002	0.002	0.002	0.002	0.002
Segment	**Direction**	**Hourly Traffic Volume (Vehicles / Hour)**																							
101 Ramp to 12	Southbound	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101 Ramp to 12	Northbound	5	4	2	1	2	7	10	15	61	242	200	175	121	82	105	118	88	27	12	10	10	5	4	2
12 to 11	Southbound	0	0	0	0	0	1	1	1	5	20	16	14	10	7	9	10	7	2	1	1	1	0	0	0
12 to 11	Northbound	5	4	2	1	2	6	9	14	59	233	193	168	117	79	101	114	84	26	12	10	9	5	4	2
11 to 10	Southbound	5	4	2	1	2	7	10	15	61	243	201	175	121	82	105	118	88	27	12	10	10	5	4	2
11 to 10	Northbound	5	4	3	1	2	7	10	15	62	244	201	176	122	82	106	119	88	27	12	10	10	5	4	2
10 to 9	Southbound	5	4	2	1	2	6	9	14	58	229	189	165	115	77	100	112	83	25	12	9	9	4	4	2
10 to 9	Northbound	5	4	3	1	2	7	10	15	62	246	203	177	123	83	107	120	89	27	13	10	10	5	4	2
9 to 8	Southbound	5	4	3	1	2	7	11	16	67	267	220	192	133	90	116	130	96	29	14	11	11	5	5	3
9 to 8	Northbound	5	4	3	2	2	7	11	17	70	275	228	199	138	93	120	134	100	30	14	11	11	5	5	3
8 to 56	Southbound	6	5	3	2	2	8	12	18	74	292	241	210	146	98	127	142	105	32	15	12	12	6	5	3
8 to 56	Northbound	6	5	3	2	2	8	12	18	73	290	240	209	145	98	126	142	105	32	15	12	12	6	5	3
56 to 7	Southbound	6	5	3	2	2	8	12	18	74	294	243	212	147	99	128	144	106	32	15	12	12	6	5	3
56 to 7	Northbound	6	5	3	2	2	8	12	18	74	294	243	212	147	99	128	143	106	32	15	12	12	6	5	3
7 to 6	Southbound	6	5	3	2	2	8	12	19	78	309	256	223	155	104	134	151	112	34	16	13	12	6	5	3
7 to 6	Northbound	6	5	3	2	2	8	13	19	80	316	261	228	158	107	137	154	114	35	16	13	13	6	5	3
6 to 5	Southbound	6	5	3	2	2	8	12	19	78	307	254	221	153	104	133	150	111	34	16	13	12	6	5	3
6 to 5	Northbound	6	5	3	2	2	8	12	19	77	304	252	220	152	103	132	149	110	33	16	13	12	6	5	3
5 to 57	Southbound	6	5	3	2	2	8	12	18	76	300	248	216	150	101	130	146	108	33	15	12	12	6	5	3
5 to 57	Northbound	6	5	3	2	2	8	12	18	76	301	249	217	151	102	131	147	109	33	15	12	12	6	5	3
57 to 4	Southbound	6	5	3	2	2	8	12	18	74	293	242	211	146	99	127	143	106	32	15	12	12	6	5	3
57 to 4	Northbound	6	5	3	2	2	9	13	19	80	317	262	229	159	107	138	155	115	35	16	13	13	6	6	3
4 to 3	Southbound	6	5	3	2	2	9	13	20	82	323	267	233	162	109	140	158	117	36	17	13	13	6	6	3
4 to 3	Northbound	6	5	3	2	2	8	12	19	78	309	255	223	154	104	134	151	112	34	16	13	12	6	5	3
34 to 9	Eastbound	0	0	0	0	0	0	2	2	4	11	10	9	7	5	6	7	6	3	2	1	1	1	1	0
34 to 9	Westbound	0	0	0	0	0	0	1	2	4	10	9	8	6	5	5	7	5	3	2	1	1	1	1	0
9 to 18	Eastbound	3	3	2	1	1	5	7	11	44	175	145	126	88	59	76	86	63	19	9	7	7	3	3	2
9 to 18	Westbound	3	2	1	1	1	4	6	9	36	140	116	101	70	47	61	69	51	15	7	6	6	3	2	1
30 to 54	Eastbound	0	0	0	0	0	0	1	1	3	6	6	5	4	3	4	4	3	2	1	1	1	0	0	0
30 to 54	Westbound	0	0	0	0	0	0	1	1	2	6	6	5	4	3	3	4	3	2	1	1	1	0	0	0
54 to 55	Eastbound	0	0	0	0	0	0	1	1	3	7	6	5	4	3	4	4	4	2	1	1	1	0	0	0
54 to 55	Westbound	0	0	0	0	0	0	1	1	3	7	6	5	4	3	4	5	4	2	1	1	1	0	0	0
55 to 6	Eastbound	0	0	0	0	0	0	1	2	3	7	6	6	4	3	4	5	4	2	1	1	1	1	0	0
55 to 6	Westbound	0	0	0	0	0	0	1	2	3	7	6	6	4	3	4	5	4	2	1	1	1	1	0	0
6 to 5	Southbound	6	5	3	2	2	8	12	19	78	307	254	221	153	104	133	150	111	34	16	13	12	6	5	3
6 to 5	Northbound	6	5	3	2	2	8	12	19	77	304	252	220	152	103	132	149	110	33	16	13	12	6	5	3
47 to 46	Eastbound	2	2	1	1	1	3	5	8	32	125	103	90	63	42	54	61	45	14	6	5	5	2	2	1
47 to 46	Westbound	3	3	2	1	1	4	6	10	40	159	132	115	80	54	69	78	58	18	8	7	6	3	3	2
46 to 48	Eastbound	3	2	1	1	1	4	6	8	35	139	115	100	69	47	60	68	50	15	7	6	6	3	2	1
46 to 48	Westbound	5	4	2	1	2	6	9	14	60	237	196	171	119	80	103	116	86	26	12	10	10	5	4	2
48 to 4	Eastbound	4	3	2	1	2	6	9	13	56	219	181	158	110	74	95	107	79	24	11	9	9	4	4	2
48 to 4	Westbound	4	3	2	1	2	6	9	13	56	220	182	159	110	74	96	107	80	24	11	9	9	4	4	2
4 to 58	Eastbound	2	2	1	1	1	3	4	7	28	112	93	81	56	38	49	55	41	12	6	5	5	2	2	1
4 to 58	Westbound	2	2	1	1	1	3	5	7	29	115	95	83	57	39	50	56	41	13	6	5	5	2	2	1
58 to 16	Southbound	3	3	2	1	1	5	7	10	44	172	142	124	86	58	75	84	62	19	9	7	7	3	3	2
58 to 16	Northbound	5	4	3	1	2	7	10	15	64	253	209	182	126	85	110	123	91	28	13	10	10	5	4	2
29 to 59	Northbound	5	4	2	1	2	6	9	14	58	231	191	167	115	78	100	113	83	25	12	10	9	5	4	2
29 to 59	Westbound	4	3	2	1	1	5	8	12	51	201	167	145	101	68	88	98	73	22	10	8	8	4	4	2
59 to 60	Eastbound	5	4	3	1	2	7	10	15	62	244	202	176	122	82	106	119	88	27	12	10	10	5	4	2
59 to 60	Westbound	4	3	2	1	2	6	8	13	53	211	175	152	106	71	92	103	76	23	11	9	9	4	4	2

Table 3b
Summary of Diesel Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

		Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Hour 24
Fraction of Trips/Day, All Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.017	0.051	0.055	0.062	0.062	0.080	0.084	0.069	0.074	0.079	0.073	0.073	0.059	0.047	0.031	0.027	0.019	0.016
Fraction of Trips/Day, All but HD Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.019	0.057	0.056	0.048	0.051	0.072	0.083	0.069	0.074	0.078	0.074	0.079	0.064	0.051	0.034	0.030	0.021	0.017
Diesel Scaling Factor, All Vehicles		0.030	0.047	0.062	0.040	0.032	0.072	0.027	0.014	0.055	0.190	0.159	0.108	0.071	0.058	0.069	0.073	0.059	0.018	0.010	0.010	0.015	0.009	0.011	0.007
Diesel Scaling Factor, All but HD Vehicles		0.003	0.003	0.005	0.005	0.003	0.007	0.006	0.003	0.006	0.017	0.014	0.009	0.006	0.006	0.006	0.007	0.006	0.003	0.002	0.002	0.002	0.002	0.002	0.002
Segment	**Direction**	**Hourly Traffic Volume (Vehicles / Hour)**																							
60 to 28	Eastbound	6	5	3	2	2	8	12	19	77	306	253	220	153	103	133	149	110	34	16	13	12	6	5	3
60 to 28	Westbound	7	5	3	2	2	9	13	20	85	335	277	241	167	113	146	163	121	37	17	14	13	7	6	3
10 to East	Eastbound	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0
10 to East	Westbound	0	0	0	0	0	0	0	0	1	2	2	1	1	1	1	1	1	1	0	0	0	0	0	0
11 to 29	Eastbound	0	0	0	0	0	0	1	1	2	5	5	4	3	2	3	4	3	2	1	1	1	0	0	0
11 to 29	Westbound	0	0	0	0	0	0	1	2	3	7	6	6	5	3	4	5	4	2	1	1	1	1	0	0
33 to 3rd Street	Eastbound	0	0	0	0	0	0	0	0	2	8	7	6	4	3	4	4	3	1	0	0	0	0	0	0
33 to 3rd Street	Westbound	0	0	0	0	0	0	0	0	1	5	4	4	2	2	2	2	2	1	0	0	0	0	0	0
33 to Project	Eastbound	0	0	0	0	0	0	1	1	3	13	11	9	6	4	6	6	5	1	1	1	1	0	0	0
33 to Project	Westbound	0	0	0	0	0	0	0	1	3	11	9	8	6	4	5	5	4	1	1	0	0	0	0	0
8 to 32	Eastbound	1	1	1	0	0	1	2	3	13	52	43	37	26	18	23	25	19	6	3	2	2	1	1	0
8 to 32	Westbound	1	1	1	0	0	2	3	4	16	64	53	47	32	22	28	31	23	7	3	3	3	1	1	1
32 to Project	Eastbound	2	2	1	1	1	3	5	7	31	122	101	88	61	41	53	60	44	13	6	5	5	2	2	1
32 to Project	Westbound	1	1	1	0	0	2	2	4	15	58	48	42	29	20	25	28	21	6	3	2	2	1	1	1
31 to 3rd Street	Eastbound	0	0	0	0	0	0	1	1	3	13	11	9	6	4	6	6	5	1	1	1	1	0	0	0
31 to 3rd Street	Westbound	0	0	0	0	0	0	1	1	4	17	14	12	8	6	7	8	6	2	1	1	1	0	0	0
31 to Project	Eastbound	1	1	1	0	0	2	2	4	15	59	49	43	30	20	26	29	21	7	3	2	2	1	1	1
31 to Project	Westbound	1	1	1	0	0	2	2	4	16	63	52	45	31	21	27	31	23	7	3	3	3	1	1	1
56 to East	Eastbound	1	1	0	0	0	1	2	3	12	46	38	34	23	16	20	23	17	5	2	2	2	1	1	0
56 to East	Westbound	1	1	0	0	0	1	1	2	9	37	30	26	18	12	16	18	13	4	2	2	1	1	1	0
34 to 29	Northbound	3	2	1	1	1	4	6	9	36	141	117	102	71	48	62	69	51	16	7	6	6	3	2	1
34 to 29	Southbound	3	2	2	1	1	4	6	9	39	154	127	111	77	52	67	75	56	17	8	6	6	3	3	1
34 to North	Northbound	3	2	1	1	1	4	6	9	37	146	121	105	73	49	63	71	53	16	7	6	6	3	3	1
34 to North	Southbound	3	2	1	1	1	4	6	9	36	141	116	101	70	47	61	69	51	15	7	6	6	3	2	1
54 to 31	Northbound	1	1	0	0	0	1	2	3	11	45	37	33	23	15	20	22	16	5	2	2	2	1	1	0
54 to 31	Southbound	1	1	0	0	0	1	2	3	12	47	39	34	24	16	21	23	17	5	2	2	2	1	1	0
31 to 32	Northbound	2	2	1	1	1	3	4	6	26	103	85	75	52	35	45	50	37	11	5	4	4	2	2	1
31 to 32	Southbound	2	2	1	1	1	3	4	6	25	98	81	71	49	33	43	48	35	11	5	4	4	2	2	1
32 to 33	Northbound	1	1	0	0	0	1	1	2	9	36	29	26	18	12	15	17	13	4	2	1	1	1	1	0
32 to 33	Southbound	1	1	0	0	0	1	1	2	9	36	30	26	18	12	16	17	13	4	2	1	1	1	1	0
7 to East	Eastbound	0	0	0	0	0	0	0	1	1	3	2	2	2	1	1	2	1	1	0	0	0	0	0	0
7 to East	Westbound	0	0	0	0	0	0	0	1	1	3	2	2	2	1	1	2	1	1	0	0	0	0	0	0
34 to Project	Eastbound	0	0	0	0	0	0	0	1	1	2	2	2	1	1	1	2	1	1	0	0	0	0	0	0
34 to Project	Westbound	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0

Table 3c
Summary of Gasoline Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

		Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Hour 24
Fraction of Trips/Day, All Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.017	0.051	0.055	0.062	0.062	0.080	0.084	0.069	0.074	0.079	0.073	0.073	0.059	0.047	0.031	0.027	0.019	0.016
Fraction of Trips/Day, All but HD Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.019	0.057	0.056	0.048	0.051	0.072	0.083	0.069	0.074	0.078	0.074	0.079	0.064	0.051	0.034	0.030	0.021	0.017
Gasoline Scaling Factor, All Vehicles		0.956	0.939	0.927	0.946	0.954	0.914	0.958	0.971	0.931	0.800	0.830	0.880	0.915	0.928	0.917	0.913	0.927	0.967	0.975	0.974	0.970	0.976	0.974	0.978
Gasoline Scaling Factor, All but HD Vehicles		0.982	0.981	0.979	0.980	0.981	0.977	0.978	0.981	0.979	0.967	0.970	0.975	0.978	0.979	0.978	0.977	0.978	0.981	0.982	0.982	0.982	0.982	0.982	0.982
Segment	**Direction**	**Hourly Traffic Volume (Vehicles / Hour)**																							
101 Ramp to 12	Southbound	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101 Ramp to 12	Northbound	156	77	37	32	52	82	341	1,015	1,035	1,020	1,044	1,428	1,563	1,304	1,392	1,476	1,386	1,442	1,168	927	618	531	378	319
12 to 11	Southbound	13	6	3	3	4	7	28	82	84	83	85	116	127	106	113	120	113	117	95	75	50	43	31	26
12 to 11	Northbound	150	74	36	30	50	79	328	976	996	981	1,005	1,374	1,504	1,254	1,339	1,420	1,333	1,387	1,123	892	595	511	363	307
11 to 10	Southbound	157	77	37	32	52	82	341	1,015	1,036	1,021	1,045	1,430	1,565	1,305	1,393	1,477	1,387	1,443	1,169	928	619	532	378	320
11 to 10	Northbound	157	78	37	32	53	83	342	1,019	1,041	1,025	1,049	1,435	1,571	1,310	1,398	1,483	1,393	1,449	1,174	932	621	534	380	321
10 to 9	Southbound	148	73	35	30	50	78	322	959	979	964	987	1,350	1,478	1,233	1,316	1,395	1,310	1,363	1,104	876	585	502	357	302
10 to 9	Northbound	159	78	38	32	53	83	345	1,028	1,050	1,033	1,059	1,448	1,585	1,322	1,411	1,496	1,405	1,462	1,184	940	627	538	383	324
9 to 8	Southbound	172	85	41	35	58	90	375	1,116	1,139	1,121	1,149	1,571	1,719	1,434	1,531	1,623	1,524	1,586	1,284	1,020	680	584	416	351
9 to 8	Northbound	178	88	42	36	60	93	387	1,152	1,176	1,158	1,186	1,622	1,776	1,481	1,581	1,676	1,574	1,638	1,327	1,053	702	603	429	363
8 to 56	Southbound	188	93	45	38	63	99	410	1,221	1,246	1,227	1,257	1,719	1,882	1,569	1,675	1,776	1,668	1,736	1,406	1,116	744	639	455	384
8 to 56	Northbound	187	92	45	38	63	98	408	1,215	1,240	1,221	1,251	1,710	1,872	1,562	1,667	1,767	1,660	1,727	1,399	1,110	741	636	452	382
56 to 7	Southbound	190	94	45	38	64	100	414	1,232	1,257	1,238	1,268	1,734	1,898	1,583	1,690	1,792	1,683	1,751	1,418	1,126	751	645	459	388
56 to 7	Northbound	189	94	45	38	63	100	413	1,229	1,254	1,235	1,265	1,730	1,894	1,580	1,686	1,788	1,679	1,747	1,415	1,123	749	643	458	387
7 to 6	Southbound	200	99	47	40	67	105	435	1,294	1,321	1,301	1,333	1,822	1,995	1,664	1,776	1,883	1,769	1,840	1,490	1,183	789	678	482	407
7 to 6	Northbound	204	101	49	41	68	107	444	1,322	1,349	1,329	1,361	1,861	2,037	1,699	1,814	1,923	1,806	1,879	1,522	1,208	806	692	492	416
6 to 5	Southbound	198	98	47	40	66	104	431	1,285	1,311	1,291	1,323	1,809	1,980	1,651	1,762	1,869	1,755	1,826	1,479	1,174	783	673	478	404
6 to 5	Northbound	196	97	47	40	66	103	428	1,274	1,301	1,281	1,312	1,794	1,964	1,638	1,748	1,854	1,741	1,812	1,467	1,165	777	667	475	401
5 to 57	Southbound	194	96	46	39	65	102	422	1,256	1,282	1,262	1,293	1,768	1,936	1,614	1,723	1,827	1,716	1,785	1,446	1,148	766	658	468	395
5 to 57	Northbound	194	96	46	39	65	102	424	1,262	1,288	1,268	1,299	1,776	1,944	1,622	1,731	1,835	1,723	1,793	1,452	1,153	769	661	470	397
57 to 4	Southbound	189	93	45	38	63	99	411	1,225	1,250	1,231	1,261	1,725	1,888	1,575	1,681	1,782	1,674	1,742	1,410	1,120	747	642	456	386
57 to 4	Northbound	205	101	49	42	69	108	446	1,329	1,356	1,336	1,368	1,871	2,048	1,708	1,823	1,933	1,816	1,889	1,530	1,214	810	696	495	418
4 to 3	Southbound	209	103	50	42	70	110	454	1,353	1,381	1,359	1,392	1,904	2,084	1,739	1,856	1,968	1,848	1,923	1,557	1,236	824	708	504	426
4 to 3	Northbound	199	98	47	40	67	105	434	1,292	1,319	1,298	1,330	1,819	1,991	1,661	1,772	1,879	1,765	1,836	1,487	1,180	787	676	481	407
34 to 9	Eastbound	107	52	19	22	36	57	242	723	716	603	645	916	1,056	879	938	990	944	1,002	814	649	434	377	265	223
34 to 9	Westbound	98	48	18	20	33	53	223	666	660	556	594	844	973	810	864	912	870	923	750	598	400	347	244	206
9 to 18	Eastbound	113	56	27	23	38	59	246	733	748	737	755	1,032	1,130	943	1,006	1,067	1,002	1,042	844	670	447	384	273	231
9 to 18	Westbound	91	45	22	18	30	48	197	587	600	590	605	827	905	755	806	855	803	835	676	537	358	308	219	185
30 to 54	Eastbound	64	31	12	13	21	34	144	430	426	359	384	545	629	523	558	589	562	596	485	386	258	224	158	133
30 to 54	Westbound	62	30	11	12	21	33	140	419	415	350	374	530	612	509	543	573	547	581	472	376	251	218	154	129
54 to 55	Eastbound	65	32	12	13	22	35	148	440	436	368	393	558	643	536	571	603	575	610	496	395	264	229	161	136
54 to 55	Westbound	66	32	12	13	22	36	151	450	446	376	401	570	657	547	584	616	588	624	507	404	270	234	165	139
55 to 6	Eastbound	69	34	13	14	23	37	157	469	464	391	418	594	685	570	608	641	612	650	528	421	281	244	172	145
55 to 6	Westbound	69	34	13	14	23	37	157	469	464	391	418	594	685	570	608	642	612	650	528	421	281	244	172	145
6 to 5	Southbound	198	98	47	40	66	104	431	1,285	1,311	1,291	1,323	1,809	1,980	1,651	1,762	1,869	1,755	1,826	1,479	1,174	783	673	478	404
6 to 5	Northbound	196	97	47	40	66	103	428	1,274	1,301	1,281	1,312	1,794	1,964	1,638	1,748	1,854	1,741	1,812	1,467	1,165	777	667	475	401
47 to 46	Eastbound	81	40	19	16	27	42	176	524	535	527	539	738	808	674	719	762	716	745	603	479	319	274	195	165
47 to 46	Westbound	103	51	24	21	34	54	224	667	681	670	686	939	1,028	857	915	970	911	948	768	609	406	349	248	210
46 to 48	Eastbound	90	44	21	18	30	47	195	581	593	584	599	819	896	747	798	846	794	827	669	531	354	304	217	183
46 to 48	Westbound	153	76	36	31	51	81	334	994	1,014	999	1,023	1,399	1,532	1,278	1,363	1,446	1,358	1,413	1,144	908	606	520	370	313
48 to 4	Eastbound	142	70	34	29	47	74	308	918	937	923	945	1,293	1,415	1,181	1,260	1,336	1,255	1,305	1,057	839	560	481	342	289
48 to 4	Westbound	142	70	34	29	48	75	309	921	940	925	948	1,296	1,419	1,183	1,263	1,339	1,258	1,309	1,060	841	561	482	343	290
4 to 58	Eastbound	73	36	17	15	24	38	158	470	480	473	484	662	725	605	645	684	643	669	542	430	287	246	175	148
4 to 58	Westbound	74	37	18	15	25	39	161	480	490	483	494	676	740	617	659	699	656	683	553	439	293	251	179	151
58 to 16	Southbound	111	55	26	23	37	58	242	721	736	725	742	1,015	1,111	927	989	1,049	985	1,025	830	659	439	378	269	227
58 to 16	Northbound	163	80	39	33	55	86	355	1,058	1,080	1,063	1,089	1,489	1,630	1,360	1,451	1,539	1,445	1,504	1,218	967	645	554	394	333
29 to 59	Northbound	149	74	35	30	50	78	325	967	987	972	995	1,361	1,490	1,243	1,326	1,406	1,321	1,374	1,113	883	589	506	360	304
29 to 59	Westbound	130	64	31	26	44	68	283	843	861	847	868	1,187	1,299	1,084	1,157	1,227	1,152	1,199	971	770	514	441	314	265
59 to 60	Eastbound	157	78	37	32	53	83	343	1,021	1,043	1,027	1,052	1,438	1,574	1,313	1,401	1,486	1,396	1,452	1,176	933	623	535	380	321
59 to 60	Westbound	136	67	32	28	46	72	297	884	902	889	910	1,245	1,363	1,137	1,213	1,286	1,208	1,257	1,018	808	539	463	329	278
60 to 28	Eastbound	197	97	47	40	66	104	429	1,279	1,306	1,286	1,317	1,801	1,972	1,644	1,755	1,861	1,748	1,819	1,473	1,169	780	670	476	403
60 to 28	Westbound	216	107	51	44	72	114	470	1,401	1,430	1,408	1,443	1,973	2,160	1,801	1,922	2,039	1,915	1,992	1,613	1,281	854	734	522	441
10 to East	Eastbound	8	4	1	2	3	4	17	51	51	43	46	65	75	62	67	70	67	71	58	46	31	27	19	16
10 to East	Westbound	18	9	3	4	6	9	40	120	118	100	107	152	175	145	155	164	156	166	135	107	72	62	44	37
11 to 29	Eastbound	52	26	10	11	17	28	119	355	351	296	316	449	518	431	460	486	463	492	400	318	213	185	130	110

Table 3c
Summary of Gasoline Traffic Volumes by Modeled Road Segment
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

		Hour 1	Hour 2	Hour 3	Hour 4	Hour 5	Hour 6	Hour 7	Hour 8	Hour 9	Hour 10	Hour 11	Hour 12	Hour 13	Hour 14	Hour 15	Hour 16	Hour 17	Hour 18	Hour 19	Hour 20	Hour 21	Hour 22	Hour 23	Hour 24
Fraction of Trips/Day, All Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.017	0.051	0.055	0.062	0.062	0.080	0.084	0.069	0.074	0.079	0.073	0.073	0.059	0.047	0.031	0.027	0.019	0.016
Fraction of Trips/Day, All but HD Vehicles		0.008	0.004	0.002	0.002	0.003	0.004	0.019	0.057	0.056	0.048	0.051	0.072	0.083	0.069	0.074	0.078	0.074	0.079	0.064	0.051	0.034	0.030	0.021	0.017
Gasoline Scaling Factor, All Vehicles		0.956	0.939	0.927	0.946	0.954	0.914	0.958	0.971	0.931	0.800	0.830	0.880	0.915	0.928	0.917	0.913	0.927	0.967	0.975	0.974	0.970	0.976	0.974	0.978
Gasoline Scaling Factor, All but HD Vehicles		0.982	0.981	0.979	0.980	0.981	0.977	0.978	0.981	0.979	0.967	0.970	0.975	0.978	0.979	0.978	0.977	0.978	0.981	0.982	0.982	0.982	0.982	0.982	0.982
Segment	**Direction**	**Hourly Traffic Volume (Vehicles / Hour)**																							
11 to 29	Westbound	71	35	13	14	24	38	161	480	475	401	428	608	701	584	623	657	627	665	540	431	288	250	176	148
33 to 3rd Street	Eastbound	5	3	1	1	2	3	11	34	34	34	35	47	52	43	46	49	46	48	39	31	21	18	13	11
33 to 3rd Street	Westbound	3	2	1	1	1	2	7	21	21	21	21	29	32	27	29	30	28	30	24	19	13	11	8	7
33 to Project	Eastbound	8	4	2	2	3	4	18	54	55	54	55	75	83	69	73	78	73	76	62	49	33	28	20	17
33 to Project	Westbound	7	4	2	1	2	4	16	47	48	47	48	66	72	60	64	68	64	66	54	43	28	24	17	15
8 to 32	Eastbound	33	17	8	7	11	18	73	217	222	218	224	306	335	279	298	316	297	309	250	199	132	114	81	68
8 to 32	Westbound	42	21	10	8	14	22	91	270	276	271	278	380	416	347	370	393	369	384	311	247	165	141	101	85
32 to Project	Eastbound	79	39	19	16	26	41	172	512	522	514	527	720	789	658	702	745	699	728	589	468	312	268	191	161
32 to Project	Westbound	37	18	9	8	13	20	82	243	248	244	250	342	375	313	334	354	332	346	280	222	148	127	91	77
31 to 3rd Street	Eastbound	8	4	2	2	3	4	18	54	55	54	55	75	83	69	73	78	73	76	62	49	33	28	20	17
31 to 3rd Street	Westbound	11	5	3	2	4	6	24	70	72	71	73	99	109	91	97	102	96	100	81	64	43	37	26	22
31 to Project	Eastbound	38	19	9	8	13	20	83	248	253	249	255	349	382	319	340	361	339	353	286	227	151	130	92	78
31 to Project	Westbound	41	20	10	8	14	21	88	263	268	264	271	370	405	338	361	382	359	374	303	240	160	138	98	83
56 to East	Eastbound	30	15	7	6	10	16	65	195	199	196	200	274	300	250	267	283	266	277	224	178	119	102	72	61
56 to East	Westbound	24	12	6	5	8	12	51	153	156	154	157	215	236	196	210	222	209	217	176	140	93	80	57	48
34 to 29	Northbound	91	45	22	19	31	48	199	592	604	595	610	834	913	761	812	862	809	842	682	541	361	310	221	186
34 to 29	Southbound	99	49	24	20	33	52	216	644	657	647	663	907	992	828	883	937	880	915	741	588	393	337	240	203
34 to North	Northbound	94	46	22	19	32	49	205	610	623	613	628	859	940	784	837	888	834	867	702	558	372	319	227	192
34 to North	Southbound	91	45	22	18	30	48	198	588	601	591	606	828	907	756	807	856	804	836	677	538	359	308	219	185
54 to 31	Northbound	29	14	7	6	10	15	64	190	193	190	195	267	292	244	260	276	259	269	218	173	116	99	71	60
54 to 31	Southbound	30	15	7	6	10	16	66	197	201	198	203	278	304	254	271	287	270	281	227	180	120	103	74	62
31 to 32	Northbound	67	33	16	14	22	35	145	433	442	435	446	609	667	556	594	630	591	615	498	395	264	227	161	136
31 to 32	Southbound	63	31	15	13	21	33	138	411	419	413	423	578	633	528	563	597	561	584	473	375	250	215	153	129
32 to 33	Northbound	23	11	5	5	8	12	50	149	152	150	153	210	229	191	204	217	203	212	171	136	91	78	55	47
32 to 33	Southbound	23	11	5	5	8	12	50	150	153	151	154	211	231	193	206	218	205	213	172	137	91	78	56	47
7 to East	Eastbound	25	12	5	5	8	14	58	172	170	144	153	218	251	209	223	235	225	238	194	154	103	90	63	53
7 to East	Westbound	26	13	5	5	9	14	60	179	177	149	160	227	261	218	232	245	234	248	202	161	107	93	66	55
34 to Project	Eastbound	23	11	4	5	8	12	52	156	154	130	139	197	227	189	202	213	203	216	175	140	93	81	57	48
34 to Project	Westbound	12	6	2	3	4	7	28	84	84	70	75	107	123	103	109	115	110	117	95	76	51	44	31	26

Table 4
CAL3QHCR Source Parameters, Running Emissions
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Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
10 to 9 Northbound	Link_106	Above ground	553,238	4,175,107	553,211	4,175,027	0	15
	Link_23	Above ground	553,267	4,175,189	553,238	4,175,107	-2	14
10 to 9 Southbound	Link_62	Above ground	553,229	4,175,112	553,200	4,175,030	1	15
	Link_78	Above ground	553,255	4,175,192	553,229	4,175,112	-3	12
10 to East Westbound	Link_163	Above ground	553,213	4,175,015	553,237	4,175,003	1	10
	Link_164	Above ground	553,237	4,175,003	553,661	4,174,706	8	10
	Link_165	Above ground	553,661	4,174,706	553,672	4,174,696	10	10
	Link_166	Above ground	553,672	4,174,696	553,932	4,174,505	3	10
	Link_167	Above ground	553,239	4,175,007	553,214	4,175,019	1	10
	Link_168	Above ground	553,664	4,174,709	553,239	4,175,007	8	10
	Link_169	Above ground	553,675	4,174,699	553,664	4,174,709	10	10
	Link_170	Above ground	553,935	4,174,508	553,675	4,174,699	2	10
101 Ramp to 12 Northbound	Link_9	Above ground	553,106	4,174,787	553,058	4,174,718	10	12
11 to 10 Northbound	Link_91	Above ground	553,211	4,175,027	553,181	4,174,941	3	14
11 to 10 Southbound	Link_77	Above ground	553,200	4,175,030	553,189	4,175,003	1	15
	Link_83	Above ground	553,189	4,175,003	553,170	4,174,947	5	12
11 to 29 Eastbound	Link_171	Above ground	553,182	4,174,936	553,430	4,174,766	10	10
	Link_172	Above ground	553,430	4,174,766	553,452	4,174,749	10	10
	Link_173	Above ground	553,452	4,174,749	553,528	4,174,697	10	10
	Link_174	Above ground	553,528	4,174,697	553,573	4,174,670	10	10
	Link_175	Above ground	553,573	4,174,670	553,632	4,174,639	10	10
	Link_176	Above ground	553,632	4,174,639	553,662	4,174,616	10	10
	Link_177	Above ground	553,662	4,174,616	553,685	4,174,592	10	10
	Link_178	Above ground	553,685	4,174,592	553,712	4,174,559	10	10
	Link_179	Above ground	553,712	4,174,559	553,745	4,174,516	10	10
	Link_180	Above ground	553,745	4,174,516	553,773	4,174,477	10	10
	Link_181	Above ground	553,773	4,174,477	553,809	4,174,429	10	10
	Link_182	Above ground	553,809	4,174,429	553,841	4,174,380	10	10
	Link_183	Above ground	553,841	4,174,380	553,889	4,174,301	10	10
	Link_184	Above ground	553,889	4,174,301	553,912	4,174,257	10	10
	Link_185	Above ground	553,912	4,174,257	553,929	4,174,208	10	10
	Link_186	Above ground	553,929	4,174,208	553,940	4,174,158	10	10
	Link_187	Above ground	553,940	4,174,158	553,946	4,174,122	10	10
	Link_188	Above ground	553,946	4,174,122	553,956	4,174,079	10	10
	Link_189	Above ground	553,956	4,174,079	553,972	4,174,051	10	10
	Link_190	Above ground	553,972	4,174,051	554,057	4,173,967	10	10

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Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
11 to 29 Westbound	Link_191	Above ground	553,432	4,174,770	553,185	4,174,941	10	10
	Link_192	Above ground	553,456	4,174,754	553,432	4,174,770	10	10
	Link_193	Above ground	553,531	4,174,702	553,456	4,174,754	10	10
	Link_194	Above ground	553,578	4,174,678	553,531	4,174,702	10	10
	Link_195	Above ground	553,637	4,174,646	553,578	4,174,678	10	10
	Link_196	Above ground	553,669	4,174,624	553,637	4,174,646	10	10
	Link_197	Above ground	553,690	4,174,600	553,669	4,174,624	10	10
	Link_198	Above ground	553,717	4,174,566	553,690	4,174,600	10	10
	Link_199	Above ground	553,749	4,174,523	553,717	4,174,566	10	10
	Link_200	Above ground	553,780	4,174,482	553,749	4,174,523	10	10
	Link_201	Above ground	553,816	4,174,434	553,780	4,174,482	10	10
	Link_202	Above ground	553,848	4,174,385	553,816	4,174,434	10	10
	Link_203	Above ground	553,897	4,174,303	553,848	4,174,385	10	10
	Link_204	Above ground	553,921	4,174,257	553,897	4,174,303	10	10
	Link_205	Above ground	553,937	4,174,209	553,921	4,174,257	10	10
	Link_206	Above ground	553,948	4,174,158	553,937	4,174,209	10	10
	Link_207	Above ground	553,953	4,174,122	553,948	4,174,158	10	10
	Link_208	Above ground	553,966	4,174,081	553,953	4,174,122	10	10
	Link_209	Above ground	553,982	4,174,056	553,966	4,174,081	10	10
	Link_210	Above ground	554,023	4,174,013	553,982	4,174,056	10	10
12 to 11 Northbound	Link_29	Above ground	553,181	4,174,941	553,152	4,174,858	8	13
	Link_8	Above ground	553,152	4,174,858	553,106	4,174,787	10	12
12 to 11 Southbound	Link_103	Above ground	553,142	4,174,864	553,095	4,174,794	10	13
	Link_84	Above ground	553,170	4,174,947	553,142	4,174,864	7	12
29 to 59 Northbound	Link_155	Above ground	553,545	4,173,721	553,652	4,173,828	-6	16
	Link_156	Above ground	553,652	4,173,828	553,692	4,173,849	-7	15

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Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
59 to 60 Eastbound	Link_157	Above ground	553,692	4,173,849	553,871	4,173,865	-6	15
	Link_158	Above ground	553,871	4,173,865	554,079	4,173,943	-6	14
29 to 59 Westbound	Link_159	Above ground	553,539	4,173,727	553,646	4,173,835	-6	16
	Link_160	Above ground	553,646	4,173,835	553,688	4,173,857	-7	15
59 to 60 Westbound	Link_161	Above ground	553,688	4,173,857	553,868	4,173,873	-6	15
	Link_162	Above ground	553,868	4,173,873	554,074	4,173,951	-6	15
30 to 54 Eastbound	Link_25	Above ground	554,659	4,175,772	554,633	4,175,790	-5	14
	Link_26	Above ground	554,633	4,175,790	554,494	4,175,888	-4	14
	Link_88	Above ground	554,494	4,175,888	554,329	4,176,005	3	14
30 to 54 Westbound	Link_141	Above ground	554,498	4,175,893	554,332	4,176,010	3	14
	Link_142	Above ground	554,663	4,175,777	554,637	4,175,795	-5	13
	Link_143	Above ground	554,637	4,175,795	554,498	4,175,893	-4	14
31 to 32 Northbound	Link_229	Above ground	553,795	4,175,243	554,138	4,175,733	-9	12
31 to 32 Southbound	Link_230	Above ground	554,134	4,175,736	553,791	4,175,246	-9	12
31 to 3rd Street Eastbound	Link_219	Above ground	553,574	4,176,118	554,133	4,175,728	0	11
31 to 3rd Street Westbound	Link_220	Above ground	554,136	4,175,734	553,574	4,176,126	0	11
31 to Project Eastbound	Link_221	Above ground	554,133	4,175,728	554,462	4,175,492	-6	11
31 to Project Westbound	Link_222	Above ground	554,465	4,175,500	554,136	4,175,734	-6	11
32 to 33 Northbound	Link_231	Above ground	553,694	4,175,102	553,795	4,175,243	-10	10
32 to 33 Southbound	Link_232	Above ground	553,791	4,175,246	553,691	4,175,104	-10	10
32 to Project Eastbound	Link_217	Above ground	553,789	4,175,238	554,277	4,174,895	-7	12
32 to Project Westbound	Link_218	Above ground	554,279	4,174,901	553,792	4,175,245	-7	12

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Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
33 to 3rd Street Eastbound	Link_211	Above ground	553,325	4,175,353	553,688	4,175,101	-9	10
33 to 3rd Street Westbound	Link_212	Above ground	553,689	4,175,104	553,328	4,175,359	-9	10
33 to Project Eastbound	Link_213	Above ground	553,688	4,175,101	553,857	4,174,983	-6	10
33 to Project Westbound	Link_214	Above ground	553,861	4,174,988	553,689	4,175,104	-6	10
34 to 29 Northbound	Link_239	Above ground	554,080	4,173,949	554,039	4,174,038	-4	12
	Link_240	Above ground	554,039	4,174,038	554,002	4,174,127	-4	12
	Link_241	Above ground	554,002	4,174,127	553,984	4,174,261	-4	12
	Link_242	Above ground	553,984	4,174,261	553,995	4,174,400	-4	12
	Link_243	Above ground	553,995	4,174,400	554,036	4,174,505	-4	12
	Link_244	Above ground	554,036	4,174,505	554,088	4,174,609	-4	12
34 to 29 Southbound	Link_233	Above ground	554,084	4,174,612	554,037	4,174,529	-4	12
	Link_234	Above ground	554,037	4,174,529	553,985	4,174,401	-4	12
	Link_235	Above ground	553,985	4,174,401	553,978	4,174,260	-4	12
	Link_236	Above ground	553,978	4,174,260	553,990	4,174,133	-4	12
	Link_237	Above ground	553,990	4,174,133	554,025	4,174,040	-4	12
	Link_238	Above ground	554,025	4,174,040	554,073	4,173,947	-4	12
34 to 9 Eastbound	Link_20	Above ground	554,088	4,174,609	554,036	4,174,646	-8	15
	Link_21	Above ground	554,036	4,174,646	553,922	4,174,725	-8	14
	Link_22	Above ground	553,922	4,174,725	553,755	4,174,842	-7	12
	Link_24	Above ground	553,592	4,174,958	553,426	4,175,074	-5	12
	Link_28	Above ground	553,755	4,174,842	553,592	4,174,958	-4	12
	Link_7	Above ground	553,426	4,175,074	553,259	4,175,187	-5	12

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Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
34 to 9 Westbound	Link_122	Above ground	554,040	4,174,651	553,926	4,174,730	-8	16
34 to 9 Westbound	Link_123	Above ground	553,926	4,174,730	553,759	4,174,847	-7	16
34 to 9 Westbound	Link_124	Above ground	553,759	4,174,847	553,595	4,174,963	-4	16
34 to 9 Westbound	Link_126	Above ground	553,430	4,175,079	553,260	4,175,193	-5	15
34 to 9 Westbound	Link_129	Above ground	553,595	4,174,963	553,430	4,175,079	-5	15
34 to 9 Westbound	Link_133	Above ground	554,091	4,174,614	554,040	4,174,651	-8	18
34 to Project Eastbound	Link_18	Above ground	554,419	4,174,377	554,253	4,174,490	-8	16
34 to Project Eastbound	Link_19	Above ground	554,253	4,174,490	554,088	4,174,609	-8	16
34 to Project Westbound	Link_125	Above ground	554,423	4,174,382	554,256	4,174,495	-8	15
34 to Project Westbound	Link_130	Above ground	554,256	4,174,495	554,091	4,174,614	-8	16
34 to North Northbound	Link_225	Above ground	554,088	4,174,609	554,898	4,175,740	-9	12
34 to North Southbound	Link_226	Above ground	554,894	4,175,741	554,084	4,174,612	-9	12
4 to 3 Northbound	Link_92	Above ground	553,980	4,177,616	553,958	4,177,533	-10	15
4 to 3 Northbound	Link_99	Above ground	553,958	4,177,533	553,931	4,177,442	-10	12
4 to 3 Southbound	Link_105	Above ground	553,962	4,177,595	553,946	4,177,539	-10	13
4 to 3 Southbound	Link_121	Above ground	553,946	4,177,539	553,921	4,177,447	-10	12
4 to 58 Eastbound	Link_115	Above ground	553,925	4,177,439	553,877	4,177,473	-10	12
4 to 58 Eastbound	Link_116	Above ground	553,877	4,177,473	553,197	4,177,952	-10	15
4 to 58 Westbound	Link_119	Above ground	553,881	4,177,478	553,204	4,177,954	-10	15
4 to 58 Westbound	Link_120	Above ground	553,927	4,177,451	553,881	4,177,478	-10	15
46 to 48 Eastbound	Link_10	Above ground	554,854	4,176,783	554,703	4,176,889	-3	13
46 to 48 Eastbound	Link_11	Above ground	554,905	4,176,539	554,913	4,176,630	1	14
46 to 48 Eastbound	Link_12	Above ground	554,913	4,176,630	554,907	4,176,666	1	14
46 to 48 Eastbound	Link_13	Above ground	554,907	4,176,666	554,854	4,176,783	1	14
46 to 48 Eastbound	Link_14	Above ground	554,894	4,176,440	554,905	4,176,539	2	15
46 to 48 Eastbound	Link_15	Above ground	554,924	4,176,316	554,898	4,176,346	-1	15
46 to 48 Eastbound	Link_16	Above ground	554,898	4,176,346	554,888	4,176,389	-1	15
46 to 48 Eastbound	Link_17	Above ground	554,888	4,176,389	554,894	4,176,440	-1	15
46 to 48 Eastbound	Link_5	Above ground	555,002	4,176,261	554,924	4,176,316	-2	14
46 to 48 Eastbound	Link_6	Above ground	555,168	4,176,145	555,002	4,176,261	-3	14

Table 4
CAL3QHCR Source Parameters, Running Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
46 to 48 Westbound	Link_144	Above ground	555,172	4,176,151	555,007	4,176,268	-4	16
	Link_145	Above ground	554,930	4,176,322	554,905	4,176,350	-2	14
	Link_146	Above ground	554,905	4,176,350	554,896	4,176,389	-2	14
	Link_147	Above ground	554,896	4,176,389	554,902	4,176,439	-2	14
	Link_148	Above ground	555,007	4,176,268	554,929	4,176,323	-2	14
	Link_149	Above ground	554,902	4,176,439	554,912	4,176,537	2	14
	Link_151	Above ground	554,913	4,176,538	554,921	4,176,631	1	14
	Link_152	Above ground	554,921	4,176,631	554,915	4,176,668	1	14
	Link_153	Above ground	554,915	4,176,668	554,858	4,176,790	1	14
	Link_154	Above ground	554,858	4,176,790	554,709	4,176,896	-3	15
47 to 46 Eastbound	Link_104	Above ground	555,334	4,176,028	555,168	4,176,145	-3	15
47 to 46 Westbound	Link_150	Above ground	555,339	4,176,034	555,172	4,176,151	-3	16
48 to 4 Eastbound	Link_31	Above ground	554,042	4,177,355	553,925	4,177,439	-9	13
	Link_34	Above ground	554,206	4,177,240	554,042	4,177,355	-8	13
	Link_4	Above ground	554,703	4,176,889	554,539	4,177,004	-6	13
	Link_93	Above ground	554,539	4,177,004	554,206	4,177,240	-7	16
48 to 4 Westbound	Link_1	Above ground	554,709	4,176,896	554,618	4,176,961	-6	13
	Link_100	Above ground	554,215	4,177,253	554,051	4,177,368	-8	16
	Link_2	Above ground	554,618	4,176,961	554,595	4,176,986	-6	13
	Link_3	Above ground	554,595	4,176,986	554,548	4,177,018	-6	13
	Link_85	Above ground	554,548	4,177,018	554,215	4,177,253	-7	16
	Link_98	Above ground	554,051	4,177,368	553,927	4,177,451	-9	18
5 to 57 Northbound	Link_108	Above ground	553,812	4,177,001	553,788	4,176,913	-4	13
	Link_40	Above ground	553,788	4,176,913	553,764	4,176,826	-1	15
	Link_43	Above ground	553,764	4,176,826	553,740	4,176,739	2	15
	Link_46	Above ground	553,740	4,176,739	553,716	4,176,649	3	15
	Link_47	Above ground	553,716	4,176,649	553,693	4,176,563	6	15

Table 4
CAL3QHCR Source Parameters, Running Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
5 to 57 Southbound	Link_109	Above ground	553,801	4,177,007	553,778	4,176,920	-4	13
	Link_41	Above ground	553,778	4,176,920	553,754	4,176,832	-1	15
	Link_42	Above ground	553,754	4,176,832	553,730	4,176,745	1	15
	Link_45	Above ground	553,730	4,176,745	553,706	4,176,656	3	15
	Link_48	Above ground	553,706	4,176,656	553,683	4,176,569	6	15
54 to 31 Southbound	Link_227	Above ground	554,326	4,176,006	554,134	4,175,736	-1	10
54 to 31 Northbound	Link_228	Above ground	554,138	4,175,733	554,330	4,176,004	-1	10
54 to 55 Eastbound	Link_89	Above ground	554,329	4,176,005	554,165	4,176,121	10	14
	Link_90	Above ground	554,165	4,176,121	553,998	4,176,238	10	14
54 to 55 Westbound	Link_139	Above ground	554,168	4,176,126	554,002	4,176,243	10	14
	Link_140	Above ground	554,332	4,176,010	554,168	4,176,126	10	13
55 to 6 Eastbound	Link_96	Above ground	553,833	4,176,355	553,662	4,176,475	10	12
	Link_97	Above ground	553,998	4,176,238	553,833	4,176,355	10	13
55 to 6 Westbound	Link_137	Above ground	553,836	4,176,360	553,665	4,176,480	10	14
	Link_138	Above ground	554,002	4,176,243	553,836	4,176,360	10	15
56 to 7 Northbound	Link_44	Above ground	553,550	4,176,037	553,526	4,175,948	5	12
	Link_54	Above ground	553,622	4,176,300	553,598	4,176,213	10	15
	Link_58	Above ground	553,598	4,176,213	553,574	4,176,126	10	15
	Link_59	Above ground	553,574	4,176,126	553,567	4,176,103	9	15
	Link_60	Above ground	553,567	4,176,103	553,550	4,176,037	7	15
56 to 7 Southbound	Link_55	Above ground	553,611	4,176,304	553,587	4,176,216	10	15
	Link_56	Above ground	553,587	4,176,216	553,563	4,176,129	10	15
	Link_57	Above ground	553,563	4,176,129	553,557	4,176,105	8	15
	Link_63	Above ground	553,540	4,176,041	553,515	4,175,951	4	12
	Link_64	Above ground	553,557	4,176,105	553,540	4,176,041	8	15
56 to East Eastbound	Link_223	Above ground	553,525	4,175,944	554,188	4,175,475	-6	12
56 to East Westbound	Link_224	Above ground	554,190	4,175,481	553,528	4,175,951	-6	12
57 to 4 Northbound	Link_30	Above ground	553,907	4,177,351	553,884	4,177,264	-8	14
	Link_32	Above ground	553,931	4,177,442	553,907	4,177,351	-9	12
	Link_36	Above ground	553,884	4,177,264	553,860	4,177,176	-7	13
	Link_38	Above ground	553,860	4,177,176	553,836	4,177,089	-6	12
	Link_94	Above ground	553,836	4,177,089	553,824	4,177,045	-6	12
	Link_95	Above ground	553,824	4,177,045	553,812	4,177,001	-5	14

Table 4
CAL3QHCR Source Parameters, Running Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
57 to 4 Southbound	Link_107	Above ground	553,825	4,177,095	553,801	4,177,007	-5	12
	Link_33	Above ground	553,921	4,177,447	553,897	4,177,356	-9	12
	Link_35	Above ground	553,897	4,177,356	553,873	4,177,270	-8	14
	Link_37	Above ground	553,873	4,177,270	553,849	4,177,182	-7	13
	Link_39	Above ground	553,849	4,177,182	553,825	4,177,095	-6	14
58 to 16 Northbound	Link_117	Above ground	553,204	4,177,954	553,102	4,178,207	-6	15
58 to 16 Southbound	Link_118	Above ground	553,197	4,177,952	553,096	4,178,204	-6	15
6 to 5 Northbound	Link_50	Above ground	553,693	4,176,563	553,669	4,176,475	8	16
6 to 5 Southbound	Link_49	Above ground	553,683	4,176,569	553,659	4,176,482	8	15
7 to 6 Northbound	Link_101	Above ground	553,646	4,176,388	553,622	4,176,300	10	15
	Link_51	Above ground	553,669	4,176,475	553,646	4,176,388	10	15
7 to 6 Southbound	Link_52	Above ground	553,659	4,176,482	553,635	4,176,394	9	15
	Link_53	Above ground	553,635	4,176,394	553,611	4,176,304	10	15
7 to East Eastbound	Link_245	Above ground	553,624	4,176,295	554,716	4,175,525	1	12
7 to East Westbound	Link_246	Above ground	554,719	4,175,531	553,626	4,176,300	1	12
8 to 32 Eastbound	Link_215	Above ground	553,386	4,175,518	553,789	4,175,238	-10	12
8 to 32 Westbound	Link_216	Above ground	553,792	4,175,245	553,386	4,175,526	-10	12
8 to 56 Northbound	Link_113	Above ground	553,526	4,175,948	553,515	4,175,906	1	13
	Link_114	Above ground	553,515	4,175,906	553,504	4,175,862	-1	12
	Link_65	Above ground	553,504	4,175,862	553,475	4,175,777	-3	15
	Link_69	Above ground	553,475	4,175,777	553,446	4,175,693	-6	15
	Link_70	Above ground	553,446	4,175,693	553,417	4,175,612	-7	15
	Link_71	Above ground	553,417	4,175,612	553,386	4,175,526	-8	12
8 to 56 Southbound	Link_110	Above ground	553,435	4,175,700	553,406	4,175,616	-7	13
	Link_66	Above ground	553,515	4,175,951	553,493	4,175,869	0	12
	Link_67	Above ground	553,493	4,175,869	553,464	4,175,783	-3	12
	Link_68	Above ground	553,464	4,175,783	553,435	4,175,700	-5	15
	Link_72	Above ground	553,406	4,175,616	553,376	4,175,533	-8	12
9 to 18 Eastbound	Link_61	Above ground	553,019	4,175,252	552,942	4,175,275	5	11
	Link_75	Above ground	553,259	4,175,187	553,171	4,175,208	-3	11
	Link_76	Above ground	552,866	4,175,297	552,804	4,175,315	6	11
	Link_79	Above ground	553,171	4,175,208	553,079	4,175,235	-4	10
	Link_80	Above ground	553,079	4,175,235	553,019	4,175,252	0	11
	Link_81	Above ground	552,942	4,175,275	552,866	4,175,297	5	11
	Link_82	Above ground	552,804	4,175,315	552,691	4,175,348	6	16
9 to 18 Westbound	Link_127	Above ground	553,260	4,175,193	553,172	4,175,214	-3	13
	Link_128	Above ground	553,020	4,175,258	552,944	4,175,280	5	13
	Link_131	Above ground	552,805	4,175,321	552,693	4,175,354	6	12
	Link_132	Above ground	552,868	4,175,303	552,805	4,175,321	6	13
	Link_134	Above ground	553,172	4,175,214	553,080	4,175,240	-4	13
	Link_135	Above ground	552,944	4,175,280	552,868	4,175,303	5	13
	Link_136	Above ground	553,080	4,175,240	553,020	4,175,258	0	13

Table 4
CAL3QHCR Source Parameters, Running Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
9 to 8 Northbound	Link_111	Above ground	553,386	4,175,526	553,357	4,175,442	-9	12
	Link_112	Above ground	553,357	4,175,442	553,328	4,175,359	-8	15
	Link_27	Above ground	553,328	4,175,359	553,298	4,175,276	-6	14
	Link_86	Above ground	553,281	4,175,227	553,267	4,175,189	-4	13
	Link_87	Above ground	553,298	4,175,276	553,281	4,175,227	-5	13
9 to 8 Southbound	Link_102	Above ground	553,376	4,175,533	553,315	4,175,363	-8	12
	Link_73	Above ground	553,286	4,175,280	553,255	4,175,192	-4	12
	Link_74	Above ground	553,315	4,175,363	553,286	4,175,280	-7	15

Notes:
1. Segments are identified by the bounding intersections, using the intersection numbering developed in Figure 26A of the Traffic Report, and by the direction of traffic flow.
2. CAL3QHCR limits relative elevations to a range of -10 meters to +10 meters. All roads have 13.3 meters subtracted from their elevations to allow the lowest road to be at -10 meters.
3. As defined in CAL3QHCR, mixing zone width for a given free flow link is calculated by adding 6 meters to the width of the road. The width of the road is obtained by visual observation of high-resolution aeiral photograph.

Abbreviations:
CAL3QHCR: a steady-state Gaussian dispersion model
UTMx: X coordinate in Universal Transverse Mercator coordinate system, zone 10N
UTMy: Y coordinate in Universal Transverse Mercator coordinate system, zone 10N

Sources:
CHS Consulting Group et al. 2009. Bayview Waterfront Project Transportation Study: Preliminary Draft 1 Report.

Table 5
CAL3QHCR Source Parameters, Queuing Emissions
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Segment[1]	Link	Type	$UTMx_{start}$ (meters)	$UTMy_{start}$ (meters)	$UTMx_{end}$ (meters)	$UTMy_{end}$ (meters)	Relative Elevation[2] (meters)	Mixing Zone Width[3] (meters)
11 to 29 Eastbound	Link_190	Above ground	554,031	4,173,992	554,057	4,173,967	10	4
29 to 59 Northbound	Link_158	Above ground	554,040	4,173,928	554,079	4,173,943	-6	8
29 to 59 Westbound	Link_162	Above ground	553,893	4,173,883	553,868	4,173,873	-6	9
30 to 54 Eastbound	Link_25	Above ground	554,633	4,175,790	554,828	4,175,653	-5	8
31 to 32 Southbound	Link_230	Above ground	553,852	4,175,333	553,791	4,175,246	-9	6
32 to 33 Northbound	Link_231	Above ground	553,716	4,175,133	553,795	4,175,243	-10	4
32 to 33 Southbound	Link_232	Above ground	553,696	4,175,112	553,692	4,175,106	-10	4
32 to Project Westbound	Link_218	Above ground	553,880	4,175,183	553,792	4,175,245	-7	6
33 to 3rd Street Eastbound	Link_211	Above ground	553,680	4,175,106	553,685	4,175,103	-9	4
33 to Project Westbound	Link_214	Above ground	553,697	4,175,099	553,692	4,175,102	-6	4
34 to 29 Northbound	Link_244	Above ground	554,078	4,174,589	554,088	4,174,609	-4	6
34 to 29 Southbound	Link_238	Above ground	554,039	4,174,014	554,071	4,173,950	-4	6
34 to 9 Eastbound	Link_20	Above ground	554,060	4,174,627	554,080	4,174,614	-8	9
34 to Project Westbound	Link_1	Above ground	554,152	4,174,570	554,091	4,174,614	-8	10
34 to North Southbound	Link_226	Above ground	554,109	4,174,646	554,084	4,174,612	-9	6
46 to 48 Eastbound	Link_6	Above ground	555,150	4,176,157	555,168	4,176,145	-3	8
47 to 46 Westbound	Link_150	Above ground	555,194	4,176,136	555,172	4,176,151	-3	10
8 to 32 Eastbound	Link_215	Above ground	553,762	4,175,257	553,789	4,175,238	-10	6

Notes:

1. Segments are identified by the bounding intersections, using the intersection numbering developed in Figure 26A of the Traffic Report, and by the direction of traffic flow.
2. CAL3QHCR limits relative elevations to a range of -10 meters to +10 meters. All roads have 13.3 meters subtracted from their elevations to allow the lowest road to be at -10 meters.
3. As defined in CAL3QHCR, mixing zone width for a given queue link is equal to the width of the road. The width of the road is obtained by visual observation of high-resolution aeiral photograph.

Abbreviations:

CAL3QHCR: a steady-state Gaussian dispersion model
UTMx: X coordinate in Universal Transverse Mercator coordinate system, zone 10N
UTMy: Y coordinate in Universal Transverse Mercator coordinate system, zone 10N

Sources:

CHS Consulting Group et al. 2009. Bayview Waterfront Project Transportation Study: Preliminary Draft 1 Report.

Table 6
Residential Exposure Assumptions for Carcinogens
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Parameter Symbol	Parameter Definition	Units	Average Exposure		High End Exposure	
IR	Inhalation Rate	L/kg-day	271	a	302	b
		m^3/day	17		19	
F	Fraction of Day Exposed	unitless	1	c	1	c
EF	Exposure frequency	days/year	350	a	350	a
ED	Exposure duration	years	70	b	70	b
T	Modeling Adjustment Factor	unitless	1	d	1	d
A	Inhalation Absorption Factor	unitless	1		1	
BW	Body Weight	kg	63	a	63	a
AT	Averaging time	days	25,550		25,550	

Notes:
L = Liter
kg = kilogram
m^3 = cubic meter

[a] Cal/EPA 2003.
[b] BAAQMD 2005.
[c] Residents are assumed to be exposed 24 hours per day, thus a value of 1 is used for the fraction of the day exposed.
[d] Modeling adjustment not necessary for residential receptors.

Source:
Bay Area Air Quality Management District (BAAQMD). 2005. *BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidelines.* June.
California Environmental Protection Agency (Cal/EPA). 2003. *Air Toxics Hot Spots Program Risk Assessment Guidelines: The Air Toxics Hot Spots Program Guidance* Manual for Preparation of Health Risk Assessments. Office of Environmental Health Hazard Assessment. August.

Table 7
Carcinogenic and Noncarcinogenic Toxicity Values
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Chemical	Cancer Potency Factor[a]	Chronic Reference Exposure Level[b]	Acute Reference Exposure Level[b]
	($[mg/kg\text{-}day]^{-1}$)	ug/m^3	ug/m^3
1,3-Butadiene	6.00E-01	2.00E+01	----
Acetaldehyde	1.00E-02	1.40E+02	4.70E+02
Acrolein	----	3.50E-01	2.50E+00
Benzene	1.00E-01	6.00E+01	1.30E+03
Formaldehyde	2.10E-02	9.00E+00	5.50E+01
Diesel PM	1.10E+00	5.00E+00	----

Notes:
---- = Value not available.
ug/m^3 = microgram per cubic meter
$[mg/kg\text{-}day]^{-1}$ = per milligram per kilogram-day

[a] Cal/EPA 2009.
[b] Cal/EPA 2008.

Sources:
California Environmental Protection Agency (CalEPA). 2008. *OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary.* Office of Environmental Health Hazard Assessment. December 18.
California Environmental Protection Agency (Cal EPA). 2009. Toxicity *Criteria Database.* July 21.

Table 8
Summary of Estimated Cancer Risks, Noncancer Hazard Indices (HIs), and PM2.5 at the Onsite Maximally Exposed Individual Resident (MEIR)
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Sources	Cancer Risk[a]		Noncancer HIs		PM2.5
	Average Exposure	High End Exposure	Chronic HI	Acute HI	$\mu g/m^3$
Existing Scenario[b]	133	148	0.1	0.23	0.5
Scenario with ATCM[c]	39	43	0.06	0.23	0.4
Proposed BAAQMD Thresholds of Significance for Cumulative Analysis	100		1.0	1.0	0.8

Notes
[a] Cancer risks presented as number of estimated cases per million.
[b] The existing scenario assumes current emissions from Bay-View Greenwaste Management facility.
[c] The scenario with ATCM assumes diesel generator located at the Bay-View Greenwaste Management facility is replaced with a new unit which meets the emissions limits specified in the California Air Resources Board Air Toxic Control Measure for Stationary Diesel Engines.

HI = Hazard index
ATCM = Airborne Toxic Control Measure

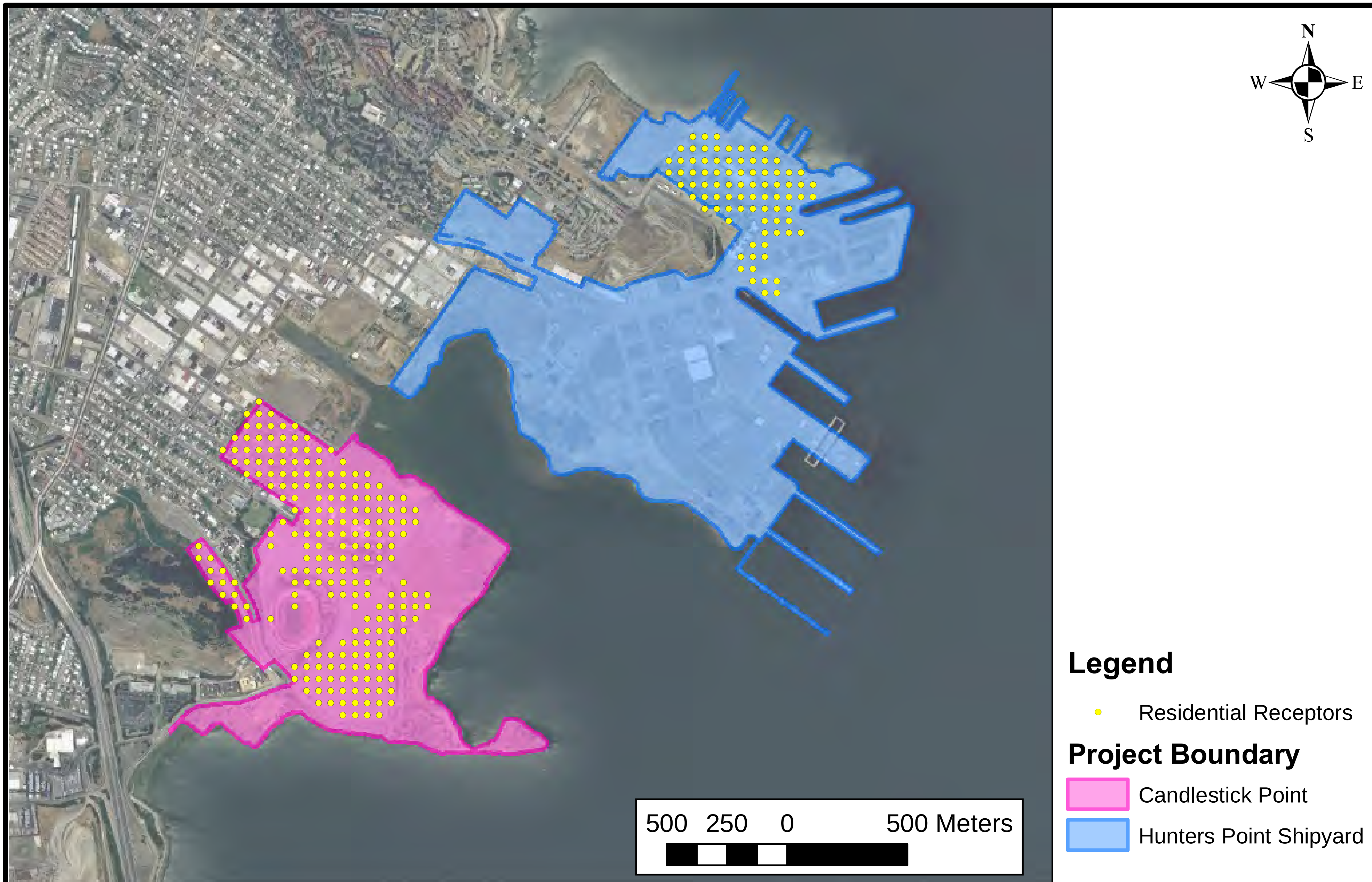
Table 9
Summary of Estimated Cancer Risks, Noncancer Hazard Indices (HIs), and PM2.5 at the Offsite Maximally Exposed Individual Resident (MEIR)
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Sources	Cancer Risk[a]		Noncancer HIs		PM2.5
	Average Exposure	High End Exposure	Chronic HI	Acute HI	μg/m³
Existing Scenario[b]	79	88	0.11	0.31	0.74
Scenario with ATCM[c]	72	80	0.11	0.31	0.72
Proposed BAAQMD Thresholds of Significance for Cumulative Analysis	100		1.0	1.0	0.8

Notes
[a] Cancer risks presented as number of estimated cases per million.
[b] The existing scenario assumes current emissions from Bay-View Greenwaste Management facility.
[c] The scenario with ATCM assumes diesel generator located at the Bay-View Greenwaste Management facility is replaced with a new unit which meets the emissions limits specified in the California Air Resources Board Air Toxic Control Measure for Stationary Diesel Engines.

HI = Hazard index
ATCM = Airborne Toxic Control Measure

F I G U R E S



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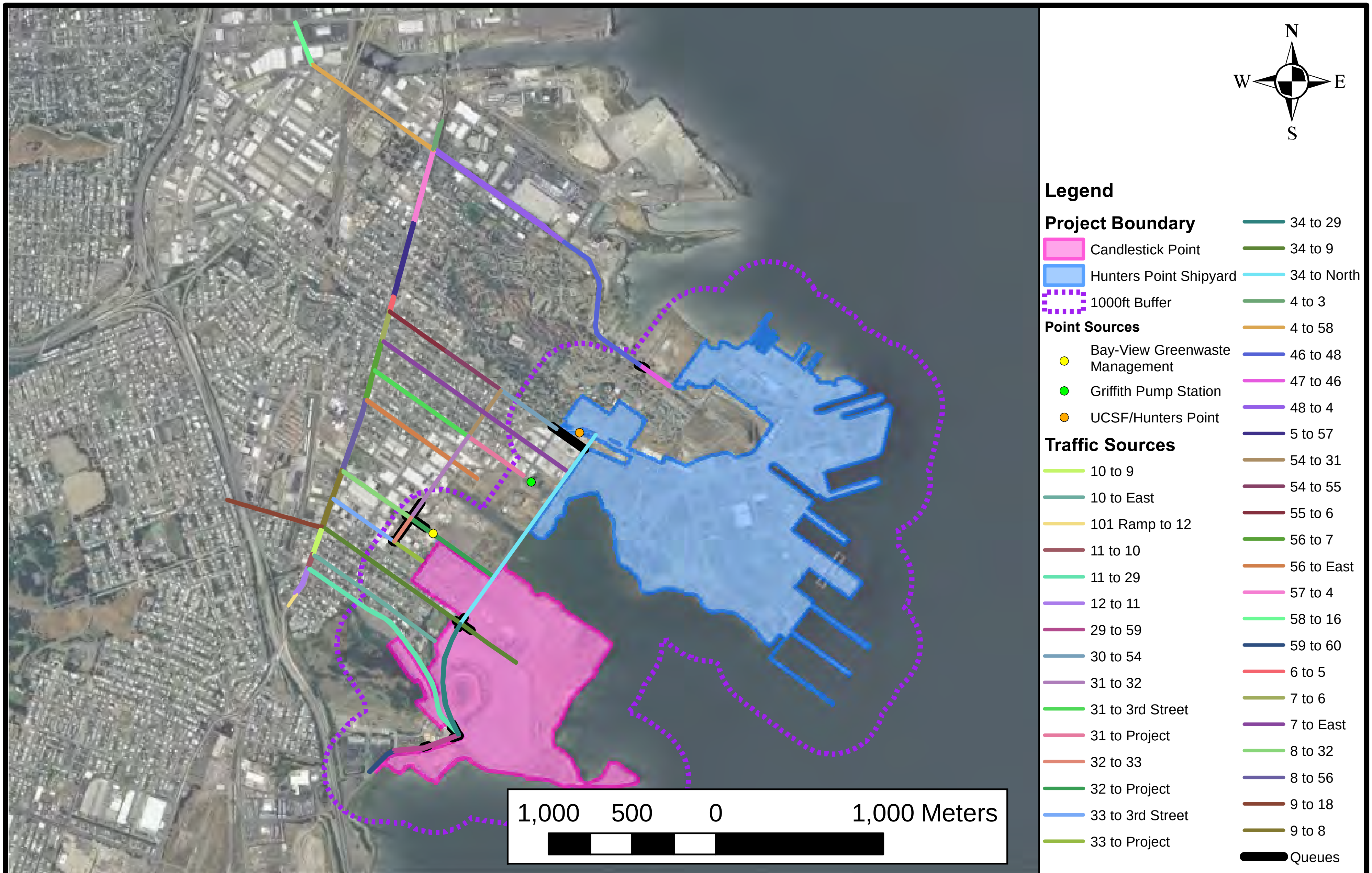
Onsite Residential Receptors for Cumulative Analysis
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure
1

Drafter:	Date:	Contract Number:	Approved:	Revised:



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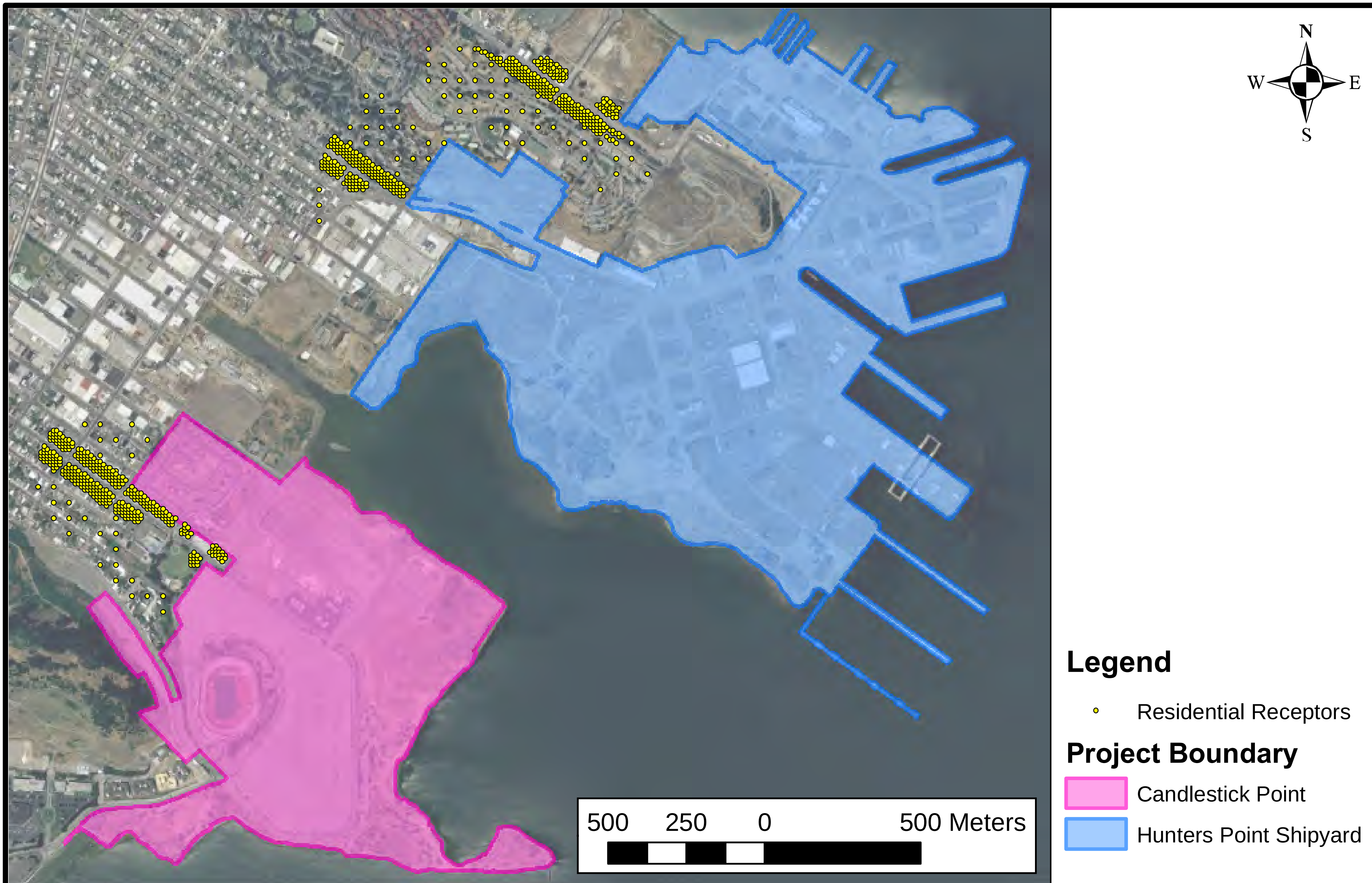
Sources Modeled in Cumulative Analysis
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure
2

Drafter: Date: Contract Number: Approved: Revised:



ENVIRON

6001 Shellmound St., Suite 700, Emeryville, CA 94608

Offsite Residential Receptors for Cumulative Analysis
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure 3

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Appendix J1 CIRCA, Historic Context Statement, July 2009

BAYVIEW WATERFRONT PLAN HISTORIC RESOURCES EVALUATION, VOLUME I: HISTORIC CONTEXT STATEMENT

Prepared for

PBS&J on behalf of the San Francisco Redevelopment Agency

Prepared By

CIRCA: HISTORIC PROPERTY DEVELOPMENT

1 Sutter Street #910, San Francisco, California

JULY 2009

Updated: July 2009

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I. BACKGROUND AND OBJECTIVES

INTRODUCTION

This historic context statement is part of the review of the Bayview Waterfront Project (BWP) Environmental Impact Report (EIR). This project encompasses Candlestick Point, Hunters Point Shipyard and the India Basin Shoreline. The Candlestick Point-Hunters Point Shipyard Phase II Development Plan contains Candlestick Point State Park, Candlestick Stadium, the Alice Griffith public housing and most of Hunters Point Shipyard. The India Basin Shoreline plan includes parcels from the boundaries of Hunters Point Shipyard up to and including the Pacific Gas & Electric Hunters Point Plant, now under demolition. The purposes of this document are to provide background material for the evaluation of potential historic resources within the Project and to inform the relevant sections of the Environmental Impact Report for the BWP.

To this end, this document is primarily concerned with the historical development of specific project sub-areas noted above. However, these parcels have traditionally been part of a larger community. The history and development of this larger community must be discussed to a degree to more fully frame the significance within the specific project sub-areas. This report is not intended to be a comprehensive history of the Bayview or Hunters Point districts, though information on the early development of these districts is briefly discussed.

This context statement is focused on specific geographic zones. It is primarily concerned with the existing built environment. For further discussions on prehistorical and historical archaeological studies and contexts, please see the archaeological context statement for the Project prepared by Archeo-Tec: Consulting Archaeologists for a parallel discussion. Where relevant, sections of this complementary document have been used for continuity and clarification. Please see footnotes for more precise citations of their work.

USE OF GEOGRAPHIC TERMINOLOGY

The use of geographic descriptions throughout this report refer to the general districts of the City and County of San Francisco unless specifically stated otherwise. When the point being discussed is within a specific Project sub-area, this is noted as such. Because much of the historical context for the Project is tied closely with the development of nearby parcels and regions that are not part of the Project, discussion must include a broader geographic region than is defined in the EIR scope. Therefore, when discussing the general area, including the sub-area sites, the term “Bayview-Hunters Point” is used. Where the discussion is confined to the sub-areas only (Candlestick Point, Hunters Point Shipyard Phase II, or India Basin) then these specific terms are used. Alice Griffith public housing represents a portion of the Candlestick Point-Hunters Point Shipyard Phase II development area. It is discussed separately because its historical context is highly specific.

PURPOSE OF A HISTORIC CONTEXT

A Historic Context enables the assessment of a property’s historic significance by creating a framework against which to qualify objectively its relationship to larger historical themes and events. Once this framework has been adopted, qualified historic professionals can then use the Historic Context as a basis for the completion of historical evaluations. Such evaluations encompass the following:

- Evaluate a property’s historic significance including its associative value and context utilizing national, state and local criteria and status codes.
- Establish historic/cultural themes and periods of significance based on substantiated documentation.
- Evaluate a property’s integrity and identify character-defining features.

- Determine which Standard of the *Secretary of the Interior's Standard for the Treatment of Historic Properties* will be followed for proposed changes (Preservation, Rehabilitation, Restoration, or Reconstruction.)
- Review proposed changes for consistency with the selected Standard to meet the criteria and requirements of the California Environmental Quality Act (CEQA) to avoid a substantial adverse impact.

Historical evaluation of a subject property within the Project should use this context statement as a tool for understanding where the property's significance lies within the larger historical timeline. Such assessments should also include an analysis of the immediate environment that represents the physical context for the building or site. This is part of determining the level of the resource's historic integrity. Therefore, buildings in their original locations retain a much higher integrity level and consequently are of stronger historic importance than those that have been moved. When determining the historic and cultural value of the resource, its place in history should be evaluated as well as physical location within the City's jurisdiction. In many cases, the location and environmental surroundings played a large role in its historical use and importance in the larger Bayview-Hunters Point neighborhood historic context as outlined in the following pages.

LOCATION AND BOUNDARIES OF STUDY[1]

The Bayview Waterfront Project is within the southeast quadrant of the City and County of San Francisco. The site is generally bounded by Jennings and Newhall Streets to the north, U.S. 101 to the west, the Visitacion Valley and Executive Park neighborhoods and the City and County of San Francisco – San Mateo County line and the City of Brisbane to the south, and San Francisco Bay to the east. Figure 1, illustrates the regional location of the Project and the location of the Project within San Francisco. As shown in Table 1, Phase II would comprise approximately 728 acres. The India Basin Plan area would comprise 76 acres. The sites together comprise approximately 804

[1] Taken from EIR guidelines provided by PBS&J in April 2008.

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acres, occupying the waterfront from the northern boundary of the India Basin Shoreline area to the western edge of Candlestick Point, and extending inland from the waterfront. Figure 2, Bayview Waterfront Project Site Boundaries, illustrates the Project boundaries.

TABLE 1
BAYVIEW WATERFRONT PROJECT SITE AREAS

	Acres
Candlestick Point	299
Hunters Point Shipyard Phase II	429
Development Plan Total	**728**
India Basin Shoreline Plan	76
Project Total	804

Source: SFRA, Lennar, 2008.

CANDLESTICK POINT-HUNTERS POINT SHIPYARD DEVELOPMENT PLAN

The Candlestick Point area of the Development Plan is immediately east of Executive Park, with the Bayview neighborhood to the north, the Hunters Point Shipyard (HPS) to the north and east, and Candlestick Point State Recreation Area (SRA) along the Bay frontage, as shown in Figure 2. The Candlestick Point area of the Development Plan is generally bounded by Hawes Street to the north, Candlestick Cove and San Francisco Bay to the south, South Basin to the east and, Jamestown Avenue to the west. The northern boundary of Hawes Street is limited to the San Francisco Housing Authority's Alice Griffith public housing site between Gilman and Carroll Avenues, which extends north from Aurelious Walker Way. The Candlestick Point area also includes the Candlestick Point SRA land surrounding Yosemite Slough, generally bounded by Ingalls Avenue to the north, Yosemite Avenue to the west and Thomas Avenue to the east. The southern portion of the area surrounding Yosemite Slough is contiguous with the northwestern edge of the HPS Phase II.

The HPS Phase II area is to the south of the Bayview neighborhood. As shown in Figure 2, the HPS Phase II area is generally bounded by the San Francisco Bay to north, south and east. The west end of the northern boundary extends along Fitch Street to approximately Crisp Avenue, excluding the University of California San Francisco (UCSF) Animal Research and Care Facility and former Building 815 (now owned by DataSafe Records Storage and Information Management). The northern boundary generally extends along Crisp and Spear Avenues and is contiguous with the current north, south, and east boundaries of the HPS Redevelopment Project Area, Parcel A'. The northernmost end of the HPS Phase II area is contiguous with Earl Street and the southern boundary of the India Basin Shoreline Plan.

INDIA BASIN SHORELINE PLAN

The India Basin Shoreline Plan is comprised of approximately 76 acres, immediately north of the HPS Phase II. As shown in Figure 2, the India Basin Shoreline plan is bounded generally by Jennings and Newhall Streets and Heron's Head Park to the north, Hunters Point Boulevard and Innes Avenue to the west, and Earl Street to south. San Francisco Bay forms the eastern border.

CONTEXT STATEMENT OBJECTIVE

A historical context statement is an important planning tool that is the basis for making informed and consistent decisions. Historic contexts provide information to establish significance and answer the question "why is this property important?". Context statements are critical in later survey and evaluation phases. The information as to

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Figure 1. Map showing regional overview of Project site. Figure prepared by Archeo-Tec and excerpted with permission from their companion document, *Historic Context for the Archeology of the Bayview Waterfront Project, San Francisco, California.*

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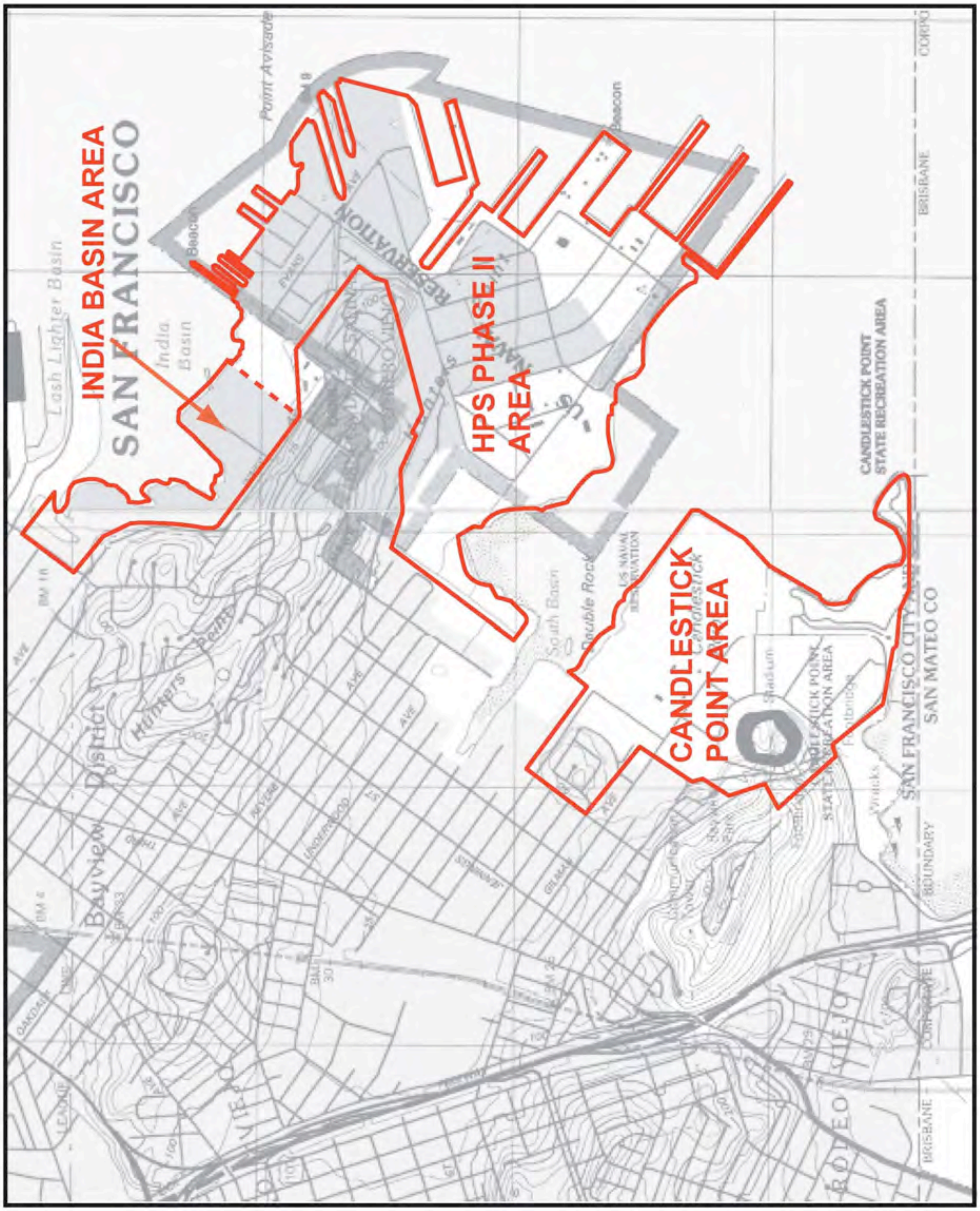

Figure 2. Map showing overview of Project site and sub-areas.. Figure prepared by Archeo-Tec and excerpted with permission from their companion document, *Historic Context for the Archeology of the Bayview Waterfront Project, San Francisco, California.*

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"why?" is well researched using primary sources such as period photographs, maps, newspapers, brochures, etc., and secondary sources such as books and reports based on primary sources. Because properties can be significant for more than architecture (relationship to an event, person, yield information) a broad spectrum of sources are consulted. The context statement itself does not evaluate individual properties. Also, it is not intended to be a definitive history of the Bayview or Hunters Point neighborhoods. It is however, the basis for all preservation planning and provides much needed information that can be used by professionals and laypersons. Because the historic context statement is based on substantiated documentation it is therefore is a "living document" that can be added to as valid information arises.

Decisions about the identification, evaluation, registration and treatment of historic properties are most reliably made when the relationship of individual properties to other similar properties is understood. Information about historic properties representing aspects of history, architecture, archeology, engineering and cultural themes must be collected and organized to define these associations. The historic context statement provides identified areas of significance. The approach describes the important broad patterns of development in an area that may be represented by historic properties. The historic context statement is the foundation for decisions about identification, evaluation, registration and treatment of historic properties.

The objectives of this context statement are as follows:

- Create a well-defined historic context based on property types, architectural character-defining features, local development and land use patterns, and significance of place and cultural themes for the period of approximately 1849 to 1966.
- Outline the chronological development of the neighborhood with connections made between patterns of development, and structures and properties that may still exist today.
- Offer an understanding to how and why the neighborhood was developed in the way it exists today.

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- Provide documented information to allow for the comprehensive evaluation of a property's importance within the historic context of the Bayview-Hunters Point area.

Historic context statements are important tools for the preservation planning process. This Historic Context Statement is meant to provide the San Francisco Redevelopment Agency, the San Francisco Planning Department and other bodies with a means to evaluate potential resources for their associative, architectural, or historic value. Such a tool will provide a baseline reference for determining environmental impacts related to future development of the area and inform mitigation measures to limit or avoid adverse environmental impacts.

All evaluations of significance for specific buildings within the Project area are presented in the second volume of this study, the *Bayview Waterfront Plan Historic Resources Survey Report,* also prepared by Circa: Historic Property Development. This companion volume presents the result of the historic resource survey, including State of California Department of Parks and Recreation forms (DPR forms) relevant to the Project and recommendations for further actions related to historic resources. This document, *Bayview Waterfront Plan Historic Resources Evaluation, Volume I: Historic Context Statement*, is intended to provide the initial background for these evaluations and to present general property types that may be associated with the historical development of the areas in question.

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II. METHODOLOGY

RESEARCH AND DEVELOPMENT

There have been many studies of the cultural and historical development of the areas within the Bayview Waterfront Project. The oldest were completed over 30 years ago, while others were undertaken concurrent with the writing of this document. Consequently, much of the background information presented here was first gathered from these existing documents, then cross-referenced to verify accuracy and merit. Where required, additional research with primary and secondary sources was undertaken. In some cases, the information presented in previous documents is paraphrased. These examples are typically noted at the beginning of the subject headings.

Unlike most historical context statements, this one encompasses several distinct plan areas. Much of this is comprised of lands reclaimed from San Francisco Bay during the World War II and later periods. Therefore, there is little to historically connect the project areas except their relationship to the larger development of the outer limits of San Francisco during the late 19th and early 20th Centuries. Therefore, original research was largely limited to the very early and very late chronological periods of development.

Gathering this information depended upon a diverse assortment of local archives and libraries. For those subjects within the more recent past, oral histories and personal remembrances of individuals who either worked, lived or had been associated with Hunters Point Shipyard, Alice Griffith public housing, Candlestick Park or India Basin have been used.

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SUMMARY OF RESOURCES

The following are general resource types. Individual resources of these types are listed in the bibliography.

- Historical societies – including the California Historical Society and other local historical societies.
- Public and private archives and libraries – including the San Francisco Public Library, Main Branch and Bayview Branch, the Bancroft Library, the Oakland Public Library, Main Branch, The Maritime Museum and Naval archives on Treasure Island.
- Census records
- Newspaper clippings – including historical and contemporary newspapers available in online repositories as well as in the collections of various archives and libraries.
- Books
- Maps – including Sanborn Fire Insurance Maps, United State Geological Survey Maps, coast survey maps and a wide variety of specialty maps included in previously completed reports.
- Promotional material
- Volunteers
- Scholarly articles
- Trade publications
- Period photographs
- Oral histories
- Government publications – including previously commissioned reports
- Environmental reports
- U.S. Navy documents
- Previously prepared contexts and historical evaluations – in particular evaluations of San Francisco Public Housing, the Shipyard, India Basin, Candlestick Park, among others.

III. INTRODUCTION

HISTORIC CONTEXT THEMES

Main sections of historic contexts are generally organized into “themes’ or areas of significance as identified in National Register Bulletin 15, *How to Apply the National Register Criteria for Evaluation*. This bulletin explains that a determination must be made on how the theme of the context is significant in the history of the local area, the State, or the nation. “A theme is a means of organizing properties into coherent patterns based on elements such as environment, social/ethnic groups, transportation networks, technology, or political developments that have influenced the development of an area during one or more periods of prehistory or history. A theme is considered significant if it can be demonstrated, through scholarly research, to be important in American history. Many significant themes can be found in the list of Areas of Significance used by the National Register.” This list is quoted as follows:

AREAS OF SIGNIFICANCE:

Agriculture
Architecture
Archeology
Prehistoric
Historic-Aboriginal
Historic-Non-Aboriginal
Art
Commerce
Communications
Community Planning &
    Development
Conservation
Economics
Education
Engineering
Entertainment/Recreation
Ethnic Heritage
    Asian
    Black
    European
    Hispanic
    Native American
    Pacific Islander
    Other
Exploration/Settlement
Health/Medicine
Industry
Invention
Landscape Architecture
Law
Literature
Maritime History
Military
Performing Arts
Philosophy
Politics/Government
Religion
Science
Social History
Transportation
Other

Themes are then tailored to accommodate areas of significance specific to a particular community when appropriate. In this way, contexts follow a common thread of understanding regarding building development and growth patterns, cultural and ethnic evolutions and economic changes etc., while allowing for customization or specification in areas that define community character. One obvious context for the Bayview Waterfront Project, and indeed the entire San Francisco Bay Area, is military development. However, we explore four other context areas that we feel more closely relate to the specific aspects of local history. These themes are: early development of the area, early development of India Basin with particular emphasis on maritime development, evolution of public and subsidized housing and recreation.

To better understand important historic events and their impact on the local community and/or historical resource, it is often helpful to have a sense of the larger natural, political and social setting in which these events took place. While this document is concerned with the chronological development of the Project, the more general community's connection to broad historical movements, development trends and natural setting are key elements in understanding the influential factors that may be implied, but not overtly stated, in the following discussions.

SUMMARY OF REGIONAL GEOGRAPHY AND GEOLOGY

The Bayview-Hunters Point and India Basin neighborhoods of southeast San Francisco generally occupy the waterfront south of Islais Creek (more generally, south of César Chávez Street (see Figure 1.) This area of Islais Creek has changed considerably during the 20th Century. What was originally a series of extensive marshes interspersed with rocky outcroppings was transformed into mostly flat land reclaimed by leveling nearby hills and clearing rocky shoreline. All of the project sub-areas contain a mixture of original and reclaimed land. What differs are the reasons the land was created and how it was developed.

At the southern end of Bayview is Candlestick Point. This area is dominated by a large hill (now known as Bayview Hill), of serpentine and sandstone that originally arose from the shallow marshland at its base. Today, it has been extensively quarried and otherwise altered to accommodate Candlestick Park Stadium. The remainder of Candlestick Point is a former landfill that was further reclaimed with fill for parking lots and Candlestick Point State Recreational Area. Near Yosemite Slough and the Alice Griffith public housing, the land was a mix of marshlands and rocky shoals. During World War II, it was partially filled to create the site for the Double Rock War Dwellings. After the war, the area around Yosemite Slough, known as South Basin, was filled in to create its current configuration.

Hunters Point Hill is comprised of serpentine rock with steep slopes to the north and south. It rises much more gently to the east and west. What remains today is only a part of the original natural formation. Before U.S. Navy development in 1941, Hunters Point Hill extended almost a mile out into San Francisco Bay and was much steeper, longer and more prominent than its current form.

India Basin is a mixture of fill and original shoreline. Of all the sub-areas, this one has seen the least alteration of its natural geologic formations. It is here that the northern slopes of Hunters Point Hill fall steeply down to a gravelly shoreline that extends out into mud flats at low tide. See Figure 3 for a comparison of shore locations in 1852 to the present.

CHRONOLOGICAL SUMMARY OF AREA DEVELOPMENT

The story of the Bayview-Hunters Point project site is varied. For much of its early existence, it was part of San Francisco only on paper. Until the 1940s, its development and purpose showed little resemblance to the trends shaping the rest of the City. In many ways, it was akin to the farming communities of the San Francisco Peninsula,

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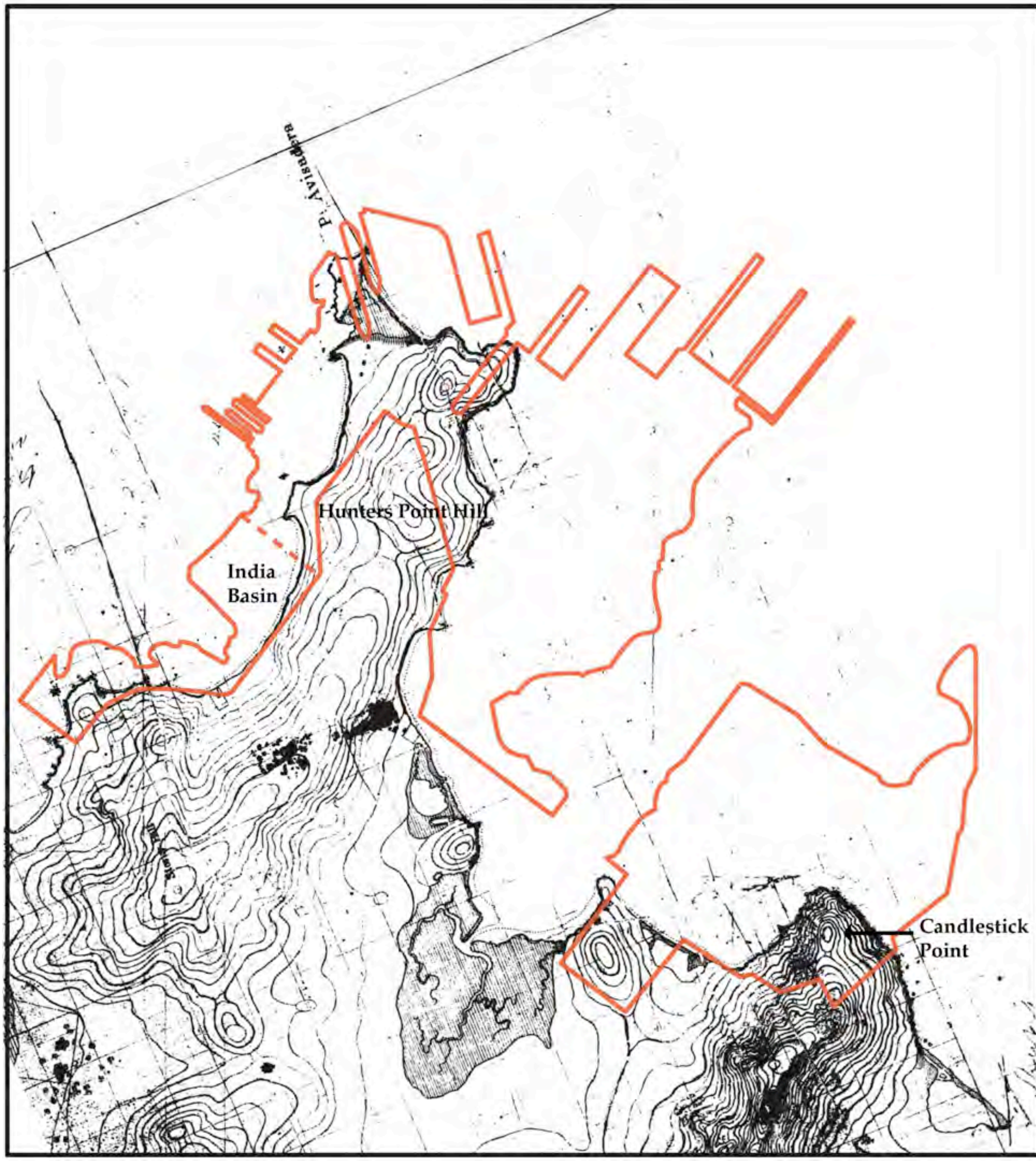

Figure 3. Map comparing the 1852 shoreline to present day shoreline. Figure prepared by Archeo-Tec and excerpted with permission from their companion document, *Historic Context for the Archeology of the Bayview Waterfront Project, San Francisco, California*.

mostly rural, used for weekend retreats and drives in the country. It was a relatively bucolic district composed of rocky shoreline, marshlands and fertile tidal plains. A place of continual speculation but little development, growth was focused and never sponsored from within the existing community.

This changed when the United States entered World War II in 1941. This seminal moment thrust the Bayview-Hunters Point area into the national spotlight. Farms were replaced with housing. Drydocks became shipyards. Fishing shacks gave way to cranes and berthing piers. When the dust settled, a whole new population called the area home and most of the reminders of the rural past were swept aside. A brief account of the history of this transition is provided in the following section. These areas are discussed in greater detail in the individual chapters of this document.

PRE-1849

Before modern settlements, the Bayview-Hunters Point project site was a favored fishing ground for native populations. It was relatively protected from the harsh winds and fogs of the ocean coastline and the extensive marshes harbored numerous species of waterfowl, fish and useful grasses. These first inhabitants lived in the area for several thousand years.

In 1775, the Spanish government sent Lieutenant Juan Bautista de Ayala into San Francisco Bay to map the coastline and to select sites for fortification. He dispatched his second mate, Juan Bautista Aguirre to explore the Bay further south. Aguirre and his crew came upon a rocky peninsula surrounded by deep water. They named it Point Avisadera (Beacon Point.) Aguirre's diary is the earliest known written account of Hunters Point Hill.

In 1776, as soldiers were busy building a military fortification at the entrance to San Francisco Bay, missionaries were establishing a church along Dolores Creek. Mission

San Francisco de Asis was granted all of the land now contained within the Project for use as pasture for its cattle. When Mexico secularized the Missions in 1834, their lands were disbursed to loyal Mexican citizens. In 1839, Jose Bernal was given most of Mission's southeastern pasture lands, including all of the land within the Project boundaries.

1849-1906

The discovery of gold at Sutter's Creek in 1848 brought floods of people from all over the world to California. Most came through San Francisco before heading east to the Sierra. Some decided to stay. More returned after mining claims proved worthless. As a result, San Francisco grew in both population and geographic extent very rapidly over a short period of time. When it became a state in 1850, even more people were drawn to settle in the area.

Settlement in the Project vicinity during this period was primarily limited to the India Basin sub-area where northern European boatwrights established small family boatyards. They found the area to be sparsely settled and easily navigable by boat. Slowly they were joined by Italian and Chinese farmers who grew vegetables for the expanding City center four miles north.

Access to the interior of the area was difficult. Few roads passed nearby and no roads ventured east except to access the boatyards along India Basin. Most travel was by ship or by a long, arduous journey through the swamps around Islais Creek. In spite of this, people came to Hunters Point Hill for outings, and to the flatlands near today's Yosemite Slough for recreation. The draw was the area's pleasant weather and wonderful Bay views.

These two factors also enticed several real estate speculations. One of the earliest was a partnership with Jose Bernal's family that involved a pair of brothers from the east coast. The Hunter brothers never found success in the venture but they stayed to settle on Hunters Point Hill where they lived and worked. The South San Francisco Homestead and Railroad Company was only slightly more successful. Their lasting legacy was the granting of land at the end of Hunters Point Hill for completion of a drydock in 1867. It was this drydock that eventually became the Hunters Point Shipyard.

1906-1941

The great earthquake and fire of 1906 had very little impact on development within the Project vicinity. A small increase in settlement occurred along Third Street near Butchertown and Islais Creek. The real improvement was the completion of a bridge across Islais Creek at Third Street in 1915. Finally there was a direct way to access Hunters Point Hill, India Basin and eventually Candlestick Point.

During this time the population was predominantly Italian with a fair number of Irish, Maltese, Portuguese, and Chinese settlers. They formed small enclaves within the larger community, sponsoring their own churches and social clubs. For the most part, this area of the City was largely self-sufficient and received little attention from the City government. The one exception to this was the commercial activity at the Union Iron Works Drydocks the end of Hunters Point Hill.

The drydocks were expanded twice during this period in response to U.S. Navy contracts. The Navy was increasingly dependent on the services at the drydocks as one of their primary shipyard resources on the Pacific Coast. This eventually prompted them to purchase the drydocks from Bethlehem Steel (then the parent company of Union Iron Works) in 1939.

1941-1945

When the United States entered World War II at the end of 1941, the Navy had just completed its takeover of the drydocks at Hunters Point. From there, construction ensued for the next five years, dramatically increasing the dry landmass around the end of the point and changing the topography of the entire area. Demands for housing for the defense workers at the shipyard resulted in over 12,000 units of housing constructed in the immediate area. Every portion of the Bayview was impacted by these housing projects. The population explosion transformed the rural Bayview and Hunters Point neighborhoods into an urban enclave almost overnight. Demographic shifts from Italian to African-American, economic shifts from agriculture to heavy industry and social shifts from multigenerational families to transient settlers all occurred during this highly tumultuous time.

1945-1966

After World War II, construction continued at Hunters Point Shipyard, but the jobs began to decrease in numbers. In response to peacetime activities, a sizable workforce was needed, but not in the around-the-clock mode that was common during the war. This decrease in work prompted some families to leave the area. Others moved into one of the hundreds of permanent single-family homes that were being constructed on the former truck garden lots. This left a great number of temporary war dwellings vacant.

The post-war period in San Francisco was marked with an extreme shortage of quality housing. However, the low-income segment of the market was even harder hit. These temporary buildings became apartment units managed by the San Francisco Housing Authority. The concentration of war dwellings around Hunters Point Shipyard was transformed into the highest concentration of low-income housing in San Francisco. The history of the post-war period within the Project boundaries is largely a story of the transition of this housing stock and its impact on the more well-established surrounding community.

SUMMARY

When considered as a whole, the Project areas had a relatively uneventful history up until 1941. The outbreak of World War II transformed the whole southeastern portion of

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San Francisco. Each of the sub-areas was altered in its own way, but the result was a vastly different social (housing and demographics), economic (military and industry) and physical environment than what existed prior to 1941. The second most influential date was 1945 – the end of World War II. If the onset of the war changed the area from farmland to industrial powerhouse, the end of the war changed the industrial areas into a community. Even today, the various portions of the Project wrestle with their post-war identity and purpose. In most of the specific, these purposes and uses have remained relatively constant but in a state of routine unrest. The uncertainties of how to adapt from wartime to peacetime uses was the first step. Today they experience uncertainties of redevelopment on a scale not seen since World War II.

This context attempts to frame the past evolution of the Project site in order to help shape the path of this next major chapter in the Bayview-Hunters Point history. The following chapters each focus on one aspect of this history and present it in greater detail. Chapter IV discusses the general development of the geographic region prior to the start of World War II. It will elaborate on much of the information presented, briefly, in this section. Chapter V focuses on India Basin and its unique development history. Chapter VI concentrates on the Hunters Point Shipyard and its development from a single drydock to a vital military installation. Chapter VII looks at the history of public housing in San Francisco with a focus on the evolution of housing from temporary workers' housing to public housing in the South Basin Activity Node and at the Alice Griffith public housing. Finally, Chapter VIII briefly discusses the development of Candlestick Park and Candlestick Point.

Within the Project site there are a variety of previously identified historic resources. Several are discussed in this document. However, this context is meant to provide the background information necessary for facilitate *future* evaluations of historical significance for the Project. Please refer to the Bayview Waterfront Project Survey Report for a more complete account of existing and newly identified historic resources within the Project site.

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IV. BAYVIEW-HUNTERS POINT (PRE-HISTORY-1941)

Human habitation of Northern California has occurred since at least 11,000 years ago. What is generally recognized as the first native civilization on the San Francisco Peninsula appeared around 6,000 years ago and flourished as a population until the mid-1700s, when they encountered the first Spanish explorers.[2] For the next half-century, Spanish military and Catholic missionaries tried to bend the native cultures to the will of European social and religious norms, with little success. Their efforts largely ended when Mexico won its independence from Spain in 1821. When Mexico secularize the Missions in 1834, withdrawing strong governmental support of the mission system, most missions were abandoned or dramatically reduced. The lands were bought by or given to favored Mexican citizens. The grants within present-day San Francisco were initially used as grazing pastures for small herds of livestock. When gold was discovered in 1848, much of the land within several miles of the entrance to San Francisco Bay was surveyed and platted for more intensive development.

In the Bayview-Hunters Point area, this period between pasture land and urban settlement lasted much longer than elsewhere. Even though several individuals and corporations tried to entice people to build their homes on the slopes and valleys of the area, it was not until World War II that the current neighborhoods started to take on substantial form. This late development is unique within the history of San Francisco and as a result, Bayview-Hunters Point has an unusual development history.

The following brief history covers the period from pre-history through the military buildup to World War II, marked by three periods settlement: Pre-history, settlement prior to statehood and settlement after 1850. Little of the architectural record remains for any of

[2] Archeo-Tec, Historic Context for the Archeology of the Bayview Waterfront Project, San Francisco, California-Draft. 2008, p. III.J-18.

these periods, but it is important to understand this period to comprehend the extreme changes brought by World War II.[3]

PRE-HISTORY

As the ice sheet retreated from Northern California at the end of the last Ice Age approximately 10,000 years ago, San Francisco Bay was formed from the flood plains around a deep pre-historic river. For thousands of years the shores of the Bay were covered with extensive wetlands, grasslands and sand dunes. The area that now comprises the Bayview and Hunters Point districts was a mixture of shallow, tule covered swamps and deep channel drop-offs. Hunters Point extended over a mile out into San Francisco Bay and was edged with deep water almost immediately off its steep slopes. Those areas around the Islais Creek delta (now India Basin) and between Hunters Point and Candlestick Point (centered on Yosemite Slough), were fairly shallow and bordered by tidal mud flats.

Hunters Point Hill is a bedrock formation that originally extended over 6000 feet into San Francisco Bay. Its serpentine rock and steep slopes made it quite inhospitable but afforded settlers on its slopes protection from prevailing wind patterns and weather. At Candlestick Point the eastern edge of Bayview Hill dropped almost straight into the Bay waters, with sandy beaches extending north and south along the shoreline.

Accounts from 1776 by Spanish settlers note encounters with the native population around Islais Creek and the presence of good land and a small spring. A large marsh spanned the distance from Potrero Point to Hunters Point. Further south, a smaller outlet existed near the present-day Yosemite Slough. See Figure 3 for a view of the 1852 shoreline.

[3] The specifics of the various types of archaeological deposits, their context, importance and locations are discussed more fully in the archaeological survey of the Bayview-Hunters Point District created by Archeo-Tec Consulting Archaeologists in parallel with the development of this document (2008).

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The marshy shore and sheltered coves of the Bayview-Hunters Point area made it a natural settlement location. Native peoples had inhabited the San Francisco Peninsula for an estimated 6,000 years before European and Mexican explorers came to the region. Islais Creek had a large tidal plain rich with various reeds, grasses, waterfowl, and other wildlife. This rich saltwater marshland covered most of the area between today's Potrero Hill and Bayview districts. Yosemite Slough supported a second, smaller marshland. The lowlands around and between these two areas were flooded daily by the continual ebb and flood of the Bay waters, creating marshlands over half a mile wide along this section of the shore.

A detailed account of the social customs and lifestyles of the native populations is presented in Historic Context for the Archeology of the Bayview Waterfront Project, San Francisco, California, prepared by Archeo-Tec in parallel with this document. The information presented on these peoples is summarized from this report. For additional detail, please see the referenced document.

OHLONE

The Project is situated along a relatively protected area of Bay shoreline. Before modern reclamation it was covered in extensive marshes rich with plants and animals. As a result, it was a favored location by native inhabitants, as evidenced in the numerous indigenous sites that have been identified within the Project boundaries.

"The Northern tip of the San Francisco peninsula was once the Yelamu tribal territory. The Yelamu were one of a number of smaller tribal groups within the larger Costanoan (Ohlone) language family, composed of no more than 160 people who spent much of their year split into three semi-sedentary villages. The present Project is located within several miles of the predicted location of the Yelamu village of Chutchui… The group of people who lived at Chutchui moved seasonally along Mission Creek to the Bay shore, where they had another village called Sitlintac."[4]

By the time Europeans arrived in the 18th Century, a stable and thriving native population existed in the San Francisco and Monterey Bay regions. At the time of the Missions' founding, central California had the densest native population north of Mexico with an estimated 7,000 to 10,000 inhabitants between Point Sur and San Francisco Bay. This population was made up of many different groups, or tribelets. Each tribelet constituted an autonomous governing body but they did not always live in a single village. Around San Francisco Bay these tribelets were more nomadic and often traveled between two or more settlements depending on the time of year.

The abundance of natural springs and freshwater wetlands in the region provided many suitable locations for temporary settlement. This cultural habit of wandering made them unusual from other Native American groups in the western United States. This was due in part to the abundance of fish, game, and wild grains around them. With little effort they had plenty to eat and never had a need for supplementing their diet with cultivated crops. Instead they were able to sustain themselves relatively comfortably with staples such as acorns and acorn flour, seeds, grasses and whatever elk, deer, rabbit, wild birds and fish they could readily hunt or catch. Their primary hunting weapons were the bow and arrow but most were also proficient with knives for close hunting and meat preparation.

Linguistically, the Ohlone language was the most widespread of the five distinct native languages in the Bay Area. These languages also included Bay Miwok, Coast Miwok, Patwin and Wappo. Ohlone, Bay Miwok and Coast Miwok were derived from a common linguistic base known as Utian. Patwin was more distantly related and Wappo was from

[4] Archeo-Tec, *Historic Context for the Archeology of the Bayview Waterfront Project, San Francisco, California-Draft*. 2008, p. III.J-12.

unrelated origins. Within the Ohlone language were many dialects. While recognized as distinct languages, some were similar enough to be understood across tribelet groups.[5]

When the missionaries came to the region in the 18th Century, the Ohlone first greeted them cautiously. The Spanish tried to trade glass beads and cloth, items both foreign and fascinating to the Ohlone. Increased contact brought about an evolution of their behavior and most soon greeted the Spanish with excitement and anticipation of the goods they traded.

The missionaries sought to convert the natives to Catholicism and to show them how to live as they did, farming the land and conducting themselves as proper Spanish citizens. The newly converted were referred to as neophytes. Generally, after conversion the neophytes moved to the mission and lived in single-sex dormitories. Living in close quarters allowed Western diseases, to which the Ohlone had no resistance, to spread quickly through the population. “Between 1817 and 1835, several hundred Indians were transferred from Misison Dolores to Mission San Rafael in Marin County where agriculture and grazing were better. By 1827, there were reported only 241 Indian men, women and children at Mission Dolores.”[6] In this way, traditional ways of life were lost. Under Mexican rule, the missions were secularized in 1834. There were no villages to return to and the wildlife and plants they depended upon were largely gone or severely impacted by the use of the land for cattle grazing.[7] Most neophytes left and tried to find work on the ranches.

[5] Ibid,, pp. 25-26.
[6] Ibid., pp. 29-30.
[7] Ibid., pp. 31-32.

EARLY SETTLEMENT (EXPLORATION – 1849)

Spanish Era

The first Europeans to come to the San Francisco Bay area in the 18th Century were Spanish explorers from Spanish-controlled Mexico. Captain Gaspar de Portola and his exploration party are generally credited with "discovering" San Francisco Bay in 1769. The purpose of their mission was to locate Monterey Bay, which they failed to do, by taking a coastal route. Instead they passed Monterey and viewed San Francisco Bay from a hilltop in present-day Pacifica. This expedition was the first to the general region and established a Spanish claim over the land between the two bays.

By 1776, permanent settlements were desired to secure Spain's claim over the newly discovered land. The great harbor was of particular value so it was one of the sites chosen for both a mission and for a Spanish fort. The mission was founded by Father Francisco Palou on June 29, 1776. He named the site for his order's patron saint, Saint Francis of Asis. The mission was inland several miles along the shores of a small creek which they called Arroyo de los Dolores.[8] Eventually the mission became known as Mission Dolores, the name in use today.

At that time, five of the original 13 missions had been established. They eventually ranged geographically from San Diego to San Francisco, founded over a 22-year period. The chain of missions up through Alta California were to be connected by El Camino Real, spaced about a day's ride apart. Mission Santa Clara (1777) was the closest mission to Mission Dolores. The original 13 missions were further apart than called for in the plan, making travel between them dangerous. In 1797, the Spanish government authorized the founding of five more missions. Mission San Jose (1797)

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[8] Historic American Buildings Survey, San Francisco de Asis, Mission Dolores Church, San Francisco, California: HABS No. CAL-38-SANFRA, 1937.

dates from this period. El Camino Real continued to be a primary north-south route well into the 19th Century.

Mexican Era

The founding of the missions continued in Alta California even as problems began for the territorial governors in Mexico. By 1810, tensions between Spain and its Mexican territory had become too great and Mexican rebels declared themselves an independent country. Nearly a decade of fighting on Mexican soil ensued. In 1817, a Mexican constitution was ratified and five years later, the newly established government took over control of the missions.

For a period, the Franciscan brothers remained at the missions and ran them with the support of the Mexican Army. However, in 1834, the Mexican government secularized the missions, stripping them of their lands and government support. The lands were given to well-connected Mexican citizens, who either paid a nominal fee or were being rewarded for military services. With the loss of military and governmental protection and support, the missions soon fell into poverty and disrepair. Food shortages and old age forced many Franciscans to return to Mexico or to abandon the more remote missions.

In 1839, a large section of the lands originally attached to Mission Dolores were granted to Jose Cornelio Bernal. According to the c1854 land case map, Bernal's Rancho Rincon de Las Salinas encompassed all the lands between Precita Creek on the north and a series of hills just north of Visitacion Valley on the south, and from El Camino Real to San Francisco Bay.[9] In total he was eventually granted approximately 4,400 acres (see Figure 4.)

Bernal was a well-established Spanish soldier. (His father, Juan Francisco Bernal traveled with Juan Bautista de Anza when they discovered San Francisco Bay.) In his

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[9] Land Case Map D-8, Unites States District Court. California, Northern District. Land Case 5 ND, p. 365, http://oac.cdlib.org/.

lifetime, Bernal was granted several other plots of former mission lands. In 1834, he was given a small plot of land near Mission Dolores as a reward for his civic services in the fledging political realms of San Jose and San Francisco. In 1840, he was granted the adjacent Potrero Viejo lands, giving him ownership of approximately 20 percent of present-day San Francisco. Unfortunately, he did not live long enough to capitalize on his gains. Jose Cornelio Bernal died in 1842 at the age of 46.[10]

Because most of the Mexican land grants were large and far from existing settlements, they were difficult to patrol. Consequently, it was easy for squatters to occupy land. According to Mexican law, non-Mexican citizens could not own Mexican land. Because of this, many Americans came west and tried to force claims on pieces of the large ranchos. Over the next ten years, problems continued to brew.

In 1846, the Mexican Governor, Jose Castro, issued an edict to all American settlers in the Mexican territories in California. They were told to relinquish all their claims on Mexican-held land or face involuntary removal. Many settlers had lived and worked the land for close to a decade and were angered by the governor's proposal to remove them. Twenty men banded together near Santa Clara and ambushed a shipment of Castro's horses being sent to troops charged with carrying out his orders to evict the Americans. They met little resistance. Embolden with this success, they continued to Sonoma to General Vallejo's home to force his surrender.[11] Here too, they met little resistance and easily captured Vallejo, who did not put up any struggle. U.S. Army Captain John Charles Fremont joined their fight and the small group, called the "Bear Flaggers" after the flag they fashioned for their independent Republic of California, soon controlled most of northern California. These events, and similar struggles in Texas, prompted the U.S. to declare war on Mexico later that year.

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[10] Greg Pabst, "To Have But Not To Hold: The Bernals of Early San Francisco and their Lost Corner of the City", gregnoevly.home.mindspring.com/Bernal.html.

[11] Vallejo was the Mexican government's acting commandant of the Northern Frontier. As such, he controlled all military forces and supplies in Northern Alta California.

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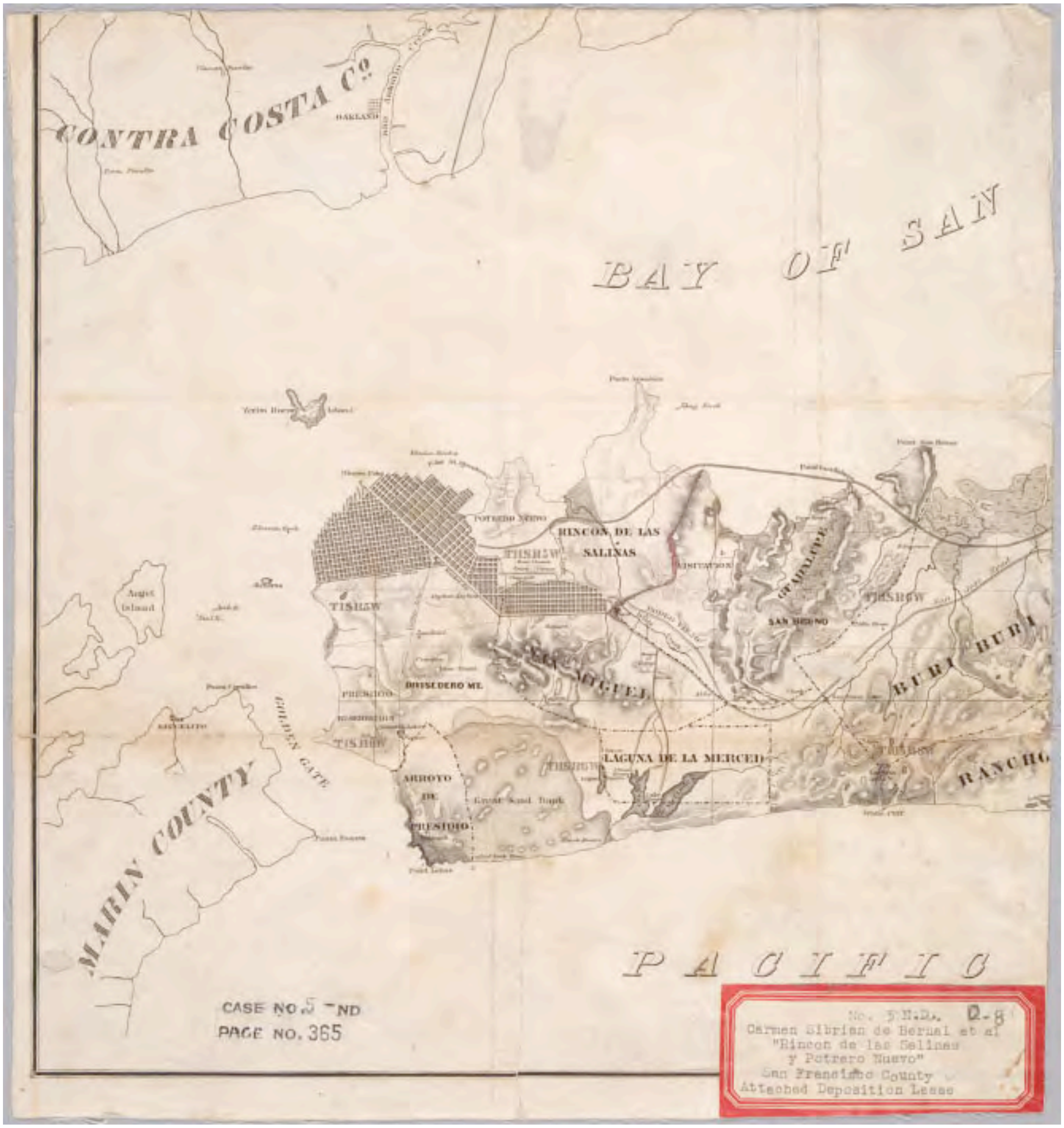

Figure 4. A map of the end of the San Francisco peninsula showing the City and the surrounding Ranchos, including Bernal's Rancho Rincon de las Salinas y Potrero Viejo. Image courtesy of the Bancroft Library, University of California, Berkeley.

The Mexican-American War ended in 1848 with the signing of the Treaty of Guadalupe-Hidalgo just days before the discovery of gold at Sutters Creek was announced. The terms of the treaty transferred all of present-day California, Nevada and Utah and parts of Arizona, New Mexico, Colorado and Wyoming to U.S. control in exchange for $15 million. California became a state in 1850.

STATEHOOD (1850 – 1941)

Early statehood in the Bayview-Hunters Point area was relatively quiet. The former Mission Delores lands were still largely held by the Bernal family or farmed by tenant farmers to supply produce to San Francisco. While the Gold Rush transformed San Francisco from a backwater port to a bustling city, the effect within the Project was minimal. The number of farms increased but it was mostly left in its natural state or used for recreational purposes. As the 19th Century progressed, more people did settle in the area, but the overall population gain was slow. Commercial development was centered around Railroad Avenue (now Third Street), near the Butchertown enclave. Transportation was the main impediment to more widespread development. However, this obstacle did not stop several entrepreneurs from attempting to bring greater residential development to the area. In the end, only the onset of World War II brought about any major alterations to the relatively quiet Bayview-Hunters Point section of San Francisco.

EARLY TRANSPORTATION

One of the biggest impediments to development of the Bayview-Hunters Point area was access. The first roads through the general area were not much more than wide footpaths connecting the scattered small settlements and farmsteads. El Camino Real, also known as San Jose Road at the time, traveled well inland, along the base of inland hills. Further east was the Bay View Turnpike, but it too avoided the marshes and rocky outcroppings in the area. Just before the gold rush, in 1848, the San Bruno Road was graded to more efficiently connect downtown San Francisco with the Mission district, Potrero Point and the farmlands immediately south. This road started further east near downtown San Francisco, following the shoreline a little more closely than the San Jose Road. Even though it was the first road to cross Islais Creek, it too took a route well west of today's Bayview neighborhood, roughly following the present-day Bayshore Boulevard. It met up with the San Jose Road near the present City of San Bruno. The San Bruno Road served workers on dairy farms in Bayview, Visitacion Valley, and present-day Brisbane. The road was so narrow that a driver had to pull the wagon into the deep grass to let another wagon pass.[12]

The first direct overland access to Hunters Point was completed in 1868. Known as Long Bridge, this horse-drawn railway trestle spanned Mission Bay and the Islais Creek estuary. South of the estuary, the route continued down Railway Avenue (now Third Street) to its original terminus at the Bay View Race Track.[13] (See page 46 for more information on this early recreational facility.) Construction of Long Bridge took three years of working through the mud flats and blasting into the serpentine rock of the coastline.[14] Shortly after its completion, tracks were laid for the Potrero and Bayview Railroad, thus opening (in theory) the southern areas of the City to settlement (see Figure 5.) Unfortunately, the railroad completion was not accompanied by improved road access. To reach the area, travelers could arrive by horse-drawn train, sail by boat, or endure the long, circuitous route around the marches if they went by wagon. Because of this most of the Bayview-Hunters Point area remained fairly sparsely settled except for those areas directly accessible by train or boat: Butchertown, Third Street and India Basin.

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[12] Visitacion Valley Grapevine, *A Concise History of Visitacion Valley*. http://www.visvalleygrapevine.com/vvvalleyhist.html.
[13] Bay View Race Track was constructed at the approximate location of today's Yosemite Slough. It covered roughly ten city blocks near the area now developed as the Alice Griffith Housing.
[14] Christopher VerPlanck, The Story of Dogpatch: Dogpatch Historical Context, http://pier70sf.org/dogpatch/DogHistSig.htm. p. 5.

Figure 5: Long Bridge shortly after construction, c.1866. Note the cut through the hillside in the distance. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

The Southern Pacific Railroad finished the Bayshore Cutoff in 1908, opening a direct rail line to the entire area. It eventually included a 4110-foot bridge over Islais Creek north of Custer Streets between Islais and Tulare Streets. The Bayshore Cutoff ran parallel to Long Bridge and the Potrero & Bay View Railroad horsecar tracks and trestle, then through a series of tunnels through Hunters Point, over the marshes of Bayview and around San Bruno mountain before meeting up with the existing main line in present day South San Francisco.[15][15]

In the aftermath of the earthquake and fire of 1906, Hunters Point became an area of respite from the smoke, chaos and debris. Accounts from the period tell of the railroad construction crews working on the Southern Pacific's Bayshore Cutoff opening their work camps to refugees. Because the area received little major damage, businesses and homes were open and occupied immediately after the earthquake stopped. Most damage occurred to buildings on the long piers over the mudflats or to buildings sliding from their foundations. Once righted, these latter buildings were once again serviceable. People took in the homeless with overflow shelters being set up in local cultural and community institutions, such as the Bayview Opera House and camps established on the open grazing lands of Hunters Point and Bayview.[16] At the drydocks, only the tall pumphouse chimney received any damage and the pumps remained functional in the immediate aftermath.

Even with the Bayshore Cutoff, the Bayview-Hunters Point area remained largely undeveloped. Foot and vehicular traffic were still required to go around most of Islais Creek to cross near the intersection of Bay Shore Boulevard and Army (present day Cesar Chavez) Street. A bridge connecting Third Street with Railroad Avenue at Butchertown was not completed until 1915.[17] This drawbridge was the final element to provide direct access to the area.

[15] Roger and Nancy Olmsted, Historical Consultants, San Francisco Bayside Historical Cultural Resource *Survey*, 1982, p. 145
[16] "Great Drydocks at Hunters Point Are Not Damaged," *San Francisco Call*, May 3, 1906.
[17] Roger and Nancy Olmsted, Historical Consultants, San Francisco Bayside Historical Cultural Resource *Survey*, 1982, p. 145

SETTLEMENT AND DEVELOPMENT

Settlement in Bayview-Hunters Point happened rather gradually compared to those districts closer to the City's core. The building boom in downtown San Francisco at the height of the Gold Rush did not extend the four miles down San Jose Road. However, speculators did try to entice people to the area. In 1849, Dr. John Townsend and John Cornelius de Boom entered into a business venture with the Bernal family to subdivide large portions of their Rancho de las Salinas and Rancho Potrero Viejo. Townsend and de Boom handled promotions and business matters in exchange for 50 percent of the sales revenues.[18] They extolled the virtue of the superior climate, protected harbors, fertile land and relative proximity to the City's core. Robert and Philip Hunter had recently arrived from New York, when they joined Townsend and de Boom's team as real estate agents.[19]

Townsend and de Boom abandoned the project by the beginning of 1850, leaving the Hunter brothers as sole agents. They built a hotel at the tip of Hunters Point Hill for prospective clients who toured the area. Ultimately, the venture was commonly referred to as "Hunters Folly" and the area became known as an escape from the noise and grime of the city. The later addition of the Bay View Race Track in 1863 only emphasized its early fame as a place for fresh air and relaxation (see page 47.)

Eventually, Robert and Philip Hunter obtained ownership of the peninsula from the Bernal Estate and were joined by their older brother John and his family in 1856.

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[18] Millie Robbons, "A Hunters Point Dream Scheme" Millie' Column. *San Francisco Chronicle.* August 24, 1973.

[19] Ironically, Robert and Philip Hunter settled themselves on the slopes of the point that would eventually bear their names but never actually purchased the land from either the Bernals or from de Boom and Townsend. While they eventually did receive claim to a small portion of Hunters Point Hill, it was years later after a court suit.

Besides the hotel and selling the occasional lot, the brothers ran a successful water supply business with abundant spring water well on their property.[20]

The Hunter brothers stayed at Hunters Point until the early 1870s, when they sold their land to a savings and loan company.

SOUTH SAN FRANCISCO HOMESTEAD & RAILROAD COMPANY

In 1861, the State Legislature passed an act authorizing the legal formation of homestead associations.[21] At that time, most of the land in San Francisco was owned by a handful of wealthy families, who had the connections and means to acquire portions of, or entire, rancho grants. The sums of money and political clout required for these transactions were well beyond the means of the average person. As demand for housing continued to increase, speculators formed homestead associations to purchase large tracts of land, made minor access improvements, and then sold smaller lots at a price within the reach of a workingman's wages. Many offered installment payments to ease the financial burden. Many neighborhoods in San Francisco were developed in this way, each with a slightly different character depending on the improvements made by the speculative owners. In the next several decades, homestead associations were responsible for forming much of present-day San Francisco.

The South San Francisco Homestead and Railroad Company was formed in 1862 in anticipation of rail service extending to the Bayview-Hunters Point area. They owned and subdivided over 2,000 75 by 100 foot lots covering Hunters Point and most of the Bayview neighborhood. In addition, they gained development rights to hundreds of underwater lots extending out into the shallow Bay waters around Hunters Point Hill and running south to Candlestick Point.

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[20] Millie Robbons, "The Mysterious Hunters" Millie' Column. *San Francisco Chronicle.* August 27, 1973.
[21] Roger and Nancy Olmsted, Historical Consultants, San Francisco Bayside Historical Cultural Resource *Survey*, 1982, p.101.

As with many homestead associations, the South San Francisco Homestead and Railroad Company tried to lure investors to their sites by building or partnering with existing recreational facilities. In this case, the company attempted to capitalize on the popularity of the recently opened Bay View Park (c.1863) race track by partially subsidizing the construction of an extension of the Potrero and Bayview Railroad's horse-drawn rail line to the park (see page 48 for more on Bay View Park.) Not only would this bring in customers for the races, but it eventually would serve the residents of "South San Francisco," as the area was then called. To further the appeal of their holdings, the Association donated land for the construction of drydocks at the end of Innes Street to attract businesses, and employees, to their land.[22] (See Chapter VI: Hunters Point Shipyard for a more complete account of the development of the drydocks at the end of Hunters Point.)

Although the Bayview Turnpike and Potrero and Bayview Railroad improved access to the area, the anticipated building boom did not materialize. Other homestead associations appear on historical maps, mostly corresponding to the larger shares of land given to stockholders in the South San Francisco Homestead and Railroad Company. These include Hunters Tract, Central Park, and Hudson Gardens and Orchards.[23] Most of the tracts and associations appeared only on paper and did not represent developed land.

By 1907, most of the area still appeared fairly open with development concentrated along Third Street (Railroad Avenue), close to Islais Creek and Butchertown (discussed below), or further south near the intersection of Yosemite and Third Street (see Figure 6.) However, the 1899 and 1913 Sanborn maps show extensive water lots platted in a

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[22] Roger and Nancy Olmsted, Historical Consultants, San Francisco Bayside Historical Cultural Resource *Survey*, 1982, pp. 101-102; "The Bay View Valley Sale," *Daily Alta California*, May 2, 1867; "Dock Company Acquires Homestead Land Tracts," *San Francisco Call*, March 12, 1910.

[23] San Francisco Block Book Vol. II, Homesteads, 1907. Other, larger homestead associations were found west of Third Street but these appear to have been formed concurrent with, and separate from, the South San Francisco Homestead and Railroad Company

strict grid from the shoreline out to the tip of Hunters Point (see Figure 7.) These water lots remained part of the South San Francisco Homestead and Railroad Association until 1910. At that point, all the remaining unsold lots east of H Street (Hudson) were transferred to the South San Francisco Dock Company (not to be confused with the San Francisco Drydock Company, discussed below.) The transfer amounted to approximately 40 city blocks, largely comprised of these underwater and tidal flat lands.[24]

Street Grid and Names

The impact of the South San Francisco Homestead and Railroad Company remains in the street grid in Bayview-Hunters Point. Unlike development in much of the rest of San Francisco, the association decided to lay out streets to minimize the impacts of topography, with 60-foot wide streets parallel to the prominent ridge of Hunters Point Hill. Thus, the streets east of Third Street are offset from the typical San Francisco north-south/east-west orthogonal grid. While this made the east-west streets much more amenable to horse and foot traffic, it meant that the north-south streets over Hunters Point Hill were largely impassable. Today, many of the streets are interrupted as they pass over Hunters Point Hill. The South San Francisco Homestead and Railroad Company surveyors used units based on the English system of measurement (feet, inches, gallons, etc.), as opposed to the rest of the City, which was surveyed according to the Spanish vara.[25] The north-south streets were originally given alphabetical letter names such as “N” and “P” Streets while the east-west streets were numbered. A similar system was employed elsewhere in the City, causing confusion for the postal service. About 1880, the post office requested that the streets be renamed.

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[24] Dock Company Acquires Homestead Land Tracts,” *San Francisco Call*, March 12, 1910.
[25] Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008. p. 14.

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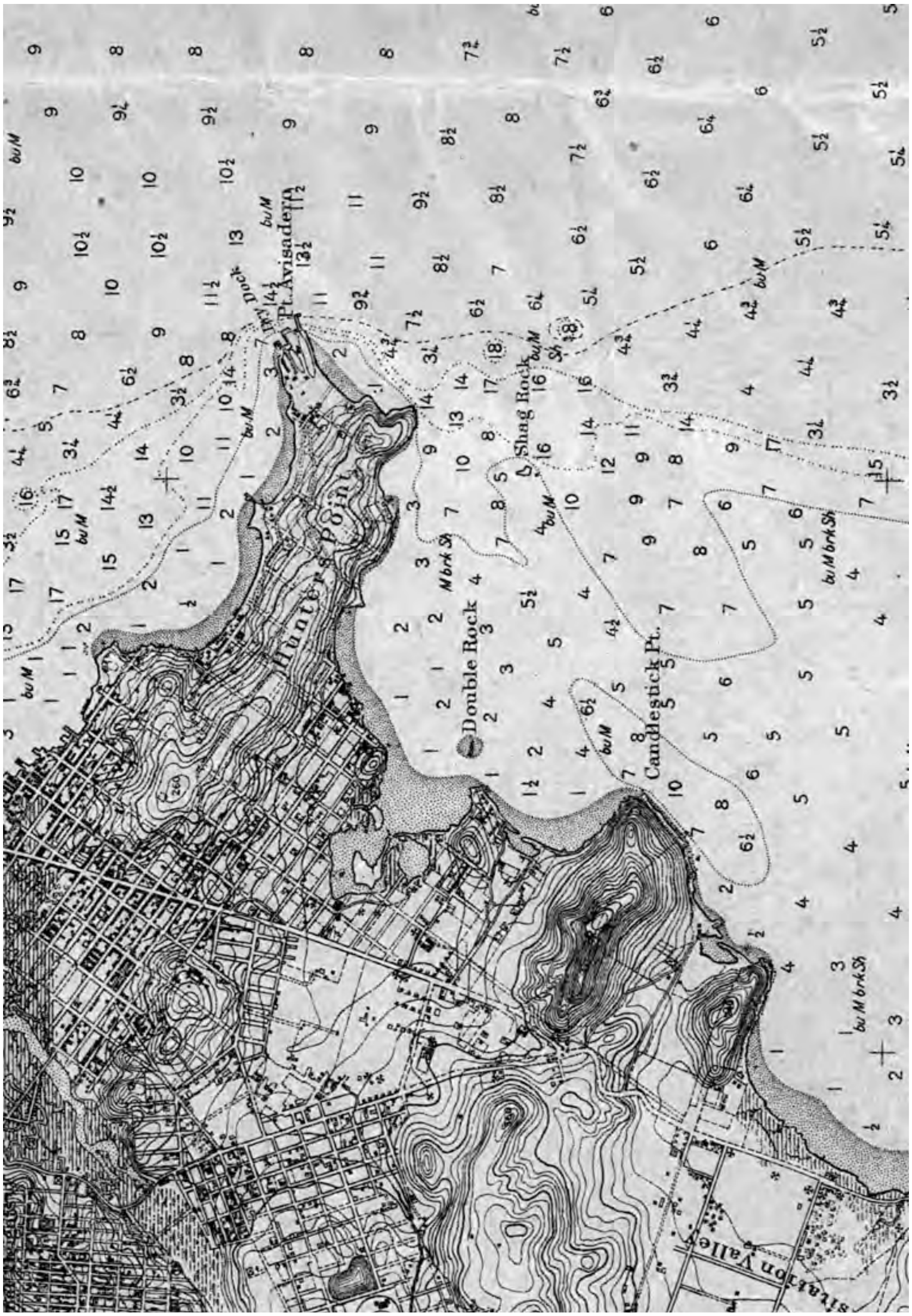

Figure 6. 1905 Coast Survey Map showing locations of development just prior to the 1906 earthquake.

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Figure 7. 1913 Sanborn Map showing the extensive water lots that had been platted for development.

The streets were given exotic geographical names of major islands and foreign nations. The north-south streets were renamed after major American rivers. The local residents resisted the new, difficult to remember names and petitioned the Board of Supervisors in 1890 to restore the old names. A compromise restored the letter and number street names, but with the designation of “south” for Bayview-Hunters Point and “north” for those streets in the Sunset district.[26]

This nomenclature continued to be confusing. Some estimates from the period claimed over 500 units of post per day were mishandled because of the street names. As San Francisco rebuilt after the earthquake and fire of 1906, and expanded into new neighborhoods in the western and southern districts, the time seemed right to address the problem of duplicate or very similar names in various districts. Mayor Taylor authorized the *Commission on the Changing of Street Names* in 1909. The three primary affected areas were the Richmond, the Sunset and the Bayview-Hunters Point districts. Most of the proposed changes were in favor of honoring the Spanish and Mexican heritage of the area. This proved to be more contentious than the committee envisioned. Because the Richmond and Sunset districts had well-organized neighborhood improvement associations, they received the bulk of the commission’s time and press coverage. Because of this, the Bayview name changes were postponed until 1910, when the commission addressed the community’s comments.

Until 1908, this section of the city had been generally known as South San Francisco. When the City of South San Francisco incorporated, this district was forced to change its popular identity to Bayview. When the Naming Commission started to work with the lettered and numbered streets in the district, the residents were generally in agreement that it was needed but lacked a consensus as to what names would best honor their community. The relatively remote, small and self-sufficient community lacked both a unifying organization and a collective identity. Into this stepped two prominent religious

[26] Ibid, p. 22.

leaders, Father O'Sullivan from All Hallows Parish and Father Ford from St. Ignatius College. They set about pushing their pro-Catholic, pro-Irish agenda in the naming of the streets in the district. The results were the selection of Palou Avenue for Padre Palou, founder of Mission Dolores. (The proposed name was Paine after Thomas Paine who the Fathers felt was an atheist and therefore unfit for a street in their neighborhood.) Another street was named for Charles Carroll, the only Catholic signer of the Declaration of Independence. (The proposed name was Cromwell, which the Irish priests objected to out of patriotic fervor.) A third street was named for H.H. Bancroft the historian, one of the only streets named for a living person. (This naming replaced the proposed Belfast, which was objected to because it was a Protestant city.) The Fathers protested unsuccessfully against Wallace (a Scotsman), Fitzgerald (after author Edward Fitzgerald who they felt was an pagan), and Nelson, until they were told it was named after American General William Nelson of Kentucky and not British Admiral Horatio Nelson.[27]

The street names negotiated in 1910 remain today throughout the Bayview-Hunters Point area. Some changes have been made, especially around Hunters Point Hill and on Hunters Point Shipyard where many of the streets were created by the Navy and do not follow the street grid.

Reclamation

Other problems also complicated the situation. The failure of the homestead associations in the Bayview and Hunters Point meant that many of the unsold lots were distributed to the respective stockholders. The end result of this was a patchwork of largely absentee landowners. For the City, trying to purchase outright or exercise eminent domain to obtain rights to these lands and water lots was a formidable task, both financially and politically. Hunters Point itself acted like a natural barrier, limiting

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[27] John Freeman, "Street Naming Controversy–1909," Encyclopedia of San Francisco, http://www.sfhistoryencyclopedia.com/articles/s/streetNaming.html

settlement and transportation both to and around it.[28] Limited access to the choicest waterside locations would be a hard sell to industrial leaders looking for good locations to establish marine businesses.

In 1925, the State legislature passed the Tidelands Reclamation Act. In response, San Francisco established a reclamation district. This included a 280-acre section near Islais Creek. As with many prior ventures, this held a promise to open the district for development. This was reflected by the business community in San Francisco who saw it as an opportunity to reap economic benefit from the neglected area.

"This area has been an eyesore for years. It has prevented the development not only of the territory within the district itself but that surrounding it… The reclamation of Islais Creek is but the beginning of the utilization of the land and facilities that are available to industry and commerce lying between the Potrero and Bay View District…"[29]

Reclamation began with seawall construction between Third Street and the Southern Pacific right-of-way. This roughly half-mile wall was then backfilled with muck dredged from the resulting channel on the opposite side of the seawall. The seawall itself was constructed of rock blasted from nearby hillsides. The U.S. Army Corps of Engineers completed a dredged a channel out to the Bay as well as a turning basin at the inland terminus. The dredged fill was used to raise the ground in the flood plain. The process continued through 1930 when the remaining marshlands of Islais Creek were filled to City grade and streets were adjusted to maintain the grid over the newly reclaimed land. The entire reclamation project was completed in 1936.[30]

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[28] Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008. p. 26.

[29] San Francisco Business 1925, as quoted in Roger and Nancy Olmsted, Historical Consultants, *San* Francisco Bayside Historical Cultural Resource Survey, 1982, p. 146

[30] David Chavez & Associates, Archaeological Resources Investigation for the Bayview-Hunters Point Redevelopment Plan, San Francisco, California, Oakinba and South Basin Activity Nodes, May 2004, p. 8. and Roger and Nancy Olmsted, Historical Consultants, San Francisco Bayside Historical Cultural Resource Survey, 1982, p. 146

CONTINUED DEVELOPMENT

Further south along Railroad Avenue, improvements to the Southern Pacific rail lines in 1905 resulted in demolition of at least a dozen early buildings. The Bayshore Cutoff included a tunnel through the block bounded by Phelps Street, Palou Avenue, Quint Street and Oakdale Avenue, just west of Railroad Avenue. That loss was more than made up for in the next ten years as the area grew. Buildings constructed after 1905 tended to be larger and of varied uses with street front retail and residential above. The increase in lodging houses along Railroad Avenue was the result of the increasing importance of the drydocks as well as the growing popularity of the area as a home for Southern Pacific's Pullman porters.[31]

Closer to the shoreline, maps after 1906 tend to show many water lots platted into the mudflats. However, little development occurred. One of the only areas of continual development was that around Butchertown and along Third Street. Some lots were used for housing, but most were for new industrial buildings. Butchertown was slowly starting to be squeezed out.[32]

Elsewhere in the district, construction was piecemeal and not part of a concerted effort for development. This is tempered with a relatively significant shift in the development of single-family homes in the areas immediately around Third Street from 1899 to 1913. Even though many lots were still rather sparsely built up, there was more general settlement along Third Street down to Palou Street, and again south of Yosemite Avenue. The in-between area was still swampy in comparison and remained devoid of buildings.[33] It was largely used for vegetable farming.

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[31] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR, Appendix E*, certified February 8, 2000, File No.1994.061E, pp. E4-E5.

[32] Butchertown was an industrial area located along the banks of Islais Creek in the late 19th century. In addition to slaughterhouses, the district was home to a multitude of related businesses including tallow works, glue factories, sausage factories, mattress manufacturers, tanneries and large stockyards. See below for further discussion.

[33] Sanborn Fire Insurance Maps: San Francisco, Volume 5, 1889 and Volume 8, 1913.

Post-1906 Housing

The 1906 earthquake and fire left a vast number of San Francisco residents homeless and afraid of the crowded city. Many sought to rebuild their lives in more spacious, though more remote, areas of the city. Some small subdivisions of the early homesteading attempts in the Bayview area had enjoyed modest success, but most of these early plans remained fairly wide open. While the number of people who moved to the Bayview-Hunters Point area was significantly greater than during the preceding years, it was by no means the rush of families that areas closer to the city core enjoyed (see Figure 8.) At this time, the character of the Bayview started to shift from industrial and pastoral to a more organized urban environment. However, Butchertown, the boatyards near India Basin (see Chapter V), the drydocks on Hunters Point (see Chapter VI) and the greenhouses and farms in the Bayview area continued to dominate the landscape and shape where people settled. Up until the beginning of World War II, most of the blocks east of Third Street remained developed only in pockets.

HUNTERS POINT IMPROVEMENT ASSOCIATION

By the 1930s, City government officially recognized Hunters Point as a separate district. However, this recognition did little to bring about civic-sponsored improvements to the area. Public transportation, adequate water and sewer service, and public recreational facilities were all still woefully lacking. The different settlement and industrial nodes – Butchertown, the boatyards of India Basin, the Drydocks, the Third Street corridor and the settlements around Yosemite Avenue were not united politically or socially.

After fighting for years to get streets graded and paved, to get parks, sewer line extensions and public transportation, the residents near the India Basin boatyards in 1939 formed the Hunters Point Improvement Association to try to bring more awareness to the needs of the community. At first they received little attention from City Hall, both because the district was not politically well connected, and because there were few

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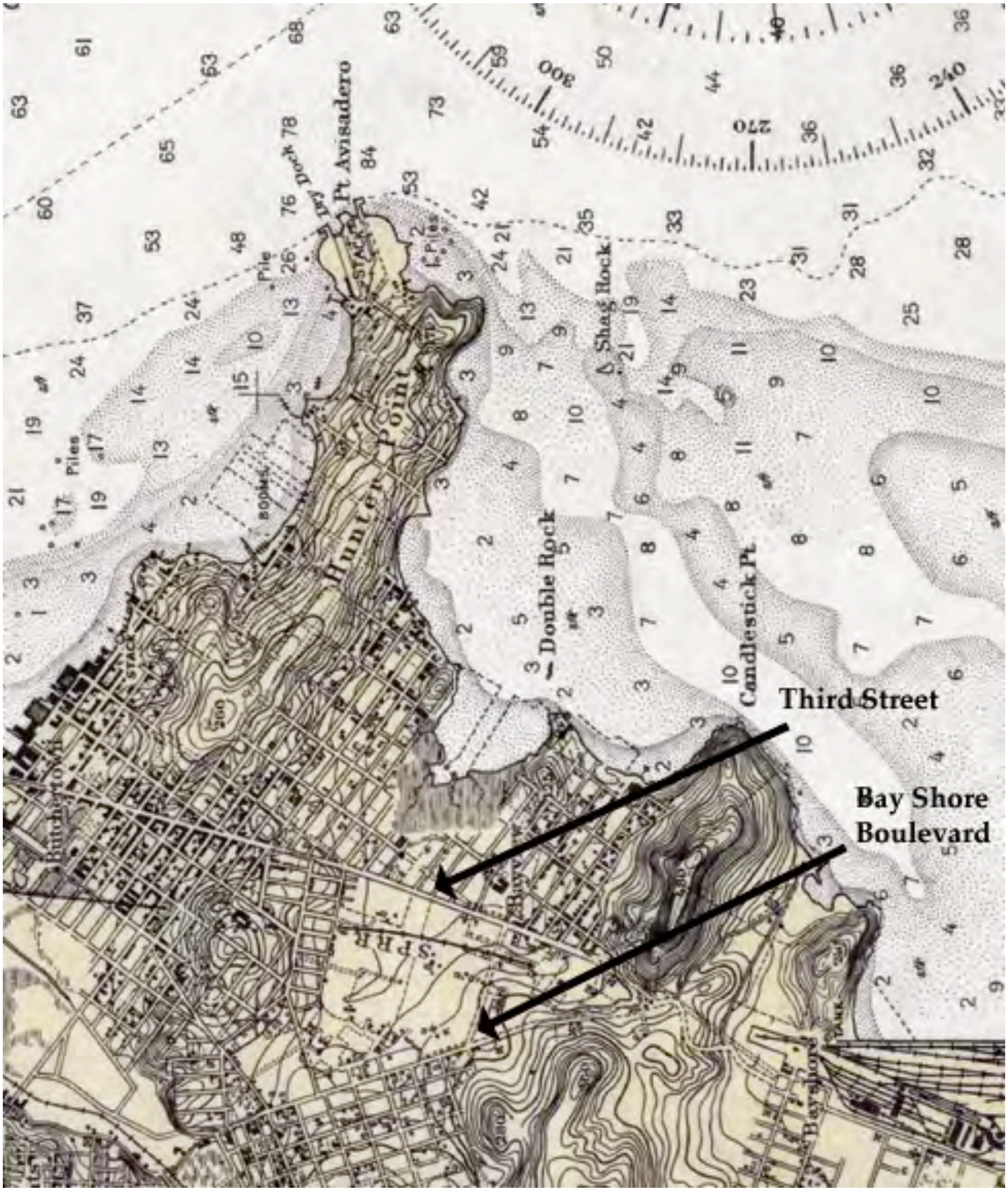

Figure 8. 1926 USGS map showing areas of increased development after the earthquake. Compare to Figure 6 and note the higher density development along Third Street.

because the district was not politically well connected, and because there were few public improvement projects happening anywhere in San Francisco because of the shaky financial environment of the Great Depression.[34]

Instead, the neighbors took matters into their own hands, just like they had on numerous past occasions.[35] This time, they undertook a cooperative grocery to address the poor access to food staples in the area. Their efforts met with limited success. The grocery came to symbolize the spirit and attitude of the district, something that was well praised in the popular media, but it did little to bring about long-lasting improvements. For that, they had to wait for the U.S. entrance into World War II.

COMMERCIAL DEVELOPMENT

Adequate transportation remained an obstacle to development well into the 20th century. However, development did occur to a limited extent. It was precisely because of the remoteness and relative isolation of the Bayview-Hunters Point area that it became a favored place to relocate necessary yet undesirable commercial uses. First this included the dairy farms, and then it was Butchertown (see Figure 9). In later years it became a favored industrial center and public works facility location.

BAY VIEW PARK

The area just north and west of the Alice Griffith Public Housing (between Third Street and the former water line) was first developed in 1863 as a high-class horse racing track known as Bay View Park. The racing oval was on soft ground, only partially dry, that gave it a reputed spring, enabling the horses to run record times. In a City filled with

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[34] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR, Appendix E*, certified February 8, 2000, File No.1994.061E, p. E3.

[35] In 1920, after years of lobbying the City for a playground, the people of the Bayview district got tired of waiting. On February 21, 1920, they held the first Community Labor Day to clear a vacant lot at Railroad and Jerrold. It became the first community playground in San Francisco. "Bay View Citizens Build a Community Playground," *Community Service Recreation League Bulletin,* February/March 1920.

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Figure 9. A view of a portion of Butchertown, c.1925. Photo used with permission from the Bancroft Library, University of California, Berkeley.

over a dozen horse racing venues, Bay View Park was thought to be one of the best. It boasted a hotel and grandstands in the latest architectural styles, and offered it own horse-drawn railroad to transport people from downtown San Francisco the hinterlands known as the Bayview (see Figure 10.)

Bay View Park had very influential investors, including George Hearst, father of William Randolph Hearst.[36] It was successful for many years and became a popular location for the City's elite. However, by 1880s, the track had been reclaimed by the sea.[37] Hearst, Crocker and other had grand plans for redevelopment of the area as a new "country" retreat for monied San Franciscans. Unfortunately, the land was not as desirable for residential development. Apparently, no one wanted to live in the swampy bottomlands so far from the City's core, in spite of the pleasant weather and wonderful views. Instead, Crocker turned his sights south to Hillsborough and the Bay View Park land remained undeveloped marshland until the eve of World War II.

Truck Farming

Before the advent of modern refrigerated transport, the costs and timeframes associated with shipping fresh fruits and vegetables limited where, when and how food could be transported. For San Francisco, food was supplied from farms around the Bay then sold at local markets, or door-to-door by individual vendors. The location of the farms on the periphery of the City was limited to those area blessed with a fresh water supply. Early on, most of these farms were in the Cow Hollow and Lake Merced sharing water with dairies. As San Francisco grew, it became apparent that relocating all agricultural pursuits to the unpopulated lands south of Market would remove the more unpleasant aspects of these businesses from residential areas. In the 1880s, San Francisco passed an ordinance to move the farms out of Cow Hollow.

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[36] The Book Club of California, California Sheet Music Covers: Bay View Park Galop, 1959.
[37] Roger and Nancy Olmsted, Historical Consultants, *San Francisco Bayside Historical Cultural Resource Survey*, 1982, p. 98.

Updated: July 2009

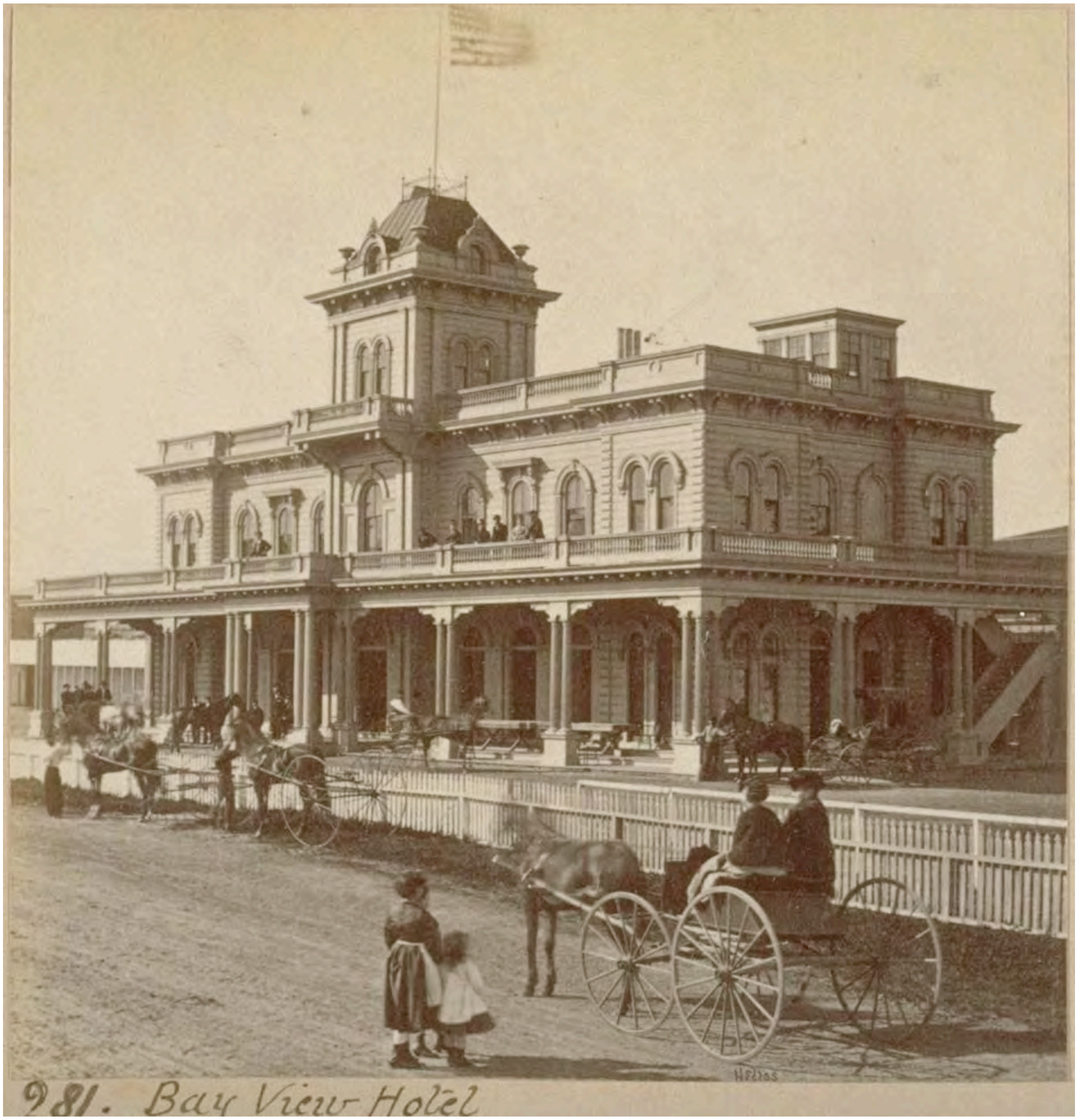

Figure 10. Bay View Hotel, San Francisco, c.1868-1880. Photo used with permission from the Bancroft Library, University of California, Berkeley.

One area that had both fertile land and ample fresh water was the Bayview area in the old pasturelands of Mission Dolores. It was here that the vegetable farms had their greatest concentration, providing San Francisco with a nearly constant supply of fresh fruits and vegetables to feed the rapidly expanding population.

Before 1870, the majority of vegetables were grown by Chinese immigrants on lands leased to them by real estate speculators. Sanborn maps up through the 1950s show many large plots labeled “vegetable gardens” or “nursery”. While many of the plots were tended by Chinese immigrants, they were not the only ethnic and cultural group to be drawn to the work. A smaller number of Italian and Portuguese citizens also grew vegetables for sale in the local markets.[38] The difference was that many of these families owned their land outright, a fact that allowed them to ascend into relative prosperity much more quickly than the Chinese farmers who immigrated with nothing and relied on a collective arrangement to amass land shared between several families.

After 1870, the proportions had changed and most of the farms were owned or operated by Italians. They tended to favor workers of similar backgrounds, hiring recent arrivals or family members to tend the fields. An account from the 1880s describes the typical market farm in the Bayview area.

“The Italian market gardens are chiefly located along the San Bruno Road, in the San Miguel Rancho, along the borders of the Presidio reservation, and in South San Francisco [Bayview]. There are a few small gardens operated by the Chinese in the neighborhood of Black Point [Candlestick Point] and between South San Francisco and Hunters Point. Where once the Chinese were the commonest sight with their vegetable cars heading for the market places, now they have been crowded out by the Italians and the Portuguese who have bought larger and larger plots of land. Like the Chinese, the

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[38] Roger and Nancy Olmsted, Historical Consultants, *San Francisco Bayside Historical Cultural Resource Survey,* 1982, p. 114.

Italian laborers in the local gardens are content with a little – so far as wages are concerned. Most of these men live on the scene of their daily toil in light shanties, part of which is devoted to the storage of root crops and seeds, and the remainder to the domestic uses of the family."[39]

In 1868, the proliferation of the "market gardens" in the Bayview area was aided with the completion of the Potrero and Bayview Railroad through the center of the district. Until then the farmers were forced to move their goods either by horse and cart or via barge. As rail service and roads improved, the smaller farms were consolidated into larger operations. The 1913 Sanborn map (the first to show much of Bayview) labels a major portion of the land east of Railroad Avenue (Third Street) for vegetable production. As late as 1950, there were still commercial farms in the area, concentrated mostly near the Bay shore, and several of the larger growers had established greenhouses west of Railroad Avenue, closer to the railroad tracks and San Bruno Boulevard.

Butchertown[40]

The original Butchertown was located at Ninth and Brannan Streets in the south of Market area. After the Gold Rush swelled San Francisco beyond its humble beginnings at Yerba Buena Cove, this once remote district of the city proved to be more valuable for other forms of industry. Therefore, in 1871, the city passed an ordinance and amended the Municipal Health Code to move Butchertown to the banks of Islais Creek, away from the then residential and industrial centers of San Francisco, and could not contaminate the water supply of the city core.[41] The move resulted in a shift in

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[39] "Market Gardens: Practically an Italian Monopoly," *San Francisco Chronicle*, November 17, 1889.

[40] Like many cities, San Francisco has traditionally concentrated certain industries in various enclaves. These enclaves then acquire nicknames derived from those industries. Butchertown is one of these examples where many different businesses associated with the butchering industry tend to be established in close proximity to each other.

[41] David Chavez & Associates, Archaeological Resources Investigation for the Bayview-Hunters Point Redevelopment Plan, San Francisco, California: Evans Avenue Addition, 2004, p. 5.

boatbuilding businesses along Islais Creek, where boatwrights moved east, further down Hunters Point to escape the worst of the "effects."[42]

Islais Creek was, in many ways, the ideal location for Butchertown. Although most parts of the slaughtered animals were used for one purpose or another, the industry still generated a large amount of biological waste. The slaughterhouses were constructed on long piers set over the mudflats of the tidal basin of Islais Creek. When the useful portions had been sent to processing plants nearby, the wastes were pushed onto the mudflats. Once here, the ebb and flow of the tides would carry the waste out into the Bay. This tidal scrubbing was so effective, that very little archaeological materials have been unearthed during construction in this area. Everything was swept out to the Bay.[43]

With the slaughterhouses, Butchertown also consisted of a host of related businesses including tallow works, glue factories, sausage factories, mattress manufacturers, tanneries and large stockyards. Most of the butchering was done on the piers over the Islais Creek running east from Railroad Avenue along the shoreline (roughly along present day Davidson and Evans Avenues.) The stockyards were west of Railroad Avenue (Third Street) near the present-day Caltrans railroad tracks. Easy railroad access was key to the transportation of cattle and livestock from the Central Valley and the south. Most were brought overland either on foot or via rail to the stockyards where they were held before slaughter. The stockyards in Butchertown were typically used for short-term holding. Tanneries, tallow and glue works were a bit further inland, on dry ground.[44] Most of the other early businesses and services, such as lodging houses, saloons and barbershops along Railroad Avenue (now Third Street) catered to the Butchertown workers.

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[42] Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008. p. 20.
[43] Roger and Nancy Olmsted, Historical Consultants, *San Francisco Bayside Historical Cultural Resource Survey,* 1982, p. 144.
[44] Sanborn Fire Insurance Maps: San Francisco, 1886, 1899, 1913, 1950.

One other commercial area that developed was in India Basin. Here a community developed around the shoreline and various marine industries such as boat building and fishing. The history and development of India Basin is covered in the next chapter.

PROPERTY TYPES

Building, structure and object types related to the discussion above would include, but are not limited to:

- Greenhouses
- Early residential buildings including farmhouses and rowhouses
- Early commercial buildings, mostly wooden frame, such as the Bayview Opera House
- Community buildings, including churches, halls and recreational facilities
- Hotels, Lodging Houses and Saloons, mostly wood frame, typically around Third Street, false fronts and Italianate detailing would have been common
- Street patterns
- Retaining walls
- Storage sheds
- Transportation facilities – loading platforms, docks, railbeds, tracks and tunnels

Most of the buildings from this pre-1941 period within the Project were removed in the building booms that occurred during World War II and in the immediate post-War period. The one major remnant that survives in much of its original form is the street grid and its naming convention.

Buildings from these periods within the boundaries of the Project are investigated, presented and evaluated more fully in Volume II of this report. This document, *Bayview Waterfront Plan Historic Resources Evaluation, Volume II: Resource Survey and Report*, also prepared by Circa: Historic Property Development, should be referenced for further information regarding specific buildings or architectural styles found within the Project.

CONCLUSIONS

The overall development of the individual districts within the Project before World War II was rather slow and measured. In spite of its superior weather, abundant water and wonderful Bay views, general access to the area greatly hampered its development as a residential neighborhood. Commercial enterprises were lacking because the overall population was too small to sustain them. Instead, specific industries developed in specific areas where the natural conditions were most suitable. Butchertown utilized the tidal basin of Islais Creek. Farming occurred on the flat lands. Recreational facilities developed at the ends of excursion rail lines. Other develops included India Basin for boat building and the tip of Hunters Point Hill for ship repairs. These industries each had a small community of workers associated with them, but no large-scale residential development occurred until the onset of World War II.

V. INDIA BASIN[45]

India Basin is composed of approximately ten full and partial blocks ranging from Earl Street to the former Pacific Gas & Electric plant site along Jennings Street. Many of these blocks are occupied by small, light industrial enterprises and residential buildings. The area has historically been a small boatbuilding community since the middle of the 19th Century. This community was fairly self-sufficient, establishing their own churches, schools and social support network. Economically, they were dependent on the Bay for their livelihoods, whether they were involved with boat building or fishing. Today, several of the early religious institutions remain, as does at least one working boatyard and several residences from the 19th Century and early 20th Century. It remains a unique working landscape within the City of San Francisco.

EARLY HISTORY – BEFORE 1941

In 1868, proximity to the newly constructed drydocks at the end of Hunters Point, brought about real estate speculation for the entire neighborhood. That same year, in preparation for this devolvement, the State Board of Tide Land Commissioners named the inlet between Potrero Point and Hunters Point at the mouth of Islais Creek, “India Basin.” The land and submerged lots were set aside for “docks, piers slips, and basins, and other purposes of commerce.”[46] At that time there were already several small dwellings along the northern coastline of Hunters Point Hill. When the drydocks opened at the eastern end of Hunters Point Hill, several small roads and footpaths connected India Basin to both the drydocks and to the rail line along Third Street. The most widely used route followed approximately along the line of today’s Innes Avenue.[47]

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[45] Most of the information in this section is paraphrased from the comprehensive historical context for India Basin prepared by Kelly and VerPlanck for The Bayview Historical Society. Specific references are provided as follows.
[46] Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008. p. 16.
[47] U.S. Coast Survey Map, 1869.

Updated: July 2009

Development in the India Basin sub-area was driven largely by proximity to and availability of water. To this end, the industries that defined the history of India Basin were boatyards, breweries, and fishing.

BOATYARDS AT INDIA BASIN

The boatyards were active in India Basin for over three quarters of a century from the mid-19th Century to the early 20th Century.[48] For much of that time, they constituted one of the only stable communities beyond the boundaries of Butchertown in the area. Most boatwrights were of northern European descent from England, Holland, Germany and Scandinavia. Boatbuilding tended to be a trade that was passed down from father to son, creating a close-knit, multi-generational atmosphere. This community took pride in their work and was largely self-sufficient.

When the first boatyards opened in the 1850s, India Basin was largely unimproved shoreline property. Arriving over land involved a circuitous journey around Mission Bay and the marshes at the delta of Islais Creek. Even the opening of Long Bridge across Mission Bay in 1868 did little to improve the route for foot travelers. Once a person disembarked from the train along Third Street, there was still a walk of a mile or so to the boatyards. Extending beyond the boatyards a single road ran along the northern shore to the drydocks being completed at the tip of the point. As more and more yards opened, this last road was greatly improved but that was mostly because of the increased business at the drydocks rather than the need to better service the boatyards. By 1906, the area had remained largely stable in size for twenty years. This period from their establishment through the great earthquake represents the height of growth of the boat yards at India Basin (from the 1850s through 1906).

[48] A more detailed account of the names and dates of the various boatyards in India Basin is given in "India Basin Historic Survey," Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008.

Individually, the boatyards at India Basin were rather small commercial operations. However, taken as a whole, they constituted one of the largest concentrations of shipwrights and shipbuilding services in San Francisco. Most specialized in the construction and repair of San Francisco Bay scow schooners. These unique craft were the workhorses of local maritime trade (see Figure 11**.)** The number and quality of roads through the region, combined with the difficult topography made shipment of goods over land an expensive and cumbersome process. Moving goods by water, however, was relatively cheap and efficient. The main difficulty was the wide marshlands that made much of the shoreline unusable. The scow schooners were developed with an adjustable and very shallow centerboard that had drew mere inches when fully retracted. Their flat decks, simple construction and efficient use of materials meant they could be built and maintained cheaply and that they could haul a variety of goods into shallow waters. To do so they sacrificed speed and agility, two qualities that were much less important on the protected waters along the shorelines of San Francisco Bay.[49]

The demise of the schooner building trade finally came in the late 1920s as roads were improved and truck shipping became more viable. The slow and steady schooner was becoming obsolete. Some retrofitting with gasoline-powered engines helped these crafts compete, but their relative instability under wind power made them highly unsuitable for the faster pace afforded by modern combustion engines. The early days of the Great Depression further weakened the schooner market. Some yards consolidated and specialized in boat repair and wooden pleasure craft. Most disappeared for good. Today only two boatyards remain visible along the India Basin shoreline: the Anderson & Cristofani and Allemand Brothers yards (see Figure 12).[50]

[49] Roger and Nancy Olmsted, Historical Consultants, San Francisco Bayside Historical Cultural Resource *Survey, 1982*, pp. 131-132

[50] Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008. p. 44.

Updated: July 2009

Figure 11. Sailing ship Jas. F. McKenna, a gas schooner. This boat represents a typical scow schooner of the late 19th Century. Photo is undated. Photo used with permission from the San Francisco History Room, San Francisco Public Library.

Updated: July 2009

Figure 12. Anderson & Cristofani and Allemand Brothers yards as viewed from the end of Arelious Walker Drive. Photo by Circa: Historic Property Development, July 2007.

Spring Water and Breweries

South of India Basin, along the northern slope of Hunters Point Hill, is a sizable natural spring. It was tapped by the Hunter brothers as a source of fresh drinking water for both themselves, and any individual willing to pay them for it. As early as 1855, they sold the water rights to Independent Water Company of San Francisco for $50 per month. This company shipped out kegs of water to barges in India Basin for transport to downtown

San Francisco. The Hunter brothers also ran an early "bottled" water venture where ships would get a full supply of fresh water before heading out to sea.[51]

The ample supply of fresh drinking water, combined with a concentration of European immigrants, made India Basin and Third Street a prime location for small brewery operations. One of the most famous of these was the Albion Brewery at 881 Innes Avenue in India Basin (see Figure 13.) Englishman John Burnell started the Albion Ale and Porter Brewery in 1870 after purchasing the Hunters' spring. There he set about crafting a traditional English beer, which was stored in the tunnels he excavated deep into the serpentine rock of the hillside. Burnell constructed an imposing limestone building complete with a tower and vast storage facilities. Being a sound businessman, Burnell also bottled the spring water for sale as part of the Albion Water Company. These popular businesses continued after his death in 1890, when his widow and sons took over operations. The end strike for this and the other breweries in the area was Prohibition in 1919. The site was abandoned shortly thereafter.[52]

The site was in ruins when French sculptor Adrien Alexander Voisin (1890-1979) purchased the property in 1933 and began a lifelong mission of rebuilding the "castle" and fashioning his elaborate gardens. Voisin and his heirs owned the property until 2005 when it was sold at auction. Today it continues to be used as a private residence and is listed as San Francisco Historical Landmark No.60.[53]

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[51] Ibid., p. 16.
[52] Ibid.
[53] The site was designated on April 5, 1974.

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Figure 13. Albion Brewery, later the Albion Spring Water Company, at 881 Innes Street. This photo was taken sometime between 1920 and 1933. Photo used with permission from the San Francisco History Room, San Francisco Public Library.

Shrimp Camps

Many Chinese came to the United States initially to work on the railroads, but a good number were experienced fisherman. The Chinese fishermen sought out the best locations for their efforts, including the northern slope of Hunters Point Hill. Shrimp fishing on San Francisco Bay began with Chinese harvesting bay shrimp sometime around 1870. The crustaceans were considered delicacies in China and most of the haul was intended for export. Eventually American settlers came to appreciate the dried shrimp as well, adding to demand. Because fishing for bay shrimp was a long and arduous process, there was little competition by European fisherman and the Chinese shrimping grounds were largely left alone.[54]

Shrimp camps were well established around the Bay by the 1880s. The most productive grounds were along the west side of the Bay at Hunters Point, Point San Bruno and Point San Mateo, and in the shallow coves of the northern Bay near San Rafael at Point San Pedro.[55] At Hunters Point, most were concentrated in the protected shallows along the northern shoreline of Hunters Point Hill, although some were reportedly along the south shore as well. They were typically arranged into camps of less than 50 men under a manager who oversaw the selection of fishing grounds and processing of the harvest. The men used large, funnel-shaped nets that were 18 feet high and up to 30 feet long, set out in the Bay along a line up to a mile long. Forty crews of five men each would work two full tidal cycles to catch the shrimp on the ebb and flow of the tide. It was difficult work lasting 12 to 14 hours a shift.[56]

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[54] Roger and Nancy Olmsted, Historical Consultants, *San Francisco Bayside Historical Cultural Resource Survey*, 1982, p.119.
[55] Ibid.
[56] San Francisco Chronicle, July 23, 1893.

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When the harvests were collected on shore, the shrimp were boiled in weak brine until they became pink, then laid out in the sun to dry. Customers could come to the camps, or the dried shrimp were packaged for sale in San Francisco or for export.

With little development pressure in the area, the shrimp camps continued well into the 20th century. The 1930 Census notes at least one shrimp camp in India Basin, housing approximately 30 workers.[57] It appears that tension was building around the shrimp camps, however. In 1939 the City undertook a "clean-up" campaign of the India Basin shrimp camps. At this time, the City deemed them unsanitary, had them condemned and the San Francisco Fire Department set ablaze the shrimp camps as the owners and their families stood by watching (see Figure 14.)[58]

Along with the shrimp camps, at least one commercial fishery was known to have existed in India Basin. Sanborn maps and photographs of the early California Dry Docks Company at the eastern end of Hunters Point Hill, identify a fish drying enterprise immediately adjacent to the drydock on the north side of the point. It had a series of buildings, including a bunkhouse, mess hall and drying shed.[59] It was slated for removal by 1913 when Drydock 3 was being planned. (See Chapter IV for more information about the construction of Drydock 3.)

As a relatively isolated community, most of the public services extended to India Basin were the result of related projects in the larger area. For instance, the first basic water service to the residences and businesses of India Basin did not occur until 1924 when the Spring Valley Water Company built a main line along a portion of Innes Avenue. Sewers soon followed, but neither water nor sewers extended up the slope of Hunters

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[57] Kelly and VerPlanck, Historical Consultants*, India Basin Historic Survey*, 2008. p. 28.
[58] San Francisco Public Library Historical Photograph Collection, *Shrimp Camp on Fire in Hunters Point*, April 20, 1939.
[59] Sanborn Fire Insurance Map: San Francisco, Volume 5, 1899, Sheet 616 and Volume 8, 1913, Sheet 816. The evolution of the ownership of the drydocks at Hunters Point can be found in Chapter VI.

Figure 14. Photograph of the 1939 burning of the shrimp camps at India Basin. Photo used with permission from the San Francisco History Room, San Francisco Public Library.

Point Hill where several isolated residences continued to utilize wells and septic tanks. Paved roads were nonexistent until 1938 when a single route from Third Street to the Union Iron Works Drydocks was regraded and tarred.[60] This began to change when the Navy showed genuine interest in acquiring the drydocks for a major military base in the early 1930s.[61]

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[60] Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008. p. 29.
[61] It was purchased by the U.S. Navy in 1939 but not occupied by them until 1941.

Updated: July 2009

WORLD WAR II (1941 – 1945)

After the United States entered World War II, the hillside blocks around India Basin were rapidly transformed. What was rocky land with a scattering of haphazardly sited residences became tidy rows of identical war dwellings. Circulation through the area was improved and expanded, with new streets and street patterns. Traffic increased substantially and the shoreline to the east was filled and reshaped. (See Chapters VI and VII for further discussion on the impact of World War II on the Shipyard and the development of housing.) In the middle of all this development, however, the physical changes to the specific blocks within the India Basin sub-area were limited. There are many houses, commercial and community facilities that remained as islands of the past and are covered in the earlier sections of this chapter.

POST – WWII (1941 – PRESENT)

By 1950, use or redevelopment of the war dwellings surrounding India Basin forever changed the community atmosphere. The demographics and social character of the area were much different than the boatwright community of before the war. In spite of this, several boatyards, including the Anderson & Cristofani Boat Building Co. (at 900 Innes Avenue) continued to operate and expand, demolishing several old structures and constructing a new warehouse, storage, administrative, woodworking and smithing shops. This operation became a vital link to the past for the remaining pre-war India Basin population. As a result, while much of the land in the area was being filled or planned for fill, this stretch of India Basin remained in its natural state.[62]

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[62] In 1965, many of the lots north of Hudson between Griffith and Earl were filled with debris from the construction of I-280. This was done to avoid pending restrictions on the practice from the Bay Conservation and Development Commission (BCDC); Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008. p. 38.

Updated: July 2009

PACIFIC GAS AND ELECTRIC

The Pacific Gas & Electric Company (PG&E) power plant at Hunters Point was originally constructed in 1929 by Great Western Power Company. Over the years it has been expanded to keep up with improvements in power generation techniques as well as to increase capacity. The following historical background is excerpted from the 2006 National Register eligibility assessment completed by Roland-Nawi Associates.

> "The development of electrical power in both the form of hydroelectric and steam generated production was a major technological innovation of the late 19th and early 20th Centuries. Its ramifications were enormous for the industrial sector of the economy and affected the way thousands of people lived. In California, especially northern California, Pacific Gas and Electric Company played a major role in the development and expansion of electric power generation and distribution. It has constructed a large system of power generating and transmission facilities throughout northern California from the late 19th Century until the present. In the 20th Century, the company had two important periods of expansion, each tied to a specific technology of electrical power generation. In the late 19th and early 20th Centuries the development of hydroelectric facilities dominated the industry. After 1950 there was a shift to modern steam generation and facilities designed for its production.
>
> "The first period of major expansion was 1900-1920. From the 1890s until World War II, power generation in California and the western United States concentrated on the exploitation of water resources. In California, major river systems originating in the Sierras provided a widely available and cheap source of energy. Private power corporations, including Great Western Power and PG&E, developed a number of dams, powerhouses,

substations, and transmission systems along these rivers. The great increase in the availability of hydropower during this period drove the need to establish a network of local distribution facilities in towns and cities served by the companies. In San Francisco, the 1906 earthquake destroyed most of the city's existing electric power infrastructure. As a result, a large number of hydroelectric substations had to be constructed in the city, with PG&E playing an important role in this rebuilding. During this period steam generation was a minor source of auxiliary power for the big power companies. Coal to fuel steam plants had to be imported from the Northeast and could not compete with water power.

"Following World War II a greatly increased demand for electrical power in California led to another period of facility expansion and a change in technology. In Northern California this expansion was led by PG&E which had become the primary supplier of electrical power in this part of the state. As noted above, prior to the war, steam generation was viewed mainly as a form of back-up in periods of low water supply. By the late 1940s the limits on potential new hydro sites and the development of technologies that made steam generation more efficient and more economical turned PG&E increasingly to this form of power. In the 1950s PG&E expended over one billion dollars in construction of new facilities, most concentrated on steam generation These plants were designed and engineered differently than past facilities to both cut costs and consolidate plant operations and control. The first part of this expansion was the development of four new power plants: Kearn (175 megawatts), Hunters Point (200 megawatts), Moss Landing (330 megawatts), and Contra Costa (330 megawatts). The Kern, Moss Landing and Contra Costa plants were new plants, while the Hunters Point plant was an addition to the existing facility.

Updated: July 2009

Figure 15. The Hunters Point PG&E plant during deconstruction, July 2007. The entire plant was removed by July 2008. Photo by Circa: Historic Property Development.

> "The PG&E Station P at Hunters Point includes a portion of the building from the 1920s period of expansion and a large portion that was constructed in the immediate post-war period."[63]

The post-war construction included an expansion in 1948 to house plant turbines, further modifications in the early 1950s for a steam generation unit and again in 1958 to

[63] Roland-Nawi Associates, PG&E Hunters Point Station P: Evaluation of Eligibility for Listing in the National Register of Historic Places, the California Register of Historical Resources, and for City of San Francisco Landmarks Designation, September 2006.

house another multi-story steam generator. An office wing has since been removed and replaced with a new office addition. The plant was closed in 2006 and demolished by 2008. The PG&E site is currently undergoing remediation (see Figure 15).

PROPERTY TYPES

Today, the India Basin sub-area consists of a mix of early residential and commercial buildings, along with open space and industrial uses. It is a mixed community that is transitioning from commercial and industrial uses, to a greater density of residential development. Most of the parcels slated for further historical evaluation in later phases of this project are either open space or devoid of any architectural elements.

Building, structure and object types related to the discussion above would include, but are not limited to:

- Warehouses
- Community properties – churches, schools, halls, etc.
- Wharfs
- Boat conveyances
- Early residential buildings
- Sheds
- Public housing
- Public staircases
- Development/siting patterns
- Street grid

The majority of the sub-area has been previously surveyed for historical resources.[64] Most studies have identified several residential and commercial buildings that are associated with the boat building industry and the early European immigrant community.

[64] For a more thorough and complete assessment of the historical context and related resources in India Basin, see Kelly and VerPlanck, Historical Consultants, *India Basin Historic Survey*, 2008.

However, within the Project, no such resources remain. At this time, no architectural resources associated with the shrimp camps have been identified.

Buildings within the boundaries of the India Basin shoreline plan are investigated, presented and evaluated more fully in Volume II of this report. This document, *Bayview Waterfront Plan Historic Resources Evaluation, Volume II: Resource Survey and Report*, also prepared by Circa: Historic Property Development, should be referenced for further information regarding specific buildings or architectural styles found within the Project.

CONCLUSIONS

India Basin is most significant for its associations with the early maritime trades that once flourished along the entire San Francisco coastline. The relative isolation of India Basin, combined with its unusually close proximity to deep water channels, allowed these industries to survive for a much longer period of time than the residential neighborhoods that were slightly further south and west. Today, it is an enclave that represents what was a common grouping of residences built around a central commercial business. These businesses were often reflective of the nationalities of the surrounding communities – truck farms with Portuguese, Italian, and Chinese owners and workers, Butchertown with its Irish and Italian workers, etc. These communities each formed associations, churches, schools and social groups. India Basin is the last remaining vestige of the area prior to the radical transformation of World War II.

Updated: July 2009

VI. HUNTERS POINT SHIPYARD

INTRODUCTION

Hunters Point Shipyard (Shipyard) occupies the eastern end of Hunters Point Hill. What was originally a narrow, steeply sloped finger of bedrock extending into San Francisco Bay has been transformed over the years into a flat expanse of reclaimed land. Part of the reclamation was accomplished through the leveling of portions of the original landform. Today, the Shipyard covers approximately 936 acres, of which approximately 493 acres are dry land and approximately 443 acres are under water.[65] By the time the Navy closed the Shipyard in 1974, the Shipyard contained over 337 industrial buildings, 57 housing and non-industrial buildings, 24,000 linear feet of pier, wall and wharf space, 21 repair berths, 10 additional deep water berths, 6 drydocks and a 225-ton crane (modified from the former 450-ton crane.)[66] As of July 2009, only a fraction of the original buildings and structures remain on the nearly 500 acres of available land.

The Shipyard has traditionally played a primary role in the development and definition of the Bayview and Hunters Point neighborhoods. In its early days as a private drydock, it was the largest single commercial entity in the Project vicinity as well as the largest and most modern drydock on the Pacific Coast.[67] This early enterprise represented a new era in maritime history, spanning from large wooden shipping craft to new steel-hulled vessels (see Figure 16.) After Navy acquisition in 1939, it brought national attention to the district and eventually resulted in the complete transformation of the economy and demographics of the area.

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[65] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR,* certified February 8, 2000, File No.1994.061E, pp. ES-1.
[66] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Study Options for Future Us*e, June 1974, p. 2-12.
[67] "San Francisco Dry Dock: Its Location, Dimensions, Machinery, Etc.," *Daily Alta California*, April 16, 1867.

Updated: July 2009

Figure 16. St. China in the Hunters Point Drydocks, c.1901. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Naval interest in Hunters Point corresponded to a dramatic expansion in the size and important of the United States Navy, as well as a general increase in the military's presence on the West Coast. Continued Pacific military campaigns (Philippine War, World War I, World War II) only emphasized the importance of West Coast military facilities. As part of this, the Navy became affiliated with the Hunters Point drydocks during this period, first as a client of the privately held shipyard then as owner of the shipyard. The continued expansion and successful operation of Naval campaigns in the Pacific Ocean was dependent on the availability of ship-servicing capacity. In 1939, when the Navy purchased Hunters Point, the facility became only the third Naval shipyard on the West Coast and the only one south of Puget Sound capable of handing modern military ships.[68] It retained this status until well after World War II when the Navy changed its policies to rely on private shipyards instead of maintaining its own facilities.

As important as Hunters Point was to the World War II Naval campaigns, it gained significance in its own right in the post-war period through its role as home to the Naval Radiological Defense Laboratory (NRDL). This facility was borne out of necessity in the latter war years and grew into a major research facility dedicated to studying the physiological impacts of radiological exposure as well as the detection of and protection from such nuclear hazards. This facility was established at Hunters Point Shipyard because of its many geographic, political and logistical advantages, and operated there from 1944 to 1969. It was one of the only facilities of its kind in the United States in either private or military control, was recognized as a leading research facility on a national scale and played a major role in every U.S. nuclear weapons test during its 25-year history.

[68] Twelfth Naval District, Physical Properties Facilities and Services: naval Activities and Principal Offices, June 1948.

Together, these areas of importance are reflected in the built environment. There are a small number of buildings that pre-date the Navy and comprise an already identified potential historic district near Drydocks 2 and 3. The rest of the Shipyard building stock was historically almost evenly split between World War II era construction and post-war era construction, although recent demolitions have left more World War II structures at the expense of the post-war buildings. While not as impressive architecturally as the earlier drydock buildings, these later military buildings and structures carried out operations critical to the United States' success during World War II. After the War, the shipyard continued to contribute to the success of military campaigns both as a shipyard as home to RADLAB.

BRIEF MILITARY HISTORY IN SAN FRANCISCO BAY

Shortly after the discovery of San Francisco Bay, the Spanish began fortifying the headlands around the Golden Gate. The first of these establishments was the Presidio, started as a Spanish encampment in 1776 to protect the entrance to the Bay, and to guard the Mission several miles away. When Mexico won its independence from Spain in 1821, it set about further fortifying its new holdings in Alta California. In 1850, the United States took control of the Presidio. By the 1860s, they were constructing a naval base at Mare Island, the first such facility on the West Coast.

In 1885, President Cleveland's administration saw San Francisco Bay as second only to New York Harbor as vital to the nation's security.[69] The result was a number of small batteries and encampments along the coast and Bay shorelines. After the Spanish-American War (1898-1902) America's naval strength became a top national priority and San Francisco's strategic naval importance could not be denied. As a result, a massive expansion of military facilities throughout the region occurred during the first half of the

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[69] United States Commission on Navy Yards and Naval Stations, *Additional Navy Yard on the Pacific* Coast: Message from the President of the United States transmitting report no.5 of the Commission of Navy Yards and Naval Stations, 1918.

20th Century. Part of this buildup included increased capacity for shipbuilding and repair, and hence the increased interest in the private drydocks at Hunters Point in the years leading up to World War II.

EARLY HISTORY AT THE SHIPYARD – PRE-1941

What became Hunters Point Naval Shipyard was originally two separate regions at the end of Hunters Point Hill: a small residential neighborhood and the drydocks. While most of the information contained in this document concentrates on the contributions of the drydocks to the overall development of the Shipyard it is important to recognize the residential portions of the military facility that pre-dated World War II. Information on the early residential development of the land within the Project is included after a brief discussion of the history of the drydocks.

CALIFORNIA DRY DOCK COMPANY

What would become the heart of Hunters Point Shipyard began in 1864 as the brainchild of A.W. Von Schmidt, a German engineer. He approached the South San Francisco Homestead and Railroad Association with the idea that a drydock in such close proximity to their land would bring industry (and workers needing housing) to the area. They readily agreed and donated ten acres to the project.[70] However, financing for the construction was more difficult to secure. Eventually, Von Schmidt partnered with a number of investors, including William Ralston and Lloyd Tevis, to form the California Dry Dock Company.

The drydock was largely cut from solid rock at the northeastern tip of Hunters Point (see Figure 17.) It was completed in late 1867 and brought great praise from local real estate speculators and promoters. The Hunter brothers built a small hotel at the tip of the point near the drydocks in anticipation of a flood of new settlers drawn by employment

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[70] Roger and Nancy Olmsted, Historical Consultants, San Francisco Bayside Historical Cultural Resource *Survey*, 1982, pp. 93-94.

Figure 17. Hunters Point Drydock under construction, c.1867. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 18. Hunters Point Drydock, c.1870. This photo appears to be from the first decade of the drydock operations at Hunters Point. Note the cluster of houses in the background, near center. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

opportunities at the drydocks. Around the hotel several residential and commercial buildings were erected (see Figure 18.)[71]

SAN FRANCISCO DRY DOCK COMPANY

The California Dry Dock Company operated through the end of the 19th century supported by a significant number of government contracts and also acted as a primary repair facility for U.S. Navy ships returning from various Pacific military missions. Around 1901, the company changed its name to the San Francisco Dry Dock Company and commenced construction of a second drydock, Drydock 2 (see Figure 19.) Completed in 1903, the facility became the most modern drydock on the Bay. While it was busy with increased business, its location was gaining the attention of military personnel in Washington, D.C. It was also attracting the attention of Charles Schwab (of Bethlehem Steel) who was concerned that his Potrero Point (Pier 70) shipbuilding operation was becoming inadequate to handle the most lucrative types of naval shipbuilding and repair contracts. In 1907, as he considered building additional facilities at Potrero Point, Schwab met William Babcock, president of the San Francisco Dry Dock Company.

A year later, Schwab purchased all the company stock for $1.875 million, becoming the sole owner of the drydocks at Hunters Point.[72] His close connections with President Woodrow Wilson and his position as director-general of the Emergency Fleet Corporation meant his shipyard and drydock facilities in San Francisco, as well as his shipyards in Alameda, were well placed in the years leading up to World War I.

The combination of the shipyard at the Potrero Point site and the drydocks at Hunters Point made the San Francisco Yards of Bethlehem Steel one of the largest combined facilities in the world.

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74 John Haskell Kemble, *San Francisco Bay, A Pictorial Maritime History*, photograph, 1868, p. 63.
72 “Hunters Point Dry Dock Merged With Union Iron Works,” *San Francisco Call*, November 12, 1908

Figure 19. View of the Hunters Point drydocks as seen from Hunters Point Ridge, 1924. Drydock 2 is to the right in the image. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

NAVAL INTEREST INCREASES

After the Spanish-American War, President Theodore Roosevelt sent a fleet of U.S. Navy ships on a circumnavigation tour to demonstrate the power of the U.S. Navy. It was commonly referred to as the *Great White Fleet* and it served to establish the naval dominance of the United States as well as to show the technological capabilities of American engineers and shipyards. From a political standpoint, the 1907-1909 tour also built up domestic support for the development of naval bases on both coasts. At the time, the Navy had only two shipyards on the West Coast – Puget Sound Naval Shipyard in Bremerton, Washington and Mare Island Naval Shipyard in Vallejo, California.[73] If the U.S. was to dominate the seas with military might, it needed new facilities large enough to handle the massive steel ships then being manufactured. For the time being, the Navy contracted out the manufacture and maintenance of its fleet to shipyards such as Bethlehem Steel's San Francisco Yards.

In the Bay Area, Mare Island Naval Shipyard was seen as an important base, but it was incapable of handling the larger ships. It was plagued with shallow drafts as the result of decades of mining tailings being washed into the northern San Francisco Bay as well as by limited geographic space for physical expansion. Additional facilities were needed and various locations in and around San Francisco Bay were high on the Navy's list of considerations. In 1916, during World War I, Congress authorized the creation of a commission to further study locations for Navy Yards in the San Francisco Bay Area. It became known as the Helm Commission after its chair, Rear Admiral J. Helm.[74]

The commission looked at a variety of locations, including Alameda, Goat Island (now Yerba Buena Island), Richmond and Hunters Point. In spite of the strong, long-standing Naval tradition at Hunters Point, the commission ultimately voted in favor of Alameda as

[73] JRP Historical Consulting Services, Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard, September 1997, p. 11.
[74] Ibid.

the preferred location of the new shipyard. This recommendation was never acted upon, and the site eventually became the Naval Air Station at the western end of the island of Alameda.

In the meantime, the Navy compromised by further solidifying its relationship with Bethlehem Steel's drydocks at Hunters Point. It subsidized construction of new, larger facilities at Hunters Point in exchange for prioritized access to the privately owned site.[75] This arrangement enabled Bethlehem Steel to construct Drydock 3 in 1918.[76] This drydock was built by enlarging Drydock 1 (1867) and it greatly increased the ship repair capabilities of the Hunters Point facility.

The almost exclusive U.S. Navy access to the drydocks at Hunters Point worked out well during peacetime. However, following World War I, it became apparent that the size and destructive power of the world's navies had increased dramatically. As the ships became more sophisticated, so too did the repair facilities that kept them afloat. Realizing that they would eventually have to develop their own west coast facilities, the U.S. Navy once again began searching in earnest for the right locations.

The pressure for an established shipyard, capable of handling the world's largest fighting machines, increased dramatically as hostilities in Europe began to escalate at the end of the 1930s. To address the situation, the Navy purchased the Bethlehem Steel drydocks at Hunters Point in 1939 (see Figure 20.)

At the time, the entire site was approximately 48 acres and contained two drydocks. Anticipating involvement in the growing conflicts in Europe and the Pacific, the Navy began construction of supply buildings and storehouses along the drydocks (see Figure 21.) This construction was rather limited in size and scope due to extreme shortages of

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[75] NAVSEA, Hunters Point Shipyard: Final Historical Radiological Assessment: History of the use of General Radioactive Materials, 1939-2003. 2004, p. 6-2.
[76] JRP Historical Consulting Services, Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard, September 1997, p. 12.

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Figure 20. Hunters Point Drydocks, 1940. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 21. Aerial view of Hunters Point, c. 1941. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

emergency construction money and materials. All construction during this period at Hunters Point was done as money became available and used what were considered inexpensive materials to build temporary structures.[77] Improvements from this early-Navy period included a new assembly building just south of Drydock 2, latrines, a 50-ton crane and an 800-foot quay wall just south of Drydock 2, as well as smaller service-oriented buildings near the point (now since removed.)[78] The Bureau of Yards and Docks, a branch of the U.S. Navy, took on these projects. This bureau was responsible for the building and maintenance of the yards and Drydocks, as well as all support facilities related to ship construction, repair and maintenance. The majority of the Hunters Point Shipyard buildings of this pre-war period were built using standard plans developed by the Bureau of Yards and Docks. These early projects were still under construction when the Government terminated its lease to Bethlehem Steel in October 1941. The Navy took full control of the facility on December 18, 11 days after the bombing of Pearl Harbor.[79]

PRE-NAVY COMMUNITY

To handle the immediate need for barracks and residential accommodations, in 1942, the Navy acquired an entire neighborhood at the end of the ridge as part of the Hunters Point Naval Shipyard expansion. (This area was wholly contained within Parcel A of the Phase I Project.) The roughly 75-acre, flag-shaped area was bounded by Donahue Street to the west, Galvez Avenue to the north, Hill Drive to the east and Kirkwood Avenue to the south.[80] In total, 86 homes and 23 businesses became Naval property.[81]

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[77] Hunters Point Naval Shipyard Association, untitled report, c.1974, p. 6. Included as an appendix to Hunters Point Naval Shipyard: A Historical Analysis by Karl F. Kimbrough, August 1978.
[78] Ibid. p. 15.
[79] NAVSEA, Hunters Point Shipyard: Final Historical Radiological Assessment: History of the use of General Radioactive Materials, 1939-2003. 2004, p. 6-2.
[80] Environmental Protection Agency: *Region 9: Superfund, Hunters Point Naval Shipyard* website, http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/vwsoalphabetic/Hunters+Point+Naval+Shipyard!OpenDocument#_Section2; City and County of San Francisco, Redevelopment Agency, website, *Hunters Point Shipyard Redevelopment Project Area Map*, http://www.sfgov.org/images/sfra/landusemap.gif.

The buildings were used for married officers' housing, military clubs and other social and recreational uses. Over the years, the Navy added several 1950s era residential buildings to this area as well.

Not much is known about the small community that lived on the end of Hunters Point Hill, overlooking the shipyards, drydocks and fishing operations. This neighborhood was the result of increased business at the Bethlehem Steel drydocks at Hunters Point (discussed in the preceding sections). According to a 1997 report, "the bulk of the houses in this area [dated] to the 1908-1939 period, with more being constructed during the 1930s than any other decade." The report noted 31 homes were constructed between 1909 and 1939, with 20 of these constructed in the 1930s.[82] Within these 20th Century buildings, there apparently were two earlier structures that were tentatively dated to the 1890s or early 1900s. Together, they formed an eclectic grouping of mostly one- and two-story revival-style homes.[83]

WORLD WAR II – 1941-1945

Hunters Point Shipyard was not initially intended to serve as a stand-alone facility. When first acquired, and throughout World War II, it was designated as an annex to the Mare Island Naval Shipyard.[84] To this end, the early work at Hunters Point was completed by servicemen stationed at Mare Island. As its role as a repair facility for large ships became more heavily in demand, Hunters Point Annex grew accordingly. Because Mare Island could not accommodate these larger ships, Hunters Point was a vital part in the Navy's shipyard facilities in San Francisco Bay. When Mare Island's

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[81] *San Francisco News*, March 10, 1942
[82] JRP Historical Consulting Services, Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard, September 1997, p. 9.
[83] DPRa forms were recorded for each of these houses in 1997 as part of the JRP report. Full descriptions of the homes and their 1997 conditions are included in these documents.
[84] Karl F. Kimbrough, Hunters Point Naval Shipyard: A Historical Analysis, August 1978, p. 9.

capacity for submarine repair was strained by the War, additional facilities were constructed at Hunters Point. Its role and importance as a separate facility was not established until December 1945, near the end of the war.[85] At this time the mission of the Shipyard was still highly focused on the repair and servicing of large ships (209 during World War II), even though it had expanded capabilities to handle smaller craft and submarines and had limited capabilities for the construction of new ships (4 during the World War II period.)[86]

In fulfillment of its role as an annex to Mare Island, Hunters Point was developed as a highly specific facility. It did not have the extensive administrative support buildings, personnel or training facilities of Puget Sound or Mare Island. It did not need such facilities with Mare Island so close by and with its historical relationship to this other Naval base. Instead, it continued to be developed as the most modern large-capacity shipyard on the West Coast. This is evidenced in the construction of Drydock 4, the largest drydock in the world at the time of its construction in 1943, and the erection of the 450-ton Bridge Crane (1948), also the largest in the world at the time of its construction.

DEVELOPMENT AND EXPANSION

Between 1939 and 1945, due to the anticipated involvement in World War II and subsequent battles along the Pacific Rim, Hunters Point Naval Shipyard was expanded from 48 acres to 583 acres.[87] This was accomplished by moving over 8 million cubic-yards of earth from the end of Hunters Point Hill to the shallow areas immediately north

[85] Ibid. p. 12. The Mare Island Annex at Hunters Point was then renamed the San Francisco Naval Shipyard.

[86] Mare Island produced 17 submarines, four submarine tenders, 31 destroyer escorts, 33 small craft, and over 300 landing craft. Many more were docked for repairs during this time and an exact figure could not be found. National Parks Service, "World War II in the San Francisco Bay Area," http://www.nps.gov/history/nr/travel/wwIIbayarea/mar.htm. This is compared to 50 built and 384 total dockings at Puget Sound. National Parks Service, *National Register of Historic Places Nomination: Navy Yard Puget Sound*, December 1991.

[87] Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corp, 1940-1946, Volume 1. 1947, p. 198.

and south of the drydocks. The northern area became the submarine servicing area and the southern portion formed what was to become the bulk of the Shipyard's usable land. (Figures 22-26 illustrate the rapid changes to the land mass in 1942.) These major dredging and engineering projects were completed simultaneously with dozens of other, more traditional construction projects completed in record time.

In 1941, $675,000 was appropriated for the construction of a new quay wall. However, the project was started in January 1942, immediately after the United States entered the war. In April 1942, the installation of 10 miles of sewer pipe and 10 miles of fresh-water lines was begun on the lands being leveled. The utility systems were further expanded in 1942 when connecting crane tracks were laid from old Drydocks 2 and 3 to those of the new 1092-foot drydock (Drydock 4), under construction at the time.

One of the major infrastructure projects during the World War II period was the laying of miles of railroad track within the Shipyard. These tracks allowed the massive ship propulsion and operational equipment to be moved from storage to installation facilities, as well as to transport such equipment from off-site foundries to Hunters Point. Even today, rail lines, spurs and beds remain scattered as reminders of the importance of the railroad to the everyday functioning of the Shipyard.

Beginning in 1942, the Navy commenced an extensive building campaign at the Shipyard. The bulk of the site's development took place during the emergency period of World War II and the majority of the buildings remaining at the Shipyard date to this period. The use of standardized designs and easily produced, readily accessible construction materials enabled military planners during the war to build a large number of buildings in highly condensed timeframes for the least amount of money.[88] According to a 1997 study of buildings and structures at Hunters Point Shipyard, nearly all of the

[88] JRP Historical Consulting Services, Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard, September 1997, p. 17.

Figure 22. Aerial view of the Shipyard shortly after the Navy took over full control of the drydocks, March 11, 1942. Photo used with permission from the San Francisco History Center, San Francisco Public Library and the United States Navy.

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Figure 23. Aerial view of the Shipyard shortly after the Navy took over full control of the drydocks. This photo was taken at approximately the same time as Figure 30. Photo used with permission from the San Francisco History Center, San Francisco Public Library and the United States Navy.

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Figure 24. Aerial view of the Shipyard shortly after the Navy took over full control of the drydocks. This photo was taken a short time after Figures 30 and 31. Note the completed construction of the quay wall and the advanced leveling of the ridge in the background. Photo used with permission from the San Francisco History Center, San Francisco Public Library and the United States Navy.

Figure 25. Aerial view of the Shipyard after completion of reclamation, c.1945. Photo used with permission from the San Francisco History Center, San Francisco Public Library and the United States Navy.

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Figure 26. Aerial view of the Shipyard after World War II with most of the available berths in use, December 17, 1948. Photo used with permission from the San Francisco History Center, San Francisco Public Library and the United States Navy.

buildings at Hunters Point were constructed using these Bureau of Yards and Docks standardized plans.[89]

The World War II-era buildings at Hunters Point are a mixture of temporary, semi-permanent and permanent construction types. Because of the restricted use of critical materials, most of the structures completed during this time were temporary or semi-permanent facilities. All of the barracks, toilet facilities, and nearly all of the shops and warehouses were built according to standard plans. These plans, however, could be modified somewhat during and after construction to accommodate specific programmatic needs.[90] A number of structures built after the Second World War, including some large-scale industrial shop buildings and the basic facilities of the Naval Radiological Defense Laboratory, were designed as permanent buildings.

Shipyard Design

Though standardization was a key component in the rapid World War II-era Shipyard expansion, not all Shipyard buildings are of a standard Bureau of Yards and Docks plan. Throughout the course of the war, the Corps of Engineers and Bureau of Yards and Docks worked together to both develop designs that could be mass-produced, and, in an effort to provide federal employment opportunities during a time of scarce private construction projects, administering both architect-engineer (A&E) and construction contracts. The actual layout of individual buildings as well as plans for entire military bases commonly was turned over to private A&E firms. These firms could, and frequently did, use Navy or Army standardized plans, adapting them as needed to accommodate specific conditions at each individual base.[91] The main administration building (Building 101) for example is essentially a compilation of numerous modules,

[89] A review of drawings held at local Navy archives confirms these findings.
[90] JRP Historical Consulting Services, Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard, September 1997, p. 17.
[91] Ibid, p. 18.

each derived from standard Navy plans. Further, the warehouses in the 400-series section of the South Shipyard are essentially identical, though minor variations in plan and design are visible.[92]

A small number of important buildings were not constructed using standardized plans though still adhere to longstanding design traditions of the Navy and industrial manufacturing buildings in general. The designs for Buildings 253, 231 and 411, for example, were not specifically derived from standardized plans but nonetheless retain several features common to large manufacturing shops built by the Navy throughout the United States since the early 20th century.[93]

During the World War II-era, a variety of A&E firms were contracted by the Navy at HPS as well as at other military facilities throughout the Bay Area and the United States. The scarcity of civilian contracts during the war, and abundance of military design work for both architects and engineers, resulted in work for nearly every practicing architect in the state during that time. Many prominent architects and engineers were contracted by the military for design work during WWII owing to the profusion of Federal contracts available in support of the war effort. At Hunters Point Shipyard, buildings and structures were designed and built by a variety of nationally prominent and well-known Bay Area architects, engineers and contractors including: John H. Devitt (architect), Barrett & Hilp (contractors), Austin Willmott Earl (engineer), Albert Kahn Associated Architects, Timothy Pflueger (architect), Ernest J. Kump Co. (contractors), and Walter L. Huber & Edward K. Knapik. Many of these firms are well known for their work both before and after the World War II period.

[92] JRP, 17-18. Also see Sedway/Cooke, *Hunters Point Shipyard Study: Options for Future Use*, San Francisco: June 1974.
[93] JRP, 18.

Barrett & Hilp

The San Francisco-based contracting firm of Barrett & Hilp was awarded the master cost-plus-fixed-fee (CPFF) contract for Hunters Point Shipyard by the Navy.[94] As such, this firm constructed the majority of the buildings on the shipyard; most were built using standard Bureau of Yards and Docks plans. J. Frank Barrett and Harry H. Hilp founded the construction company in 1912 with $450 in capital. The firm grew along with the Bay Area, constructing schools, office buildings, subdivisions and public buildings in addition to the anchorages for the Golden Gate Bridge. An advertisement for Barrett & Hilp in the November 1943 issue of *Architect and Engineer* indicates that the firm had constructed war housing, industrial plants for the war effort, dams and aqueducts, dry docks, hospitals, cantonments and one complete shipyard.[95] The firm split into two companies in 1953 and J. Frank Barrett passed away in 1959.[96]

Harry H. Hilp, a San Francisco native, began his construction career as a carpenter with Southern Pacific Railroad shortly after the 1906 earthquake. His 1976 obituary notes that the firm of Barrett & Hilp received governmental awards for the firm's emergency work at Mare Island, the South San Francisco Shipyard [Hunters Point] and elsewhere.[97] Both men were also highly active in civic and social affairs within San Francisco and the Bay Area.

W. L. Huber and E. K. Knapik

Walter L. (Leroy) Huber collaborated with Edward K. Knapik, both civil engineers, on Building 134 at Hunters Point Shipyard. A San Francisco native, Huber graduated from the University of California in 1905 and was fully involved in the massive post-earthquake rebuilding campaign a year later. In the 1920s he served as the structural

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[94] The exact date of this awarded contract could not been verified.
[95] *Architect & Engineer*, November 1943, p. 11. Which shipyard the firm had completed by 1943 was not stated.
[96] "J. Frank Barrett Dies at 70," *San Francisco Chronicle*, 12 January 1959.
[97] "Civic Leader Harry H. Hilp Dies at 88," *San Francisco Chronicle*, 26 October 1976.

engineer for the University of California Medical Center, the Roosevelt Junior High, Balboa High and Alamo Schools in San Francisco and YWCA's in Oakland, Long Beach and Riverside. Huber died in 1960.[98] Archival research did not produce any biographical information on Edward K. Knapik.

Ernest J. Kump Co.

In 1944, the Navy issued an A & E contract to the firm of Ernest J. Kump Co. to design a new optical and Ordinance Shop to be joined to the 1942 Shipfitter's Shop (Building 211). Bay Area architect Ernest J. Kump, a San Joaquin Valley native, designed a number of buildings for the Navy and other military branches during WWII and was otherwise known for designing buildings, primarily schools, in the Fresno and Bakersfield areas. He gained national attention, however, in the immediate post-war period for his influential community college campus designs at Foothill and De Anza on the Peninsula, which were credited with being not only important achievements in school design but also seen as precursors of corporate "campus" layouts.[99]

Kump was also awarded an honor award for outstanding examples of American Architecture in 1955 by the AIA for the North Hillsborough School.[100] In addition to Kump's work for the Navy at Hunters Point, he designed a storage building at McClellan AFB in Sacramento (1940); defense housing in Vallejo (presumably for the Navy in relation to Mare Island) (1941); buildings at the Army Sierra Ordnance Depot, Susanville (1941); a second housing unit at Vallejo (1942); and a building for the Army Corps of Engineers in Suisun (1944), among others.

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[98] "Engineer W. L. Huber Dies at 77," *San Francisco Chronicle*, 31 May 1960.
[99] JRP, p.6-7 on Building 253 and 211 DPR set.
[100] "Peninsula Architect Wins Top Honor," *San Francisco Chronicle*, 24 April 1955.

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Albert Kahn Associated Architects, Inc.

The firm of Albert Kahn Associated Architects, Inc. consulted Building 411, the Shipfitters, Welders and Boilermakers shop. Based in Detroit, the firm, founded by noted industrial architect Albert Kahn, was likely hired for its expertise in the construction of large industrial manufacturing buildings, a building type pioneered by Kahn in the early 20th centuries. Building 411 was completed in 1947. Architect Albert Kahn died in 1942.

John H. Devitt

John H. Devitt, a San Francisco-based architect and acting architect for the City in the post WWII period, was contracted to design two restaurant buildings at Hunters Point Shipyard. Archival research located no other biographical information on Devitt.

Timothy Pflueger

Timothy Pflueger was one of the Bay Area's most famous architects through the 1920s, 1930s and until his early death in 1946, known for his extravagant designs in a wide variety of architectural styles. Earlier studies have indicated that Pflueger was one of the many architects to receive a contract for work at the shipyard during WWII. He was suspected to have designed Building 110, a barracks building, because of its vaguely streamlined design, which was unlike other barracks buildings remaining at the shipyard. However, research revealed that contractors Barrett & Hilp built this building from Bureau of Yards & Docks plans (Drawing #184767). One document found in the Navy's on-site archives at HPS indicates that Pflueger was involved in the design of the Beauty Salon and Chaplain's office additions to the rear of Building 505, the Navy Exchange Building in the South Shipyard area. The rest of this building is thought to have been designed using standard Bureau of Yards & Docks plans.

Navy records also indicate that Pflueger assisted in the design of a restaurant building at the shipyard, three of which are still extant (Buildings 125, 228 and 252). Archival research indicates that John H. Devitt was the primary architect for Buildings 125 and 228. Plan drawings for Building 252 were not located to confirm Pflueger's involvement in the design; however, the teardrop-shaped restaurant building is constructed with common materials and, beyond its unusual plan shape, is architecturally undistinguished, especially when compared to other extant Pflueger buildings in the Bay Area.

Austin Willmott Earl

Retained as the consulting structural engineer for a number of projects at Hunters Point Shipyard, Austin W. Earl received the Civilian Merit Award for his work during World War II for the Navy's Bureau of Yards and Docks. A 1906 graduate of the University of California, Earl became a recognized authority on waterfront and was responsible for the engineering of many industrial structures at Mare Island, Hunters Point and Port Chicago. At Hunters Point he served as the consulting engineer on such projects as the massive Shipfitters, Welders and Boilermakers shop (Building 411), the Paint and Oil Storage building (Building 810), and on the general tracks plan for the railroad craned and tracks, which ran throughout the shipyard. Earl was the founding president of the Consulting Engineers Association of California, which later helped organize the Consulting Engineers Council, a national organization.[101]

Circulation

As the Shipyard was expanded, two main entrances were created to provide access to the facilities, one on either side of Hunters Point Hill. At the north, the Main Gate was on King Avenue, just east of the intersection with Donahue Street. To the south, the South Gate was on Crisp Avenue, near the junction with Griffith Street. The hill created a

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[101] "Austin Earl Dies – Noted Engineer," *San Francisco Chronicle*, 22 February 1965.

major natural barrier to quick access from one side of the Shipyard to the other. Consequently, uses were generally segregated and some facilities were duplicated to better serve their immediate surroundings and to improve general efficiency. Even so, the area around Fischer Avenue became a bottleneck as "[a]ll automobile, truck, crane and train traffic has to pass through this single corridor."[102]

ZONES OF USE

The overall site plan for the Shipyard was a direct product of the World War II expansion. Prior to the war effort, the sparse amount of available land at the site did not necessitate a comprehensive site planning strategy. However, with an increased amount of land made available through the reclamation process, site planning became a necessity and the result was an orderly arrangement of buildings and structures in functional groupings. The first and most important influence was access to the water. Since the primary charge of Hunters Point Shipyard during World War II was the repair and retrofit of ocean-going military vessels, access to the various berths had a large impact on the location of storage, shops and administration buildings. Of secondary concern was the movement of equipment and personnel between buildings. Rail lines traced throughout the Shipyard, following wharfs and extending into warehouses. The sometimes massive scale of equipment and materials required the use of cranes and motorized transportation mechanisms to move objects from ships to repair facilities and back again. The consequence of these influences was a compartmentalized base with specific use zones, reflected largely in the numbering system. In general, these zones were:

- Administration
- Submarine Repair
- Ship Repair and Outfitting

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[102] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Study Options for Future Use*, June 1974, p. 2-10-11.

- Warehousing, Supply and Industrial Support
- Residential
- Radiological

The numbering system, still in place, was instituted during the World War II period. Each series of numbers generally refers to a specific functional grouping of buildings. The 100 series of buildings were chiefly administrative buildings, located near the Main Gate, as well as the submarine repair-related buildings along the northern pier. Many of the administrative buildings in this series have been demolished though many of the submarine repair-related shops in the north portion of the Shipyard are still extant.

The 200 series is largely comprised of industrial shops and ancillary buildings between Drydocks 2 and 4 in the Ship Repair and Outfitting portion of the shipyard. This area was dedicated to the repair and overhaul of larger surface vessels and located between the most active drydock facilities (Dry Docks 2, 3 and 4), requiring minimum movement of ships and materials between the industrial shop buildings and waterfront operations.[103]

The 300 and 400 series buildings are industrial and warehouse buildings located in the Warehousing, Supply and Industrial Support area of the south Shipyard. This area was used for long period conversion work, new ship construction and for storing inactive vessels, all of which required less travel to and from the major shops.[104] A few large shop buildings, numerous supply storehouses and smaller industrial support facilities dominate this grouping of buildings.

There are relatively few remaining buildings in the 500, 600, 700, 800, and 900 series; these buildings were located along the western boundary of the Shipyard, generally

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[103] Hunters Point Naval Shipyard Association, untitled report, c.1974, pp. 15-16. Included as an appendix to *Hunters Point Naval Shipyard: A Historical Analysis* by Karl F. Kimbrough, August 1978.
[104] Ibid.

north and south of the 400 series buildings.[105] The 500 and 600 series buildings were largely dedicated to residential and related uses in the south Shipyard and the 700 and 800 series buildings were either used for industrial support or storage purposes or for NRDL-related activities. Though no 900-series buildings remain at the Shipyard, records indicate that they included an Officers' Mess Building, various greenhouses and garden sheds, a bank and garage facilities.

Within these zones, a relative uniformity of building types, styles and materials existed. As the focus of the shipyard changed from Navy repairs to commercial ventures, some of this organization was lost. However, the general arrangement of buildings today still reflects the order imposed by World War II-era requirements and planning and a great deal of the original spatial organization is discernable in the built fabric.

WWII Period Summary

All of this construction was centered on the stated mission of Hunters Point Shipyard:

"For all classes of vessels: interim docking, shaft and propeller repairs, repairs of major underwater damage; for carriers: interim overhaul of about three to four weeks comparable to overhaul by repair vessels afloat."[106]

In general, that is what occurred. However, sometimes Hunters Point Shipyard was used to load and outfit ships prior to embarkation. This was the case on July 15, 1945, while the USS Indianapolis was docked at Hunters Point awaiting orders. On this day, components of the atomic bomb "Little Boy" were loaded aboard the Indianapolis for transport to the South Pacific. It was reported to have contained half of the available uranium in the United States, valued at over $300 million at the time. The ship left Hunters Pont at 6:30 AM the next morning but was held in San Francisco, awaiting the

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[105] JRP Historical Consulting Services, Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard, September 1997, p. 17.
[106] Ibid, p. 15.

results of the first atomic weapons test in New Mexico. The test was a success and the Indianapolis sailed out of the Golden Gate at 8:30 AM.[107] On August 6, 1945, the bomber Enola Gay dropped "Little Boy" on Hiroshima, essentially ending World War II.

POST-WWII – 1946 - PRESENT

The end of hostilities did not signal and end to construction or military duties at Hunters Point Shipyard. Many projects were underway when the war was starting to draw to a close. Consequently, the momentum of construction continued in 1944 and through 1945 and included most of the larger buildings on the site. Infrastructure was also added during this time and included wharfs, cranes, rail spurs and other facilities. Even after the end of hostilities with Japan, several projects were underway, including further increases in the land area through more leveling of the Hunters Point Hill.

Most immediately after the end of World War II, Hunters Point Shipyard, like the other deep-water shipyards, became one of the primary berthing sites for ships returning from the Pacific campaigns. Photographs from the time show dozens of ships of all sizes moored and tied up several deep at the various wharves, piers, docks and quay walls (see Figure 27.) The immediate task was to perform routine maintenance and ready the ships for a return to service. Those deemed beyond repair were salvaged for parts and disposed of. In spite of all the work that needed to be done, this process was abruptly suspended in the summer of 1946 when Hunters Point Shipyard became the domestic base for handling the aftermath of Operation Crossroads.[108] It required the formation of a special radiation safety office and program to handle radiologically contaminated vessels.[109] Hunters Point Shipyard was chosen because it was already the center for the Navy's radiological science research and it was close to the developing nuclear expertise at both the University of California at Berkeley and Stanford University. These

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[107] NAVSEA, Hunters Point Shipyard: Final Historical Radiological Assessment: History of the use of General Radioactive Materials, 1939-2003. 2004, p. 6-4.
[108] Ibid. p. 6-5.
[109] Ibid.

Figure 27. The Submarine Repair Area, 1946. Photo used with permission from the San Francisco History Center, San Francisco Public Library (United States Navy Photograph.)

strategic advantages, and the results from Operations Crossroads, would change the history of the facility.

OPERATION CROSSROADS[110]

"Operation Crossroads" was the code name for a series of atomic weapons tests conducted at Bikini Atoll in the Marshall Islands in the middle of 1946.[111] It was designed to study the effect of atomic weapons detonation on ships and personnel, mainly for the purposes of developing effective defensive and detection measures. The tests included the detonation of two Nagasaki-sized atomic bombs under various conditions to study their impacts. Operation Crossroads was a major undertaking, involving approximately 42,000 personnel and more than 240 ships. Some ships were used as target vessels and some were used for support. The target vessels were placed as specified distances from the detonation site to determine what physical damage would be caused under various conditions. It was expected that some ships would be completely destroyed, while others would remain operational. The support ships were placed at what was thought to be safe distances for observation of the tests as well as for data collection after the explosions.

Test 1 was called Shot Able and it was dropped by plane and detonated above a specified target ship. Unfortunately it missed its mark and fell a half-mile from the intended target, sparing the brightly painted target ship from complete annihilation. Overall, while the concussion blast caused extensive physical damage to the target ships, the radiological contamination was relatively minor and much less than anticipated.

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[110] The entirety of this and following relevant sections are paraphrased from Hunters Point Shipyard Historical Radiological Assessment, Section 6, unless otherwise noted.

[111] The Marshall Islands are a small Micronesian archipelago just west of the International Date line and just north of the equator in middle of the Pacific Ocean. They were occupied by the United States after World War II and used for extensive nuclear testing. The Republic of the Marshall Islands became self-ruling in 1979.

Test 2 was called Shot Baker. It was detonated 60 meters below the surface of the water, immediately under the target vessel. The results were wholly unexpected. The detonation spawned a massive steam bubble that generated a shockwave of water over 90 feet in height. It rolled over the land, the target ships and the support ships, contaminating everything with radioactive coral, sand, fissure material and unused plutonium. To this initial contamination was added additional damage when the support ships went in to survey the area and processed the radioactive water of Bikini Atoll's lagoon through their filtration systems.

The limited amount of shipyard support, expertise and equipment at Bikini Atoll was almost useless to address the massive decontamination problem. Work was begun to develop standards for the decontamination procedures while the remaining ships were moved to Kwajalein Atoll. The most heavily contaminated ships were sunk at Kwajalein Atoll. The rest underwent preliminary decontamination but the amount of work demanded a full shipyard to deal with the problem. Hunters Point Shipyard was chosen because it was already the center for the Navy's radiological science research and it was close to the developing nuclear expertise at both the University of California at Berkeley and Stanford University.

The prospect of hundreds of radiologically contaminated ships arriving at Hunters Point necessitated a great deal of planning and coordination. Many of the ships were anchored out in the Bay near Hunters Point while methods for testing, monitoring and carrying out decontamination were developed. Eventually several methods were used.

Decontamination by wet sandblasting was carried out where the contaminated surfaces were exposed and readily accessible. The sand was then either collected and packaged in 55-gallon drums, or it was deposited back into the Bay at ebb tide with no further treatment. For harder to reach places, such as pipes and systems components, an acid solution was used to remove any surface coatings. All this work was carried out in the largest Drydocks 3 and 4 as well as the smaller drydocks on the north side of the shipyard (6 in particular) and at other berthing stations if the work did not require strict containment. All in all, 18 target ships and 61 support ships returned to Hunters Point Shipyard for treatment.[112]

NAVAL RADIOLOGICAL DEFENSE LABORATORY (NRDL)[113]

Concurrent with the development of nuclear weapons, the Federal Government recognized the need to develop protection devices to shield soldiers and civilians from the ill effects of prolonged exposure to radioactivity. This included detection devices for those working with and exposed to radioactive materials as well as handling procedures for equipment containing radiological materials. Such devices were common throughout the Navy and included everything from radioluminescent paint to exit signs. Originally formed as one of the support teams for Operation Crossroads, the group charged with the development of protective and monitoring devices was called the Radiological Safety Section, or RSS for short. The RSS was tasked with the “development of radiation detection instrumentation, equipment for protection of personnel onboard ships, and development of methods and equipment for decontamination of ships.”[114] All Bureaus of the Navy were assigned responsibility for support and implementation of the proposed organization. While the original charter was intended to support Operation Crossroads, the mission was soon expanded and the RSS became unofficially known as the RADLAB.

Hunters Point Shipyard was chosen as the base for the RSS because of its strategic location near both Berkeley and Stanford and the nuclear research being conducted at these campuses. Also, at the time, San Francisco was viewed as a “natural staging

[112] NAVSEA, Hunters Point Shipyard: Final Historical Radiological Assessment: History of the use of General Radioactive Materials, 1939-2003. 2004, p. 6-17.
[113] Ibid., pp. 6-22–6-33.

[114] Ibid., p. 6-22.

point for future Pacific Weapons tests."[115] Hunters Point Shipyard was also close to a major metropolitan area and had easy access, something the other testing facilities in the Southwest certainly lacked.

After Operation Crossroads decontamination was completed in 1948, the RADLAB was formalized as the Naval Radiological Defense Laboratory (NRDL) with an expanded mission that included "practical and applied research into the effects of radiation on living organisms and on natural and synthetic materials, in addition to continued decontamination experimentation."[116]

For the first few years, the NRDL operated under the command of the Commander of Hunters Point Shipyard. As the research objectives expanded and NRDL's role grew beyond addressing the needs of other shipyard operations, it was given a separate command in October 1950. The mission continued to broaden from its origins in ship decontamination and at the time NRDL was disestablished in 1969, the mission of NRDL was, "to perform research, development [sic], test, and [evaluate] the effects of nuclear explosions, natural and controlled nuclear processes, nuclear accidents and incidents, and related fields of science and engineering."[117] This came to embody the development of defensive measures for ships, personnel and shore installations. Over the course of the next decade, NRDL personnel were involved in all atomic weapons tests between 1950 and 1958, providing test support, primarily related to radiation safety and monitoring. In the process, NRDL became a pioneer in the development and use of radiation sources for detection and research means. Unlike most other military research facilities from this period, such as Los Alamos National Laboratory and Lawrence Livermore National Laboratory, NRDL was primarily concerned with gaining

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[115] United States Navy, History of N.S. Naval Radiological Defense Laboratory: 1946-1958, p. 2.
[116] NAVSEA, Hunters Point Shipyard: Final Historical Radiological Assessment: History of the use of General Radioactive Materials, 1939-2003. 2004, p. 6-23.
[117] United States Navy, Disestablishment Report for Naval Radiological Defense Laboratory, San Francisco, California, March 1969, p. 1.

knowledge rather than producing hardware and weaponry.[118] Its staff members actively published and largely developed their own research plans to address the physiological impacts of the radiological hardware and devices being developed in other research facilities. NRDL continued to operate at Hunters Point Shipyard until 1969.

In addition to advancing the understanding of the effects of radiological exposure, the NRDL work directly influenced national, state and local public policy. "Many organizations, including the California Department of Public Health, California Highway Patrol, Office of Civil Defense, U.S. Public Health Service and the Atomic Energy Commission used the expertise of the NRDL and its personnel to develop regulations and controls governing the growing use of radioactive materials in the public sector.[119] In war preparedness, NRDL was a leader in the continued study of nuclear fallout, its properties, distribution, effects and remediation. To this end, at least one full-scale bomb shelter was constructed as a test platform for social, psychological, physiological and organizational experiments using volunteers. The most widely publicized event occurred in December 1959 when 100 men spent 14 days in the test bomb shelter. The results were used to fine tune emergency rationing and organizational recommendations throughout the country.[120] (The shelter's location, historical or actual, has not been determined. Its current status is unknown.)

While NRDL continued to expand in the post-World War II period, the rest of the facility maintained its original mission to support U.S. Navy ship-related needs. To this end, Hunters Point Shipyard continued to see improvements in the immediate postwar years.

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[118] United States Navy, History of N.S. Naval Radiological Defense Laboratory: 1946-1958, p. 5.
[119] NAVSEA, Hunters Point Shipyard: Final Historical Radiological Assessment: History of the use of General Radioactive Materials, 1939-2003. 2004, pp. 6-24-25.
[120] United States Navy, History of N.S. Naval Radiological Defense Laboratory: 1959, p. 3.

Updated: July 2009

THE NAVY CLOSES HUNTERS POINT SHIPYARD

By the end of World War II, the Navy was developing Hunters Point as a compact, highly specialized facility that could use the broader range of services of the surrounding naval bases if necessary. It was exactly this highly specialized development that left it open to closure when its areas of expertise were no longer seen as useful, or had been superceded by development on other bases during the Korean and Vietnam war periods.

After the 1951, as the NRDL took over many of the buildings in the southern half of the facility, the maritime portions of Hunters Point Shipyard became primarily used for submarine repair. Work continued to decline in the 1960s and early 1970s as the Navy shifted back to using private shipyards and contractors rather than maintaining its own yards.[121] Some parts of the shipyard were converted to "peacetime" activities and were leased out to individual vendors and businesses. The Shipyard continued to employ between 5000 and 8000 people, mostly from the surrounding communities.[122] While this was a significant decrease from wartime highs, it still represented the largest employer in the southern areas of San Francisco. During this time, there was continual speculation concerning the closure of the facility. After years of study and last minute reprieves, the Navy officially closed the shipyard in June 1974.

In July of that same year, the City of San Francisco received a grant to fund a one-year reuse study for the Shipyard. Efforts were made to contact over 500 potential tenants throughout the United States and Canada, for the purposes of establishing a private ship repair venture at Hunters Point.[123] As a result, by 1976, the Navy entered into a long-term lease with Triple A Machine Shop. Triple A controlled most of the property

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[121] United States Navy, History of N.S. Naval Radiological Defense Laboratory: 1946-1958, pp. 6-5.
[122] Karl F. Kimbrough, Hunters Point Naval Shipyard: A Historical Analysis, August 1978, pp.15-16
[123] Ibid, p. 54.

until 1986 when the Navy reclaimed the property for the purposes of environmental remediation with the eventual goal of removing the property from Federal ownership.

HUNTERS POINT SHIPYARD TODAY

Today, what remains of the Shipyard is used for a multitude of purposes. On the north side of Hunters Point Shipyard Phase II are a series of artists studios housed in former dormitory buildings near the former submarine drydocks. Several large warehouse structures are also present on this side of the sub-area as well as the remains of Drydocks 5, 6, and 7 and what remain of the rail spurs that served the drydocks. At the eastern end of the peninsula is the previously identified National Register eligible Commercial Drydocks District, including the masonry pumphouse for Drydocks 2 and 3, as well as Drydocks 2 and 3. Immediately south of Drydock 2 is Building 231, one of the first buildings to be constructed by the Navy on the site. This potential district was identified in 1988 as part of a cultural resources survey of Bay Area Navy properties commissioned by the Navy.[124]

Immediately south of this potential district is the glass and steel Building 253. Most of the other buildings in this 200-series area are wood or steel framed shop buildings and support structures. South and west of Drydock 4 is the 450-ton crane, the Gun Mole Pier and a series of wood and steel frame shop buildings, warehouses, and assorted other World War II and post-World War II buildings. Some are used by various industrial concerns; others are vacant. The San Francisco Police Department maintains facilities in a new building in this area.

Most of the buildings are in usable condition and are fairly rectilinear in form. Constructed for industrial use, the warehouses and shops continue to be used for

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[124] Bonnie Bamburg, Urban Programmers, Historical Overview of Hunters Point Annex, Treasure Island Naval Base and Descriptions of Properties that Appear to Qualify for Listing in the National Register of *Historic Places*. 1988, as citied in JRP Historical Consulting Services*, Historic Context and Inventory and* Evaluation of Buildings and Structures: Hunters Point Shipyard, September 1997, p. 2.

storage or operation of heavy machinery. The smaller scale dormitory and administrative buildings on the north side of HPS are currently used for office and artist work space purposes. These buildings are primarily wood frame with wood and asbestos shingle cladding and remain in serviceable condition in spite of worn appearances.

One building of particular note, just outside the HPS, near the South gate of the Shipyard is Building 815, former home to RADLAB. This building was designed and constructed specifically to house the main NRDL laboratory facilities. It contained different levels of experimental rooms, animal control facilities, offices, and administrative rooms. Today it is owned by Datasafe Record Storage and Information Management, and is operated as a document storage warehouse.

PROPERTY TYPES

PRE-1941

Building, structure and object types related to the discussion above would include, but are not limited to:

- Early residential buildings including farmhouses and other detached buildings
- Street patterns
- Retaining walls
- Restaurants
- Retail shops
- Commercial buildings
- Early dry docks
- Industrial buildings used to house mechanical equipment
- Early Navy constructed warehouses

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When the Navy purchased the Shipyard in 1939, they gained a fully functioning commercial facility. When they expanded this during World War II, they gained control of a distinct residential neighborhood as well as several commercial structures that provided services for that neighborhood. As such, there are pre-1941 properties within the Project.

The residential area transferred to the City of San Francisco in 2004 and was designated Parcel A in 2005 as part of the current Project. This area has since been cleared, graded and prepared for redevelopment. No pre-1941 residential properties remain within the Project boundaries. However, commercial buildings, including those related to the original dry docks, do remain. They are primarily constructed of brick, although the former restaurant (Building 109) is a wood frame and stucco clad building. Dry docks 2 and 3 and the rest of the Hunters Point Commercial Drydock Historic District are prime examples of the industrial development from this period. Building use types from this period include:

WORLD WAR II (1941-1945)

- Administrative – long rectangular wood frame buildings with wood siding, built from standard plans
- Residential – barracks, houses and related community buildings (churches, cafeterias, latrines, etc.) These could be simple wood frame buildings, concrete high rises, or metal Quonset huts.
- Utility – relatively small, simple, concrete buildings
- Later dry docks – smaller dry docks for submarines and larger for ship repair
- Warehouses – Wood or steel frame with corrugated metal cladding, often rectangular with monitor roofs
- Mechanical Shops – used for welding, equipment storage, etc. Similar in design to warehouses but smaller

- Shipbuilding and repair – shops, warehouses, equipment storage. These buildings would take various forms from standard plans to custom designed buildings. They range from steel frame buildings with wood or metal cladding to glass curtain wall structures that were architect-designed.
- Other/infrastructure: railroad and crane tracks, light standards, circulation patterns, etc.

After the United States entered into World War II, the Navy commenced a tremendous building campaign at Hunters Point Shipyard. The land was reconfigured: hills were leveled and water was replaced by dry land. The scarcity of materials during this period meant that most buildings were constructed of wood, were constructed quickly, and were designed for multiple functions. Most were built from standard Navy plans while local architects individually designed a few buildings. At the start of this study in 2007, most of the World War II era buildings remained in their original locations, however some have been demolished. See volume II of this document for further discussion of extant resources.

POST WORLD WAR II (1945-PRESENT)

- Administration and Support – more compact footprint, mostly concrete, includes offices, vehicle servicing stations, water and sewage treatment plants, etc.
- Ship repair and outfitting – mechanical sheds, warehouses, cranes, Butler buildings.
- Radiological Laboratories and support buildings - Very few buildings were constructed specifically for RADLAB but many existing buildings were utilized by the facility. They could include any of the above building types.

Building during the post-World War II period was somewhat limited though a number of buildings remain from this period. Immediately following the war, construction continued because the Navy was unable to complete their plans during the timeframe of the war. Projects already underway were completed and new ones were slow to begin. One exception to this was a few large concrete buildings dedicated to RADLAB uses – all have been demolished except for Building 815. Other exceptions were continued improvements to the dry docks and construction of at least one large crane (the 450-ton Bridge crane) for ship repair and unloading.

Buildings from these periods within the Shipyard boundaries and within the boundaries of the Project are investigated, presented and evaluated more fully in Volume II of this report. This document, *Bayview Waterfront Plan Historic Resources Survey Report*, also prepared by Circa: Historic Property Development should be referenced for further information regarding specific buildings or architectural styles found within the Project.

CONCLUSIONS

Hunters Point Shipyard is significant as a snapshot of the evolution of ship repair facilities on the West Coast. As originally constructed, it serviced wood-hulled ships of various sizes as well as early steam powered vessels. Subsequent improvements in 1901 and 1918 expanded the capabilities of the facility to address the largest steel-hulled commercial and military vessels of the time. This corresponded to a dramatic expansion in the size and important of the United States Navy, as well as a general increase in the military's presence on the West Coast. Continued Pacific military campaigns (Philippine War, World War I, World War II) only emphasized the importance of West Coast military facilities. In 1939, when the Navy purchased Hunters Point, it became only the third Naval shipyard on the West Coast and the only one south of Puget Sound capable of handling modern naval warcraft. For a period of nearly 50 years, (1901- post-World War II) Hunters Point was the primary Naval ship repair facility in California.

After World War II, Hunters Point gained significance in its own right through its role as home to the Naval Radiological Defense Laboratory (NRDL). This facility was borne out of necessity in the latter war years and grew into a major research facility dedicated to studying the physiological impacts of radiological exposure as well as the detection of and protection from such nuclear hazards. This facility was established at Hunters Point Shipyard because of its many geographic, political and logistical advantages, and operated there from 1944 to 1969. It was one of the only facilities of its kind in the United States in either private or military control, was recognized as a leading research facility on a national scale and played a major role in every U.S. nuclear weapons test during its 25-year history.

As space and building availability increased, so did its role in the advancement of military operations. Hunters Point Shipyard played a major role in the military and civilian use of radioactive materials during the period of most intensive nuclear research. NRDL was associated with all above-ground atomic testing from 1950-1958 as well as the development of practical detection devices and public policies that continue to influence the regulation of radioactive materials in the public sector today. It was a unique and highly respected facility, arising from Hunters Point Shipyard's strategic location, its state-of-the-art facilities, and its successful contributions during World War II. As a result, it continued to impact society well into the post-war years.

Today, a portion of the built environment from all three periods remains: pre-WWII, WWII and post-WWII. Drydocks 2 and 3 as well as their associated pump houses and support facilities, built in the pre-WWII period, have been determined eligible for listing on the National Register in previous studies as part of the Hunters Point Commercial Drydocks Historic District. Outside of this district, only Building 109 remains from the pre-World War II community that once occupied the end of the Point near the drydocks. From the World War II-era, many of the warehouses, shops, residential and other buildings and structures remain, particularly between Dry docks 2 and Drydock 4, and in the southern portion of the Shipyard. From the post-war period, most of the NRDL buildings and facilities have been removed as part of recent environmental remediation efforts. However the main NRDL building, Building 815, remains, although it is just outside the study area. Taken as a whole, the history of the Shipyard is still generally represented in its built environment, although some key portions, critical to the understanding of the shipyard as a whole, have been removed. Light industrial uses, artist studios, police training facilities, community storage, and some ship repair-related uses are currently found at the HPS.

Updated: July 2009

VII. PUBLIC HOUSING

The Alice Griffith public housing (1962) is generally bounded by Carroll Avenue (north), Arelious Walker Drive (east), Gilman Avenue (south) and Hawes Street (west). A guard kiosk secures the property's Fitzgerald Avenue entrance at Cameron Way. The housing stock consists of 33 apartment buildings, constructed from standardized plans using five slightly different building types. The six Type A apartment and eight Type B buildings contain six apartments each, the four Type C buildings and seven Type E buildings have ten apartments per building, and the eight Type D buildings each contain seven apartments.

Alice Griffith public housing represents a cross between the first (pre-1941) and second (late 1960s-1970s) waves in public housing architecture in San Francisco; it was constructed in the same organizational and architectural manner of earlier projects, but was completed with stricter budgetary requirements put forth in a later period. It is indicative of the types of developments that were completed at Hunters Point on former military housing land. However, these developments differ greatly from those in other parts of the City built in the same period. The Bayview-Hunters Point public housing developments were planned to address an immediate shortage of housing that used existing, if temporary, housing units – the military dwellings. Over time, these projects were redeveloped and renamed but occupied the same sites. Their architecture is most similar to older forms of public housing; however, they were expected to function under a different set of expectations that were developing at the time.

To understand the present context for Alice Griffith public housing, it is important to first look at the institutional history of public housing in the United States. The roots of today's public housing were established in the early years of the Great Depression under the auspices of the New Deal programs. From this starting point, early public housing evolved into a rather codified system. This system was stripped down to its basic parts during World War II to provide for tens of thousands of temporary housing units for defense workers. After 1945, much of this temporary housing reverted to public housing, but the social and political climate had changed. Alice Griffith public housing represents a combination of the influences of these eras.

THE FIRST GENERATION OF PUBLIC HOUSING

THE BEGINNING – PUBLIC WORKS ADMINISTRATION (PWA)

The Great Depression put an extraordinary strain on the country's urban housing stock. With little money to invest in repairing or building new housing to accommodate the influx of people moving from rural areas to urban centers for work, the existing residential conditions went from marginal to deplorable in many cases. To combat rising unemployment and improve the economy though the construction of public highways and buildings, in June 1933, the Federal government passed the National Industrial Recovery Act (NIRA). Under this act, several key New Deal agencies were established to simultaneously provide jobs and improve the country's infrastructure. Title II of the act appropriated $3.3 billion for the creation of the Public Works Administration (PWA).[125] Under this agency, a special housing division was created to construct residential buildings that showcased the benefits of modern living. This agency's prime directive was to provide jobs while building housing for low-income families. It was not as concerned about economies of scale or economic design and construction.

In its brief history, the PWA completed seven low-income housing projects, all on the east coast. They were heavily influenced by European, specifically German, cooperative design and were fairly modern in their use of materials and arrangement. The designers were given wide latitude to develop creative solutions for layout, program and choice of materials. The results were well-designed, high-quality homes that, unfortunately, were

[125] Paul R Lusginan, "Public Housing in the United States, 1933-1949," *Cultural Resources Management* Bulletin, No. 1, 2002, p. 36.

out of the price range of most low-income families. In fact, only one of these original seven projects met the low-income tenant objective.[126]

1937 HOUSING ACT

In 1937, Congress passed the first United States Housing Act. This act established the United States Housing Authority (USHA) as a part of the Department of the Interior. It was this act that created the decentralized public housing governance structure that is still in existence today. It put the Federal government in the funding role while giving governance of the resulting housing to local housing authorities. "Under this decentralized program, local public housing authorities were given primary responsibility for initiating, designing, building, and operating their own housing projects, while the newly created United States Housing Authority provided program direction, financial support, and technical and design assistance."[127] This was done by issuing low-interest, 60-year loans for up to 90 percent of the development costs for public housing and slum clearance.[128] San Francisco was one of the first cities to apply for the Federal program, establishing the San Francisco Housing Authority (SFHA) in 1938.[129] This initial Federal program was highly influential on the modern public housing governance system even though it was short-lived. It resulted in over 370 projects throughout the country over the course of its three-year term.

The emphasis on design and modern living in the PWA projects created a strong backlash from social critics who saw the program as wasteful and the extras as luxuries that should not be included in public housing. Powerful lobbyists for the real estate industry also posed strong opposition to the act because they saw it as a threat to real estate and rental values near housing projects. Their fear was the low costs and low

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126 Ibid, p. 37.
127 Ibid.
128 Fred L. McGhee, National Register Nomination: Santa Rita Courts, Austin, Travis County, Texas. 1990, p. 7.
129 Carey & Co., Inc., Historic Resource Evaluation for Hunters View Housing Development, San *Francisco, California*, Prepared July 26, 2001 and updated September 10, 2007, p. 9.

rents of the projects would force the entire local market down.[130] As a result of the 1935 District Court ruling in United States v. Certain Lands in the City of Louisville, influential lobby groups, and other cost-conscientious interest groups, were able to affect strict expenditure limits on all USHA-funded construction to make sure it could not compete with the open rental market.[131] The ruling limited the power of the Government to exercise eminent domain to acquire land, which in turn, limited the funds available for the design and construction of the projects. As a result, strict limits were placed on costs. Projects were funded under the terms of $1000 per room or $4000 per dwelling unit, including all construction and land acquisition costs. These strict guidelines virtually mandated that systematic, "cookie cutter" design be used and that cost minimizing measures become paramount to maximizing the number of dwelling units that could be built. Individual designs for single-family dwellings gave way to more rectilinear, apartment-style residences all constructed in a similar form with simple details. However, in spite of this, the early public housing projects displayed a surprising quality of material, craftsmanship, and design.

Even in 1938, land values in San Francisco were discouragingly high. Meeting the required $1000/$4000 limits established by the USHA proved to be impossible even within the depressed real estate market. Therefore, from the beginning, SFHA had to rely on a combination of Federal and City money to acquire and develop public housing.[132] As a result, the first housing projects took longer to reach completion than in many early adopting cities on the east coast. However, in spite of the delay, in 1940 Holly Courts opened in the Bernal Heights neighborhood of San Francisco, becoming the first public housing project completed west of the Rocky Mountains under this system.[133]

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[130] Ibid, p. 8.
[131] Alexander Garvin, *The American City*, 2002, p. 207.
[132] Ibid, p. 4.
[133] "Beginning of the Housing Projects," *Hunters Point Beacon*, October 22, 1943.

Generally, site planning was considered an economical way to make the developments attractive and distinctive. At the time, two major types of planning predominated public housing design: the super-block and the court plan. The super-block was a common planning concept promoted in the European Modernist literature. In this plan, large parcels of land were bordered by streets that became the primary vehicular circulation paths to and around the area. Small, very limited vehicular access was sometimes provided to the interior of the block, but most often, the interior was only accessible by foot or bicycle. In this way, the bulk of the experience within the super-block was free from the noise, pollution and danger of traffic, creating a peaceful residential space. Most of the building mass was concentrated as well to leave as much of the super-block as possible open to public parks and communal spaces and to provide for uninterrupted vistas from residential windows and balconies.

The court plan traded the openness of the super-block for more intimate arrangements. In this plan, the buildings were placed along the periphery of the property, or arranged throughout the property, to create small courtyards between the building sections. These spaces were often protected from vehicular access, and were also thought to provide for a peaceful, more personal residential space. The courts were shared by the residents in the surrounding units, rather than by the entire project and allowed for easier supervision of children in the public spaces.

To guide the local housing authorities on site planning, design, management and maintenance issues, the USHA published numerous brochures and pamphlets on a variety of subjects from design to tool maintenance. Some public housing projects from this early era incorporated the suggested styles and layouts exactly and others had a more liberal interpretation. The whole program was viewed as a positive, socially responsible, progressive step to address poor living conditions throughout the country. Many prominent social critics, architects, planners and designers of the time either worked on or wrote about the public housing being built. In general, the expectation was for the units to serve as transitional housing for whole family units to move from poverty to the middle-class. The selection criteria were created to promote this ideal, and included interviews of the prospective tenants in their current living quarters as well as minimum income guidelines. People had to be gainfully employed and meet a certain level of self-sufficiency to qualify.[134]

The USHA was initially authorized for a period of three years. In 1939, when the process to extend the bill was starting to gain steam, Congress felt that the economy was improving sufficiently enough that it no longer needed the extra building stimulus provided by the USHA programs. It was not renewed. Instead, the government began to shift its focus from providing public housing to building defense-related housing in preparation for entering World War II.

WORLD WAR II AND WARTIME HOUSING

As part of the country's shift to a wartime condition, all housing construction was stopped to conserve construction materials for the war effort. This included all public housing projects then underway. Special provisions were made to those housing projects in strategic locations near defense bases and industrial zones. There, the housing projects were allowed to finish with the provision that all unoccupied units be made available for war housing. In this way, many public housing projects throughout the United States became part of the war effort. In most cases, these housing units were the best constructed and most comfortable of all the subsequent war housing options because they were constructed to last at least as long as the 60-year loan period. In San Francisco, Potrero Terrace and Sunnydale initially were used for wartime purposes when they opened in 1941, with Westside Courts and Valencia Gardens following in 1943.[135]

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[134] Amy Howard, Northern Shelter: Community, Identity and Spatial Politics in San Francisco Public *Housing, 1938-2000*, Dissertation, College of William and Mary, 2005, p. 12.
[135] "Beginning of the Housing Projects," Hunters Point Beacon, October 22, 1943.

More war housing was desperately needed after the United States officially entered World War II in 1941, construction for war housing went into overdrive. By early 1942, to cut costs and minimize materials, the Armed Services built only "temporary" housing. It was estimated that utilizing such methodologies would cost only 20% of permanent housing construction.[136] However, even this level of construction effort became too time-consuming and costly in the most stressed areas, especially at Hunters Point. Demountable housing was the next option. In this method, all the building parts were constructed offsite and shipped as a unit. Once on site, they were unpacked and assembled in a matter of hours. Most utilized single-board construction and were one-story in height. This was most typically used for the single-workers housing. In mid-1944, when demountable housing could no longer be accommodated and "a limited duration need was definitely known, a minimum portable dwelling unit was utilized, which approximated an improved trailer-type accommodation."[137] Those workers and soldiers in the metal camping trailers shared the communal dining and social facilities in the single-workers' dormitories, although some small families were also assigned to the portable trailers.

The mandates for extreme speed and economy in war housing construction were handed down by provisions in the 1940 Lanham Act. This act appropriated $150 million to the Federal Works Agency to provide defense-related housing in the most congested and stressed cities. The provisions also placed strict limits on construction costs, with average costs per dwelling unit to less than $3750 per family unit, with no single unit exceeding $4500.[138] To emphasize the temporary nature of the housing authorized under the Lanham Act, it was amended in July 1943 to require that all housing built with its funding be demolished within two years after the war was over. This amendment

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[136] Ibid.

[137] Building the Navy's Bases in World War II: History of the Bureau of Yards and Docks and the Civil Engineer Corp, 1940-1946, Volume 1. 1947, p. 376.

[138] Robinson & Associates and Jeffery Shrimpton, Draft: Public Housing in the United States, 1933-1949: *A Historic Context*, August 14, 1997, p. 80.

Specifically forbade the units to be used as subsidized housing for low-income families after the end of World War II.[139] Between 1940 and 1944, the Lanham act was responsible for the construction of over 625,000 housing units.[140] Of these, over 580,000 units were considered temporary construction. The idea was that these units would be of such low construction quality that they would have to be removed from the housing market after the war, thus posing no long term competition to the existing housing markets in the effected cities.[141]

WAR HOUSING IN THE BAYVIEW-HUNTERS POINT AREA

Throughout World War II, Hunters Point Shipyard served as an annex to the naval facilities at Mare Island. When the shipyard was initially occupied by the Navy in 1941, housing for the shipyard workers was not an issue as most of them were stationed at Mare Island, lived in the area or commuted from other parts of San Francisco. Most were local residents or at least locally stationed. As Hunters Point Shipyard increased production it soon became a vital Navy property that was essential to the Pacific theater and it needed many more workers.

To house the workers, San Francisco's public housing projects were converted to defense-worker housing. Special permission was granted to the SFHA to finish construction on Valencia Gardens and Westside Court to provide housing for the rapidly increasing wartime population near Hunters Point. This was a temporary solution as these units were full almost immediately.

The first of the war housing construction projects to open was the Middle Point War Housing complex, along the Bay between Evans Avenue and Innes Avenue, in early 1943. In the next six months, five more war housing complexes opened on the north

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[139] Ibid, p. 82.
[140] Paul R Lusginan, "Public Housing in the United States, 1933-1949," *Cultural Resources Management* Bulletin, No. 1, 2002, p. 37.
[141] Robinson & Associates and Jeffery Shrimpton, Draft: Public Housing in the United States, 1933-1949: *A Historic Context*, August 14, 1997, p. 79.

and south slopes of Hunters Point Hill, at the eastern end of the point near the shipyard and in the flat lands near the Bay further south, including the Double Rock War Dwellings, the precursor to Alice Griffith public housing (see Figure 28.)

The family dwellings were all constructed according to very similar plans. Generally, they consisted of groups of two-story rectangular buildings with eight apartments to a building. There was a range from one to three bedrooms and they came either furnished or unfurnished. The families rented the apartments by the month for between $27.50 for a two-room, unfurnished unit to $42 for a furnished five-room unit.[142] Most of the complexes had at least one elementary school, childcare facilities and a community center that doubled as a health center for routine checkups and minor illnesses.

Ridge Point was the largest of the developments and occupied the ridge and both slopes of Hunters Point Hill. It was originally designed to have 250 buildings, each with eight apartments. The expected occupancy was 2000 families. To provide for these families in an area of the city notorious for its lack of services, the Navy constructed three elementary schools, three childcare centers and a community center, all dedicated to this single complex.

Other family-specific complexes included the Double Rock and Candlestick Cove War Dwellings. The Double Rock complex was designed for 69 buildings with a total capacity of 552 families. This project was located just south of Yosemite Slough between Donner Avenue and Gilman Avenue along the Bay. Candlestick Cove was larger, holding 118 buildings for 944 families. This site was just south of Candlestick Point. It was a desired spot for families with children because the project boasted its own beach. However, it also suffered from repeated minor landslides. That portion of Candlestick Point was eventually leveled by the Navy to prevent any more damage to the occupied units.

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[142] *Hunters Point Beacon,* June 1, 1944. All prices are in 1944 dollars.

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Figure 28. Hunters Point housing dedication ceremony, November 27, 1943. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Dormitory facilities were constructed for the single men and women who came to work at the shipyard. These were segregated by sex, as was the convention of the day. Both Harbor Slope near India Basin and South Gate along Oakdale Avenue, originally had seven long rectangular buildings. Each building was constructed of two wings connected by a central unit containing a cafeteria and common spaces.

Even the rapid six-month construction period of these housing complexes for over 2500 families failed to meet demand. Before they were finished in early 1944, money was appropriated for annexes to Double Rock (256 families), Middle Point (224 families) and South Gate (1000 more beds). However, this was not enough. However, by July 1944, the Navy was authorized to purchase camping trailers to place on 33 newly reclaimed acres of land in the southwest corner of Hunters Point (see Figure 29.) In the 12-month period between September 1943 and September 1944, the civilian population housed at Hunters Point Shipyard rose from 1550 to 12,245. In October 1944, 3000 more family units were planned and the annexes to the various housing complexes were reaching

Figure 29. This image shows the trailers that were used at Hunters Point as housing for shipyard workers. Similar accommodations were used at other shipyards in the Bay area. Compared with the private shipyards, the facilities at Hunters Point were relatively clean and sanitary with adequate bathing and restroom facilities in the immediate vicinity. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

their limits (see Figure 30.) In the midst of all the construction, living conditions were mixed. People had clean, if basic, accommodations but little in the way of site improvements (see Figure 31).

AFRICAN-AMERICANS AT HUNTERS POINT – THE BEGINNING OF A CULTURAL SHIFT

In 1900, Italian families were the predominant ethnic and social group in the Hunters Point vicinity. This continued through the onset of World War II when the demographics of the area were dramatically altered. As a result of the tremendous recruiting efforts in the rural south for war industries employment, the Bayview-Hunters Point area saw a major increase in its African-American population. It is important to understand how dramatic a change this was for the area to provide some context for the current and historical social landscape, especially as it relates to the public housing communities.

Updated: July 2009

Figure 30. Aerial view of Hunters Point, August 14, 1945. Most of the shipyard housing complexes can be seen in this image. Hunters Point Hill is at the bottom of the image and Candlestick Point is at the top. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Updated: July 2009

Figure 31. Even the military families living on the shipyard had to become accustomed to living in a constant construction zone, February 18, 1948. Here the Quonset huts were used for military family housing. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

PRE-1941

While there was a small African-American community in San Francisco before 1906, it lived in relative obscurity. Most were either freed slaves or children of freed slaves who came from the southern states. A smaller population was from northern states and born into freedom. In total, their numbers were small enough that the white majority did not see them as a viable threat, choosing instead to focus their racial aggressions on other ethnic groups, primarily the Chinese. While instances of discrimination were common before 1941, most African-Americans in San Francisco experienced more general freedoms than in other major metropolitan areas.[143]

At the turn of the 20th Century, 1,654 African-Americans lived in San Francisco.[144] This was actually a *decrease* from the prior decade. The job opportunities at this time were not a sufficient enough draw to entice people to leave their homes and strong social networks to make the long and expensive journey to the West Coast. Relative to Midwestern cities, San Francisco was geographically isolated, making travel more difficult. There was also more competition in San Francisco from other minority groups for unskilled and semi-skilled jobs.[145] When looking to move to urban environments for jobs or improved opportunities, Midwestern and Northeastern cities were closer, more accessible and better known to most southern African-Americans. Those who did make the journey often settled in Oakland or Los Angeles where the economic climate was more hospitable for people of color and there were more established African-American communities.

However, from 1910 to 1930, the African-American population of San Francisco grew by 131 percent with an additional change of 26 percent in the decade before World War

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[143] Albert Broussard, Black San Francisco: The Struggle for Racial Equality in the West, 1900-1954, 1993, pp. 15, 19-20.
[144] Ibid. p. 21. The total population of San Francisco in 1900 was around 340,000.
[145] Ibid.

II.[146] While there were no specific “Black” neighborhoods, as the population increased, people started to concentrate in downtown, south of Market Street, North Beach and the Western Addition near Fillmore Street. By 1930, Fillmore Street had become “the hub of black life.”[147]

While Hunters Point was considered an undeveloped industrial backwater, it was a relatively open and welcoming community to southern African-Americans who came to work as porters for the Southern Pacific Railroad. At a time when many were openly faced with restrictions on where they could work and live, this predominantly Italian neighborhood left them in peace.

During the Great Depression of the 1930s, the African-American communities were hit harder than most other groups. This was because of the relatively tenuous employment situation in which many men found themselves. They were not allowed to join unions and were actively barred from many occupations and from all positions of authority. Coupled with the small numbers of Blacks in the area, this left them with no leverage to fight for change in a meaningful way. Consequently, when the New Deal came to San Francisco, African-Americans were disproportionately over-represented in most of the relief programs.[148]

WORLD WAR II

World War II created a sudden demand for all kinds of skilled and unskilled laborers. In theory, the demand was so great that traditional ethnic and racial segregation hiring and union membership policies were set aside. In reality, more creative ways to circumvent anti-discrimination mandates became prevalent. (See below for more information on the various Executive Orders prohibiting racial discrimination in wartime hiring.) In his study

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[146] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR, Appendix E*, certified February 8, 2000, File No.1994.061E, p. E5.
[147] Albert Broussard, Black San Francisco: The Struggle for Racial Equality in the West, 1900-1954, 1993, pp. 30.
[148] Ibid, p. 121.

of California's wartime labor, Davis McEntire, a professor at the University of California School of Social Work, "confirmed that Black workers were indeed 'slow to gain a foothold in the war industries, but as the manpower shortages intensified, the area of acceptance [was] steadily enlarged.'"[149]

Legally, the courts system put an end to labor union segregation policies in 1944. Joseph James, a Black shipyard worker and president of the San Francisco NAACP branch, spearheaded charges against the Boilermakers Union to challenge the constitutionality of their auxiliary unions.[150] In 1944, the Supreme Court of California upheld the ruling of the Marin Superior Court in the case of *James vs. Marinship*. That ruling stated that Blacks "must be admitted to membership under the same terms and conditions applicable to non-Negroes unless the union and the employer refrain from enforcing the closed shop agreement against them."[151]

In the middle of union battles on the waterfront and at the shipyards, more workers steadily poured into the area as a result of active recruitment by the Federal Government and by private industry occurred throughout the country. The most prolific of these recruitment entities was the War Manpower Commission.

From its establishment in 1942 through 1945, the War Manpower Commission was directly responsible for shifting 1.8 million American workers and their families to the West Coast. Between 1940 and July 1944, California (primarily the San Francisco and Los Angeles regions) saw an overall population gain of over 1.8 million people, by far

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[149] Ibid, p. 144.

[150] Under the auxiliary system, Unions set up special chapters (auxiliaries) that were open to all minorities. The auxiliary members paid union dues and were sometimes hired for union jobs, but they received none of the collective bargaining or other benefits afforded to full Union members. In essence it was a second-class, separate but not-really equal arrangement that allowed the parent Unions to claim non-discrimination while practicing selective hiring practices.

[151] James vs Marinship Corp., 1944, as presented in full at http://www.claralaw.cpda.org/om_isapi.dll?hitsperheading=on&infobase=cases2.nfo&record=%7B2B4E4%7D&softpage=Document_Document, 2008

the largest increase in the country during the same period.[152] San Francisco saw its African-American population rise from approximately 5000 people in 1940 to over 43,000 by 1950.[153] Many of these new arrivals settled in Hunters Point, in defense-worker housing near the shipyard jobs.[154]

By 1943, nearly 16,000 African-American workers came to the Bay Area shipyards. In San Francisco, the number of Black families rose from 2,000 to over 12,000 in the same period. Much of this population growth occurred at the Hunters Point Shipyard where the total labor force grew from roughly 8,000 to over 18,000 by 1945.[155] To put this into perspective, this five-year population increase was "larger than the combined totals of every decennial census of San Francisco's black population in the previous nine decades."[156] By 1942, the Black population in the area began to rival the Italian population, at least in terms of raw numbers.

POST-WAR PERIOD

At the war's end in 1945, the shift was complete as African-Americans became the largest demographic group in Bayview-Hunters Point, a fact that remains today. Many current residents trace their families to this mid-century migration.

THE NAVY AND HOUSING SEGREGATION

For many of the white officers and shipyard workers, Hunters Point was the closest they had ever come to working and living with African-Americans. Strict racial segregation

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[152] War Manpower Commission, Region XII San Francisco. *Pacific Coast Manpower Programs geared to* Pacific War, Jobs for Veterans and V-Day Employment Plans. Press Release, c.1944.
[153] Albert Broussard, Black San Francisco: The Struggle for Racial Equality in the West, 1900-1954, 1993, p. 133.
[154] The United States Fair Employment Practices Committee (FEPC) "stated unequivocally in its *Final Report* that by September 1945, 'more than twenty-six percent of the Negro working force were engaged in shipbuilding or ship repair'" in the San Francisco Bay Area. Ibid. p. 145.
[155] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR, Appendix E*, certified February 8, 2000, File No.1994.061E, p. E6.
[156] Albert Broussard, Black San Francisco: The Struggle for Racial Equality in the West, 1900-1954, 1993, p. 135.

housing policies were still the norm, even though small advances were being made in the workforce. This was true throughout the Bayview-Hunters Point wartime housing projects. This initially resulted in high tensions on all sides because of the rapid influx of people and the many unknown circumstances that arose as the Navy tried to deal with thousands of new workers and their families arriving every month. For security, a community police force was created. It was separate from the San Francisco Police Department but was only marginally affiliated with the Navy. At first it was composed of only white men, which was a point of contention for many of the Black residents and workers.

To combat these potential problems, the Navy and the SFHA added positions for African-American housing officers. Additionally, the Navy required all of its officers to undergo special training on race relations to raise awareness of the concerns of the Black community. These small efforts paid off and the Hunters Point housing became a model of “progressive” racially integrated (relatively) wartime housing.[157]

POST-WWII – A NEW ERA IN PUBLIC HOUSING

The restrictions of the Lanham Act enabled it to provide for many more units of housing than would have been possible under previous legislation. However, the nature of these housing units prevented them from doing more than addressing short-term housing needs. After the war, there were still a large number of people who lived in sub-standard housing but had no alternatives because the money slated for public housing construction had been diverted to temporary defense worker accommodations. Critics of the Lanham Act were quick to point out that temporary housing units had an uncanny ability to become de facto permanent housing for those who desperately needed shelter of any kind. They predicted that the temporary wartime housing would create the exact housing conditions that they were fighting – substandard, dangerous, urban slums.

[157] Albert Broussard, Black San Francisco: The Struggle for Racial Equality in the West, 1900-1954, 1993, pp. 174-176.

Unfortunately, their words came to fruition within just a few years, spawning a new era of public debate surrounding the public housing issue.

In 1949, Congress passed the Housing Act. This Act renewed federal subsidies to local housing authorities and once again closely linked public housing construction to urban development and slum clearance. In many cases, it was used to relocate families displaced by highway and urban renewal projects. Because many of the anticipated social benefits of public housing (moving families from poverty to the middle class, "improving" character for the children, etc.) failed to materialize, critic began to attack the public housing programs.

At the same time the USHA changed its federal polices regarding public housing and "SFHA began to shift away from its aim of creating public housing communities…By the 1960s, the SFHA, like the Federal government, has abandoned all facets of its initial plan for public housing to serve as a stepping-stone to middle-class 'respectability'."[158] The architecture began to reflect these changing views and utilized construction materials and methods that most economical. The result was projects with higher densities even in areas where land values did not necessarily require such developments. In many urban areas, this gave rise to a new construction type – the high-rise concrete developments of 1950s and 1960s.[159]

As this was taking place in the political and academic realm, there still existed an immediate need for housing, at all income levels, in the very early post-war years. Private development was building scores of housing developments for these families under the auspices of the National Housing Authority's financing programs and the G.I. Bill's loan provisions. However, much of this housing was not ready in time for the floods of veterans returning home. This shortage had been predicted well in advance,

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[158] Amy Howard, Northern Shelter: Community, Identity and Spatial Politics in San Francisco Public *Housing, 1938-2000*, Dissertation, College of William and Mary, 2005, p. 12.
[159] Ibid, p. xiii.

but the materials and labor were not available to adequately address the problem. As a short-term solution, the government authorized the use of defense housing to be used by veterans awaiting other accommodations. This was considered a wartime use and the majority of these units remained under the control of the Federal government. This housing crisis was so great that even those units constructed under the Lanham Act as temporary housing was put into service. These were used not only for housing veterans, but also for sheltering other people displaced by wartime activities.

TRANSITION FROM WAR HOUSING TO PUBLIC HOUSING

By August 1945, over 10,000 units of temporary wartime housing had been constructed to serve the Hunters Point Shipyard. Special restrictions on building materials continued after the war until the material shortages could be overcome. Veterans and low-income housing remained some of the only viable construction options for private developers. This, combined with the Veterans Administration (VA) low-interest loans provided as part of the original 1944 Servicemembers' Readjustment Act (G.I. Bill) and the Federal Housing Administration (FHA) incentives, brought home ownership into the realm of possibility for thousands of people. By the time this first program ended in July 1956, over 2.4 million veterans had taken advantage of the home loan program.[160] As with the era of homestead associations of the 19th Century, Bayview-Hunters Point again became a place of speculative real estate, this time aimed at the working-class shipyard workers and returning veterans.

Rows of simple two-story, five-room Moderne houses appeared throughout the district (see Figure 32). Developers and real estate agents advertised in the community newspapers within the wartime housing complexes, for open houses, easy financing terms, and modern conveniences. This helped to shift some of the wartime workers into other sections of the neighborhood, while others moved elsewhere in the City or

[160] United States Department of Veterans Affairs Website, *History of the G.I. Bill*, http://www.gibill.va.gov/, 2008.

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Figure 32. Arial photo of the Bayview neighborhood showing the rows of single-family homes that became the standard housing type in the area in the post-WWII period. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

returned home. This initial post-war phase happened fairly quickly, with families dispersing to new homes or to other regions. During this transition period, the Ridge Point war housing complex was used for Japanese-Americans returning from the internment camps. The Japanese Relocation Authority used the facility as a staging ground for those local Japanese who chose to return to the San Francisco peninsula (see Figure 33.)[161]

As the post-war period progressed, many of the temporary housing units were already showing signs of their impermanence. In spite of these conditions, in areas like San Francisco, housing was in such short supply that the Housing Act of 1950 provided for the transfer ownership of defense worker housing to local housing authorities rather than require their immediate demolition (as was originally required in the Lanham Act provisions.)[162] These units continued to operate as temporary and low-income housing well into the 1950s, being replaced only as funding became available.

The defense worker housing was officially transferred from the Federal government to the SFHA in 1954.[163] In this same year, SFHA received its first challenge over the quality of the housing projects in the Bayview-Hunters Point area.[164] In light of citizen protests and the undeniably poor conditions in Hunters Point, the SFHA began work with the Mayor's Citizens' Committee to address the process for disposing of the temporary housing within the City.[165] This process was slow and only partially addressed the rapidly deteriorating conditions in much of the Hunters Point housing units. By 1960, four of the original "temporary" housing complexes were still being used,

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[161] War Relocation Authority Photographs of Japanese-American Evacuation and Resettlement, The Bancroft Library, University of California, Berkeley.
[162] Ibid, p. 88.
[163] Planning and construction for the deposition of the temporary housing had begun prior to 1954 even though official ownership of the war housing had not yet been transferred.
[164] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR, Appendix E*, certified February 8, 2000, File No.1994.061E, p. E17.
[165] San Francisco Housing Authority, Road to the Golden Age: A Report on the First Twenty Years of Operations, 1940-1960, c.1964, p. 9.

Figure 33. "Temporary housing units at Hunters Point in San Francisco, where returning evacuees may remain until they have found permanent homes." Photograph from the "War Relocation Authority Photographs of Japanese-American Evacuation and Resettlement collection, used with permission from the Bancroft Library, University of California, Berkeley.

including the Double Rock War Dwellings.[166] A state law further extended the legal use of the Lanham Act buildings, allowing for demolition by 1970.[167] This was over two decades beyond the buildings' intended lifespan.

Indeed, a 1964 study of low-rent housing in San Francisco confirmed that all of the remaining war housing was substandard. Part of the problem was that operational funds for public housing in San Francisco were generated almost solely by rent receipts. Since the minimum income requirement had been abandoned as part of President Johnson's Great Society reforms, the profile of the public housing tenants had changed. Where the early projects were designed for traditional two-parent family units where the father was employed, these newer units were being increasingly occupied by single-mothers on some form of public assistance.[168]

The people who were in the greatest need were living in the worst conditions with little chance of improving their living situation without some increase in their rents.[169] In total numbers, there were over 2,600 people living in relinquished war housing in 1964; 36 percent were found to be living in "overcrowded conditions" and 90 percent of this total population was African-American.[170] This represented over half of the substandard dwelling units in the City at the time.

SFHA AND HOUSING SEGREGATION

African-Americans comprised much of the former war housing tenancy for several factors. The first was an increase in segregation policies within the general San

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[166] Ibid

[167] San Francisco Regional Office, Public Housing Administration, *A Study of the Current Public Low-Rent* Housing Market in San Francisco, July 1964, p. 1.

[168] Amy Howard, Northern Shelter: Community, Identity and Spatial Politics in San Francisco Public *Housing, 1938-2000*, Dissertation, College of William and Mary, 2005, p. 12-footnote 23.

[169] It should be noted that 70% of the eligible families living in the war housing (already determined to be sub-standard) would experience a rent increase of 50% or more if they were moved into new low-income public housing. Ibid, p. 7.

[170] Ibid. p. 4.

Francisco rental market. The second was the result of restrictive placement policies by SFHA. This policy followed established "neighborhood patterns," meaning they allowed settlement within the housing projects only if the applicant reflected the predominate ethnicity of the neighborhood, or if they were white. This resulted in a large number of African-Americans who were unable to find housing on the open market and were excluded from many neighborhoods with public housing. They became the largest demographic group in need of decent living quarters, but only one permanent housing project was open to them.[171] The "neighborhood pattern" policy affected not only low-income African-American families but gainfully employed, middle-income families as well. While some of the housing was relatively clean and modern, most was already being categorized as old and substandard. In spite of this, compared to the conditions found in the Fillmore District, the temporary wartime housing at Hunters Point was a significant improvement.[172]

The SFHA "neighborhood patterns" policy was the City's way to segregate housing in practice while condemning the practice in theory. It was not universally supported though. Longtime SFHA board member Alice Griffith resigned her post over the matter and became a voice opposing the policy in public debate.[173] It was in the early 1950s that the policy was legally challenged in the case *Banks vs. the San Francisco Housing Authority*. In this case, Mrs. Banks, an African-American woman, sued the SFHA when she and her family were denied housing at a new project in North Beach, a predominantly white neighborhood. The case went through a number of appeals. Eventually the District Court of Appeals upheld the State Superior Court's ruling in Mrs. Banks' favor in 1953. When the State Supreme Court refused to hear the case, the

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[171] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR, Appendix E*, certified February 8, 2000, File No.1994.061E, p. E15 and Albert Broussard, *Black San* Francisco: The Struggle for Racial Equality in the West, 1900-1954, 1993, p. 222. This "black" housing project was located in the Western Addition.

[172] Albert Broussard, Black San Francisco: The Struggle for Racial Equality in the West, 1900-1954, 1993, p. 174.

[173] Ibid, p. 177.

District Court's ruling became binding, essentially ending the unofficial segregation policies of the San Francisco Housing Authority.[174] It did not, however, do much to improve the living conditions in the Hunters Point wartime buildings.

The SFHA recognized that there was an extreme shortage of quality housing in the City. Their first priority after the war was to complete the remaining six public housing projects designed before the war. This phase of construction included Ping Yuen in Chinatown, North Beach Place in North Beach, and Bernal Dwellings in the Mission. These complexes were all designed prior to World War II and were constructed of reinforced concrete and tended to be higher density arrangements because of the limited land availability in their respective neighborhoods.

The second phase of construction dealt with the problem of the temporary war dwellings. Publicly, SFHA considered "the replacement of war housing in the Hunters Point area with permanent post-war housing [to be] a definite part of the planning program."[175] In the Bayview-Hunters Point area, there was greater land availability, therefore the housing pattern tended to be of lower density. Increases in construction costs in the post-war period brought about a change in SFHA policy, to use wood frame with stucco construction, rather that reinforced concrete.[176] The first units to be replaced were part of the Navy Point War Dormitories at Kirkwood Avenue and Earl Street, in 1953. This complex was built under the new construction policy and was called simply "Hunters Point." It consisted of 317 apartments in a series of two- and three-story apartment buildings. This design became the standard for the area. In 1956, Hunters View and Harbor Slope opened up with 576 units, replacing the Middle Point and Harbor Slope War Dwellings along Innes Avenue. These units were largely constructed on existing foundations remaining from the demolition of the temporary war buildings.

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[174] Ibid, p. 225.

[175] San Francisco Housing Authority, Road to the Golden Age: A Report on the First Twenty Years of Operations, 1940-1960, c.1964, p. 16.

[176] Carey & Co., Inc., Hunters View Housing Development: Historic Resource Evaluation, July 26, 2001 and updated September 10, 2007, p. 11.

The Alice Griffith Garden Homes replaced the Double Rock War Dwellings in 1962.[177] The South Basin war dwellings were razed and replaced with various light industrial buildings. Candlestick Cove was removed during the construction of Candlestick Park.

1966 – A PIVOTAL YEAR

By 1966, unemployment was reaching new levels within the Hunters Point community. The shipyard continued to lay off workers and few new local employment prospects moved into the area. At the same time, the living conditions in the various Hunters Point public housing projects continued to deteriorate as the last of the temporary wartime housing was still being occupied as low-income housing. Tensions were high when the San Francisco Housing Authority chose to evict Ollie Wallace and his young family. Growing social awareness and community empowerment throughout the 1960s in the African-America community brought a renewed sense of action to improve the deteriorating housing and economic situation around them. The Wallace family's predicament served as a rallying point for the Hunters Point projects community. Residents staged protests and mass sit-ins against the San Francisco Housing Authority Board of Directors. The unified efforts surprised not only City officials, but some in the larger Hunters Point community as well. In an area that had struggled to find a common identity or purpose, the seemingly unjust treatment of one young family served to highlight the general frustration of many families in the district.

The momentum continued to grow when a larger demonstration was organized to force the SFHA to review a much longer list of complaints by the residents of the Hunters Point housing. Media was alerted and for the first time, the plight of the residents in the public housing projects in Hunters Point was brought into the public view.

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[177] Alice Griffith Garden Homes was the original name of the public housing development. Today it is commonly referred to as Alice Griffith public housing, the term used in most of this document.

City-wide, several other important civil-rights related events also served to bolster the Black community's sense of empowerment and determination to challenge the systems that were failing them. Earlier in 1966, the City enacted an ordinance prohibiting discrimination in firms contracting with the City. The NAACP staged a nationwide protest called Black Monday, to support Black employment in the construction unions.[178] Both directly impacted the predominately African-American Hunters Point and Fillmore neighborhoods, giving their residents support from other areas of the City and the country.

Within the community, the list of demands by the public housing residents was supported by other, newly formed community action groups, including the churches and the regional Economic Opportunity Council.[179] Their demands were modest – jobs, fair rent, improved infrastructure, and full economic and social enfranchisement – and represented the basic entitlement that most communities enjoyed without question. However, because such a large portion of the Hunters Point community depended in some capacity on City-sponsored or subsidized programs, they had to engage the City as a member of their community. Even at the time, the general African-American population acknowledged that "no single factor [had] contributed as much to unity and solidarity of San Francisco's negro population as had the intolerable housing condition that has been allowed to develop and continues to exist."[180]

PUBLIC HOUSING TODAY

The policy changes in the 1960s that lowered the income requirements of public housing tenants also contributed to an increased isolation of these communities. Most of the commentary from the period appears to dismiss the housing communities, and

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[178] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR, Appendix E*, certified February 8, 2000, File No.1994.061E, p. E37.
[179] Ibid.
[180] Albert Broussard, Black San Francisco: The Struggle for Racial Equality in the West, 1900-1954, 1993, p. 174.

fails to give credit to the strong social networks that often developed.[181] Bad press, political corruption, increasing crime rates and other negative factors changed the public perception of public housing, attaching to its residents a debilitating social stigma.

Recent efforts have been made to reverse these decades-old trends. In 1992, the Federal government began the HOPE VI (Housing Opportunities for People Everywhere) program with the goal of encouraging local housing authorities to partner with community groups to improve the most troubled public housing locations. HOPE VI supports redevelopment of public housing projects into mixed-use communities that provide a greater mix of economic and social strata within the larger community. Facilities for residents and non-residents would bring in a broader mix of people and reduce the negative connotations associated with public housing. In San Francisco, five HOPE IV grants were received from 1994 to 1999. They were used to redevelop SFHA projects in North Beach, the Mission, the Western Addition, Hayes Valley, and Bernal Heights.[182] This included the demolition and reconstruction of one of San Francisco's first public housing projects, Valencia Gardens. While the success of these projects has yet to be determined, the philosophies are now the predominant ones used in the planning of public housing. They are seen as a way to respond to the isolation that developed in the 1960s through the 1980s as well as a means to address the economic disparities and lack of community amenities that often found in traditional public housing complexes.

PROPERTY TYPES

Within the Project, only Alice Griffith Public Housing is present. It represents a combination of Pre-WWII and Post-WWII design philosophies. It is smaller than the projects constructed after the war, but has may of the stylistic traits of the pre-WWII

[181] Amy Howard, Northern Shelter: Community, Identity and Spatial Politics in San Francisco Public *Housing, 1938-2000*, Dissertation, College of William and Mary, 2005, p. 13.

[182] Rachel Peterson, *Hope IV in San Francisco*, San Francisco Planning and Urban Research Association Newsletter, March 2005.

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designs, with more open space, small groups of units, etc. In general, these aspects are explored further in Volume II of this report. This document, *Bayview Waterfront Plan Historic Resources Evaluation, Volume II: Resource Survey and Report*, also prepared by Circa: Historic Property Development, should be referenced for further information regarding specific buildings or architectural styles found within the Project.

VIII. CANDLESTICK POINT

The Long-billed Curlew is a large North American shorebird that was common along the shoreline of San Francisco in the early part of the 20th Century. Locally it was known as the Candlestick Bird and it is after this waterfowl that Candlestick Point was named.[183] Prior to being known as the site of a professional sports stadium, it was a quarry, a landfill and a proposed site for a quarantine hospital. At the time, it seemed a likely place, far from major settled areas, to put such an institution. 50 years later it was again at the center of controversy as it became the site for San Francisco's first professional sports facility. Today, the area has a sports stadium, as well as a state park, an executive park and a small number of residences.

EARLY DEVELOPMENT

Around 1910, the City proposed Bay View Hill (now known as Candlestick Point) as the site of a new Detention Hospital for quarantining individuals with communicable diseases. The Crocker estate, who still retained ownership of the land from the 19th Century, opposed the project. They bargained with the City and donated the land for use as a public park to prevent the construction of the hospital near land they hoped to sell for subdivision when the time proved most profitable.[184] The park was dedicated in 1915 and was the first official City park in the Bayview-Hunters Point area.

During World War II, the hill lent its name to a housing complex known as the Candlestick Cove War Dwellings. These units were intended for families and boasted

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[183] San Francisco Department of Parks and Recreation website, *Welcome to Monster Park,* http://www.parks.sfgov.org/site/recpark_index.asp?id=18977, 2008.

[184] David Chavez & Associates, Archaeological Resources Investigation for the Bayview-Hunters Point Redevelopment Plan, San Francisco, California, Oakinba and South Basin Activity Nodes, May 2004, p. 8. and Roger and Nancy Olmsted, Historical Consultants, *San Francisco Bayside Historical Cultural* Resource Survey, 1982, p. 12.

views and private beaches for its residences. The complex was located on the south side of the point, right along the San Mateo/San Francisco County border.[185]

CANDLESTICK PARK

BASEBALL AND SAN FRANCISCO

Baseball has always been popular in San Francisco. For a long time the City sported several semi-professional teams that competed with other teams throughout California and the West Coast. The San Francisco Seals, enjoyed a long-lasting following in the first half of the 20th century. However, when the time came to lure a major league baseball team to San Francisco, the need for a new stadium was apparent. The largest stadium in the City at the time could seat only 18,600 people, nowhere near the capacity of other stadiums in other cities (see Figure 34.)[186] If San Francisco wanted a professional team, they needed to provide state-of-the-art facilities.

In 1954, voters approved a $5 million bond measure for the construction of a Major League Baseball stadium. This was done before any team had committed to moving to San Francisco. It was a major political gamble that was soon to pay off. When Major League Baseball approved an expansion of teams west of the Rocky Mountains, they opened the door to the eager San Francisco fans. Ultimately, the owner of the New York Giants agreed to move his team from New York City, where they competed with two other major league teams, to San Francisco where they would be the biggest show in town. At that same time, the Brooklyn Dodgers, agreed to move to Los Angeles, thus bringing their rivalry to California.

The San Francisco Giants began their relationship with the City in 1958, playing their first two seasons at Seals Stadium at 16th Street and Bryant Street. During this time, fill,

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[185] See Chapter VI for further information on World War II housing at Candlestick Cove.
[186] Ballparks of Baseball, *Seals Stadium*, http://www.ballparksofbaseball.com/past/SealsStadium.htm 2008.

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Figure 34. Seals Stadium, 1958. The Giants spent their first two season in San Francisco playing in this 18,600 seat stadium in the Mission District. It was demolished immediately after the last game of the MLB season in 1959. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Updated: July 2009

Figure 35. Candlestick Park under construction, 1959. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Updated: July 2009

Figure 36. Demolition of Seals Stadium, January 7, 1960. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

grading and construction began at Candlestick Point (see Figure 35.) Designed by architect John Bolles, Candlestick Park was the first baseball stadium to be entirely constructed out of reinforced concrete. The baseball stadium was finished at the end of the 1959 season, becoming the first Major League Baseball stadium on the west coast.[187] It was also reported to be one of the last dual use (baseball/football) stadiums built in the United States (for baseball and football). As soon as the season ended, the Giants left Seals Stadium to the bulldozers. Demolition began in November 1959 and was completed in early 1960, before the Giants had finished a single practice on their new field (see Figure 36.) Vice President Richard Nixon threw out the first pitch on April 12, 1960 at the Giants home opener. The Oakland Raiders football team played their 1961 season at Candlestick Park and the San Francisco 49ers football team made it their permanent home in 1971.

CONSTRUCTION

Then-Mayor George Christopher began investigation of possible stadium sites as early as May 1957. Charles Harney, one of San Francisco's most well known contractors offered his property on Candlestick Point to the City for $2.7 million. When studies showed that a site closer to the downtown was more expensive, the City took up Harney's offer and hired him as contractor for the project. The park was referred to as "Harney Stadium" during construction. However, a 1960 naming contest sponsored by the San Francisco City Recreation and Parks Commission resulted in the official name of "Candlestick Park."[188]

From opening day, Candlestick Park began to acquire a reputation for its harsh environment for both spectators and players alike. Strong gusts caused serious problems for the players during the 1961 All Star game. At that game, some of the

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[187] Dodger Stadium was completed in 1962.
[188] Jones & Stokes, Bayview Transportation Improvements Project-Evaluation Exemption for Monster *Park*, May 15, 2007, p. 6.

nation's best ball players committed seven errors and the relief pitcher was nearly blown off of the mound.[189] This prompted the architect and the City to plan for various modifications to the stadium in attempts to improve conditions.

"In 1960, the seating capacity was 43,765 and by 1993, it has increased to 58,000. Originally the grandstand consisted of two main seating decks. The lower deck extended from behind home plate down the first base line to the right field foul pole, and down the third base line and around the left field foul pole into left center field. The upper deck extended from home plate down both the first and third base lines. A small section of bleachers was located in right center field. The field surface was bluegrass and the scoreboard was located above the hitter's backdrop in center field. Behind the bleachers on the north elevation was an employee parking area" (see Figure 37.)[190]

Bolles began working on plans to accommodate football games, expand the stadium and enclose the outfield as early as 1966. As part of the redesign, attempts were made to reduce some of the wind-contributing flaws of the initial construction. The stadium was enlarged in 1970-71 to accommodate the San Francisco Forty-Niners.[191] This expansion extended the grandstand seating, enclosed the outfield of the baseball park and installed retractable seating in right field. The bluegrass field was replaced with Astroturf. The modifications resulted in the stadium's current footprint. The 49ers played their first season in Candlestick Park during the 1971-1972 season, winning a NFC West title that year. At the time, the stadium could seat 58,000 football fans plus an additional 3,000 on the retractable seating, making it the largest stadium in the National League at the time (See Figure 38.)[192] In 1994, the stadium was further enlarged to accommodate up to 71,000 football fans. The stadium continued to do double duty as

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[189] Ibid., p. 7.
[190] Ibid.
[191] Since 1946, the 49ers had played their games in Kezar Stadium near Golden Gate Park.
[192] San Francisco Department of Parks and Recreation website, *Welcome to Monster Park,* http://www.parks.sfgov.org/site/recpark_index.asp?id=18977, 2008.

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Figure 37. Candlestick Park in its original configuration for the 1961 All-Star Game, July 12, 1961. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 38. Candlestick Park in its current configuration, c.1975. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

home to the Giants for seven months of the year and for the 49ers for four months after. Often, during football preseason games or because of baseball playoffs, the field hosted both teams simultaneously. In the early 1990s, the Giants began to campaign for a new, baseball-only stadium closer to downtown San Francisco. They moved into their new stadium at Mission Bay in 2000 and remain there today. The 49ers continue to play football at Candlestick Park but are under negotiations for a new stadium.

JOHN S. BOLLES[193]

"In 1958, prominent Bay Area Architect John S. Bolles designed the stadium. Born in Berkley on June 25, 1905, Bolles obtained his bachelor's degree in Engineering from the University of Oklahoma in 1926, and graduated from Harvard with a Master's degree in Architecture in 1932. During the 1930s, he worked as a structural engineer in Oklahoma and as an archaeologist for the Oriental Institute of the University of Chicago on the excavations at Persepolis, the ancient capital of Persia, and for Washington's Carnegie Institute on a comprehensive study of one of the most important Mayan sites in the Yucatan.

"In the late 1930s, Bolles moved back to the Bay Area and joined his father's architectural firm. Father and son designed the Temple of Religion and the Christian Science Monitor building on Treasure Island for the 1939 Golden Gate International Exposition. In 1941, he passed the State of California Architectural license examination and between 1943 and 1945 Bolles served as project engineer for the Federal Public Housing Authority in San Francisco. During this time he also began collaborating with architect Joseph Francis Ward, a New Zealander, who has been associated with architect Albert Farr since 1922. Together, Bolles and Ward designed several residences in San Francisco during the 1940s and early 1950s. In 1954, Bolles began

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[193] Jones & Stokes, Bayview Transportation Improvements Project-Evaluation Exemption for Monster Park, May 15, 2007, pp. 6-7.

working independently on commercial, industrial, and residential buildings. A Modernist, Bolles' work often displayed a bold incorporation of modern art and sculpture. Eventually he started his own firm in San Francisco called John S. Bolles and Associates. Noteworthy designs by Bolles in San Francisco include the 1959 Ping Yuen Annex housing project, Embarcadero Park, and the Anna Wadden Library (Bayview Branch of the San Francisco Public Library) built in 1969. He also designed a number of buildings in Northern California including the McGraw-Hill complex in Navato, the General Motors assembly plant in Fremont, Gallo Winery in Modesto, Downtown Plaza in Sacramento and several Macy's department stores. Additionally, Bolles designed the IBM campus in San Jose of which IBM Building 25 was found eligible for the [National Register of Historic Places, California Register of Historic Resources,] and is a San Jose Landmark candidate. While his work throughout Northern California is extensive, he is best known for designing Candlestick Park. Bolles died in 1983."

BEYOND SPORTS

Candlestick Park has played an important cultural role in the lives of San Franciscans beyond its nearly 40-year relationship with the Giants. It served as the site for numerous concerts, public events and other great sporting moments. On August 29, 1966, it hosted the Beatles last live concert. It is the only stadium in the United States to host six National Football Conference championship games, three NFL Western Division Championships, 12 National Football Conference West Conference Games, two MLB World Series, and MLB two All-Star games. It was just before Game 3 of the 1989 World Series between the Oakland Athletics and the San Francisco Giants that the Loma Prieta earthquake was broadcast to millions of homes around the world. Remarkably, the 7.1 magnitude earthquake caused minimal damage to Candlestick Park and none of the 65,000 spectators were injured. The World series was delayed 10 days while engineers verified the safety of the stadium.

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CANDLESTICK POINT STATE RECREATION AREA

Candlestick Point State Park sits on land that was once covered by shallow Bay waters. The land was partially reclaimed as part of the Navy's ever expanding housing development in 1946. Parts of this land were reclaimed in anticipation of further shipyard needs, but were never used for improvements. The land was left open even as Candlestick Park grew up beside it. In 1973, the California legislature appropriated $10 million for the purchase of the land edging Candlestick Point. It was established as the first urban state recreation area in California in 1977.[194]

PROPERTY TYPES

Building, structure and object types related to the discussion above would include but are not limited to:

- Stadiums and recreational facilities
- Features associated with stadiums such as parking lots, gates, fencing
- Land grading and modification caused by reclamation projects
- Signage

Buildings found within the boundaries of the Project are investigated, presented and evaluated more fully in Volume II of this report. This document, *Bayview Waterfront Plan Historic Resources Evaluation, Volume II: Resource Survey and Report*, also prepared by Circa: Historic Property Development, should be referenced for further information regarding specific buildings or architectural styles found within the Project.

[194] California State Parks Website, *Candlestick Point* SRA, http://www.parks.ca.gov/default.asp?page_id=519, 2008.

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IX. CONCLUSIONS

The Bayview Waterfront Project encompasses contains a number of distinct geographic locations that share a common early history, but have evolved in different ways as a result of World War II. The period between 1941 and 1945 was a delineator in the development of the area, shaping the current identities of the various locations. It is important to understand the common background, although most of the architectural record from this period is scattered and not within the bounds of the current Hunters Point Shipyard Phase II Project. Of more importance, however, is the impact of World War II on the area and the physical reminders of the war years.

BEFORE 1941

CANDLESTICK POINT

At Candlestick Point, no architectural elements from the pre-1941 period have been identified. This area was largely created from fill after World War II. Those areas that were upland in the pre-war period were sparsely settled and largely used for industrial purposes.

ALICE GRIFFITH PUBLIC HOUSING

The current site of Alice Griffith public housing was mostly a swamp prior to its development during World War II. Some fringe areas of the property may have been used as part of the Bay View Park race track and hotel complex. However, nothing from this period remains.

HUNTERS POINT SHIPYARD

At HPS, several pre-World War II buildings remain. They are clear representatives of the commercial importance of the shipyard when it was solely contained within the bounds of the Bethlehem Steel drydocks at Hunters Point. Portions of the drydocks area remain from the 19th Century. These elements have previously been determined eligible for listing on the National Register and as such, are the most important resources within the Project boundaries. However, they are not the only resources that remain from the pre-World War II period. Building 109 and several large warehouse buildings near the drydocks were constructed prior to the war years.

INDIA BASIN

Most of India Basin dates to the pre-World War II period. The boatyards were established throughout the late 19th Century, mostly by northern European immigrants. Today there remains several intact architectural reminders from this period, including the Anderson-Cristofani boatyard and 900 Innes Avenue. Many other boatyards and fisheries were once found along this shoreline, but few have any visible physical presence as of 2008.

WORLD WAR II ERA (1941-1945)

CANDLESTICK POINT

During World War II, Candlestick Point was developed as a large multi-family housing complex for shipyard workers. These buildings were located along the southern shore, at the base of Bay View Hill. Landslides from the poorly graded and unstable hillside plagued the development and excavation was needed periodically to keep the units free from danger. Some areas to the east of the hill were filled in at this time, however much of the fill was not completed until the construction of Candlestick Park (see below.)

ALICE GRIFFITH PUBLIC HOUSING

A war housing complex was built on the shoreline near a dual rock outcropping just north of Candlestick Point, known as Double Rock, this eventually lent its name to the housing complex that was constructed nearby. Like the Candlestick Cove facilities, the Double Rock War Housing had its own schools, community centers, medical centers and play spaces for the children. It extended over the current Alice Griffith public housing site and further west. When the Double Rock Annex was completed around 1944, war housing extended approximately a block south and a block west from the current Alice Griffith public housing site. War housing complexes near Hunters Point, including Double Rock and Candlestick Cove, once contained over 12,000 living units of various types.

HUNTERS POINT SHIPYARD

The World War II period brought the most profound physical changes to the shipyard. The land was significantly increased while Hunters Point Hill was dramatically leveled. Rail lines were laid, warehouses built, and the largest drydock in the world were constructed in record time. Hundreds of ships were repaired and returned to battle and thousands of workers worked around the clock to meet the demands of the Navy and its ships. Most of the built fabric remaining in 2008 dates to this period. The buildings range in size from weighing stations to large warehouses and multiple level manufacturing facilities. It should also be noted that a large number of buildings at the Shipyard have been demolished since 2007.

INDIA BASIN

World War II greatly affected all the areas around India Basin, but there was relatively little effect on the built environment within India Basin. The boatyards continued to operate, although at a reduced capacity. The demand for larger ships resulted in the closing of the smaller yards and the consolidation of the remaining facilities. Those that survived into the post-WWII period did so by becoming specialty outfitters

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AFTER 1945

CANDLESTICK POINT

Candlestick Point was transformed in the late 1950s when the New York Giants relocated to San Francisco. A new baseball stadium was constructed on filled land just east of Bay View Hill. Candlestick Park Stadium was designed by a well-respected local architect John Bolles and it is considered one of the high points of his work. Unfortunately, the stadium was poorly sited and suffered from inhospitable weather patterns. Alterations in the post-war period include enlarging the seating, enclosing the stadium and reconfiguration of the stands to accommodate football and well as baseball.

ALICE GRIFFITH PUBLIC HOUSING

Public housing in San Francisco struggled in the post-war period to meet the incredible demand by the post-WWII population. War housing was built to be temporary, however it became a permanent solution for many African Americans who could find no other housing alternative in San Francisco. Changes in public attitudes toward public housing brought about less support, both politically and financially, making construction of new, adequate housing facilities even more difficult. What is today known as Alice Griffith public housing was constructed in this era of turmoil and adjustment. It is designed according to older policies concerning public housing, but was meant to serve a very different population from similarly designed complexes built before World War II. Over the years, little has changed within the complex and some residents still remain from its opening in 1964.

HUNTERS POINT SHIPYARD

Hunters Point Shipyard continued to function as a Navy repair facility in the post-war period. It did not, however, continue to receive the same level of attention from the

Navy. Other, newer shipyards were developed in Southern California during the 1950s and 1960s. By 1974, HPS had become obsolete.

In the post-WWII period the Shipyard became home to the Navy's Radiological Defense Laboratory, NRDL. NRDL came to dominate much of the space on the shipyard, at one time occupying over three-dozen different buildings. In 1955, these operations were partially consolidated in the newly constructed Building 815. The research and scientific advancements that occurred as a result of experimentation within Building 815 had a direct impact on development of practical uses for nuclear materials as well as protective measures and public policy regarding exposure and handling of such materials. NRDL was a unique and highly influential enterprise that brought a new level of renown to Hunters Point Shipyard.

INDIA BASIN

The shoreline of India Basin, its commercial enterprises and residential building stock have seen few changes since World War II. It remains a small pocket of late 19th Century and early 20th Century architecture amidst recent development. The hills above India Basin were first developed in World War II for housing. In the post-war years, much of the housing was transferred to public housing uses. Today, some of this remains but is interspersed with new development as the neighborhood continues to evolve.

SUMMARY

The geographic extent of the Project cannot be understood in a linear history like some neighborhoods. It contains a wide variety of building types, historical uses and colorful characters that still shape its development today. In some cases all that remains from the early days is the street grid and the street names (Bayview District.) In other cases, the early days remain as the most visible and obvious identifier (India Basin.) Several areas within the Project boundaries didn't exist until World War II (most of the Shipyard),

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or later (Candlestick Point.) The one unifying historical factor is the impact of World War II. Today's community and architectural identities are largely shaped by the changes brought about because of World War II, and how those changes evolved in the post-war period. The result is a series of unique modern histories, forever linked by a common past.

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Appendix J2 CIRCA, Historic Resources Survey, October 2009

BAYVIEW WATERFRONT PLAN HISTORIC RESOURCES EVALUATION, VOLUME II: FINAL HISTORIC RESOURCE SURVEY AND TECHNICAL REPORT

Prepared for

PBS&J on behalf of the San Francisco Redevelopment Agency

Prepared By

CIRCA: HISTORIC PROPERTY DEVELOPMENT

1 Sutter Street #910, San Francisco, California

OCTOBER 2009

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I. INTRODUCTION

Circa: Historic Property Development was contracted by the San Francisco Redevelopment Agency and PBS&J in May 2007 to complete the Historical Context and Survey Report for the Bayview Waterfront Project (BWP) Environmental Impact Report (EIR). This project encompasses Candlestick Point, Hunters Point Shipyard and the India Basin Shoreline areas of San Francisco. The Candlestick Point-Hunters Point Shipyard Phase II Development Plan contains Candlestick Point State Park, Candlestick Stadium, the Alice Griffith public housing and most of Hunters Point Shipyard. The India Basin Shoreline plan includes parcels from the boundaries of Hunters Point Shipyard up to and including the Pacific Gas & Electric Hunters Point Plant, now under demolition. The purposes of this document are to provide historical background material (see *Bayview Waterfront Plan Historic Resources Evaluation, Volume I: Historic Context Statement for full historic context*) for the evaluation of potential historic resources within the Project and to inform the relevant sections of the Environmental Impact Report for the BWP. Evaluations for identified potential historic resources within the survey areas of the BWP can be found in Section V (Survey Results).

This survey report is focused on the existing built environment within the Candlestick Point, Hunters Point Shipyard (HPS), and India Basin Shoreline survey areas (see subsequent sections for specific location maps). In general, this study evaluates all areas where construction activities are planned. The survey report describes existing conditions with respect to known or potential historical resources in the project area and identifies the project's potential impacts. Findings from this technical study will facilitate preparation of the environmental impact report for the project being prepared by the San Francisco Redevelopment Agency (SFRA) pursuant to CEQA.

For a parallel discussion of prehistorical and historical archaeological studies and contexts, please see the archaeological context statement and survey report for the Project prepared by Archeo-Tec: Consulting Archaeologists.

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PROJECT DESCRIPTION

The following project description is quoted from Section II: Project Description of the Bayview Waterfront Project, Administrative Draft EIR I (June 2009). See Appendix A for full Project Description.

> "The Bayview Waterfront Project ("Project") proposes new plans for the Candlestick Point, Hunters Point Shipyard ("HPS"), and India Basin Shoreline areas of San Francisco. The Project encompasses an approximately 764-acre area east of U.S. 101 in the southeast area of the City and occupies the waterfront area from India Basin to the approximate western edge of Candlestick Point. The Project is comprised of two primary components: (1) the Candlestick Point – Hunters Point Shipyard Phase II Development Plan ("CP-HPS Development Plan" or "Development Plan") and (2) the India Basin Shoreline Plan ("India Basin Plan").

CANDLESTICK POINT – HUNTERS POINT SHIPYARD PHASE II DEVELOPMENT PLAN

> "The CP-HPS Development Plan is a project-level development being proposed by Lennar Urban; this EIR evaluates the Development Plan's environmental effects at a project level of detail. The Development Plan proposes a mixed-use community with a wide range of residential, retail, office, research and development, civic and community uses, and parks and recreational open space. A major component would be a new stadium for the San Francisco 49ers, a National Football League team. Additionally, new infrastructure would serve the development as necessary. This Development Plan is organized under two major sub-components: Candlestick Point and Hunters Point Shipyard Phase II (HPS Phase II).

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INDIA BASIN SHORELINE PLAN

> "The Project also includes new land use controls for the India Basin Shoreline, also known as Bayview Hunters Point Redevelopment Survey Area C. The San Francisco Planning Department and the San Francisco Redevelopment Agency are the Project Sponsors for the India Basin Plan. Although the India Basin Shoreline was included in the BVHP Survey Area, it was not part of the BVHP Redevelopment Plan adopted in 2006. During the adoption process of the 2006 BVHP Redevelopment Plan amendment, it was determined that further community-based planning would be necessary before the India Basin Shoreline could be added into the *BVHP Redevelopment Plan*. As a result, the India Basin Shoreline remained a redevelopment survey area.
>
> "Plans for the India Basin Shoreline would allow a largely industrial zoned area to support a mix of residential, commercial, and light industrial uses. The Project would amend the *BVHP Redevelopment Plan* to include Area C, other amendments to the existing *BVHP Redevelopment Plan*, amendments to the *General Plan*, and new zoning controls and design guidelines for the area. Taken together, these components constitute the India Basin Plan. The Plan assumes that various private parties would develop the India Basin area over time."[1]

PROJECT LOCATION

The following project location description has been quoted from Section II: Project Description of the Bayview Waterfront Project, Administrative Draft EIR I (June 2009). Figure titles have been altered for the purposes of this report. Maps indicating the boundaries for each survey area can be found in elsewhere in this report.

[1] PBS&J for SFRA, Bayview Waterfront Project, Administrative Draft EIR – June 2009, p. II-1 – II-3.

Updated: October 2009

Figure 1. Map showing regional overview of Project site. Figure prepared by Archeo-Tec and excerpted with permission from their companion document, *Historic Context for the Archeology of the Bayview Waterfront Project, San Francisco, California.*

Updated: October 2009

REGIONAL LOCATION

"Candlestick Point, HPS Phase II, and the India Basin Shoreline, comprise the southeasternmost portion of San Francisco; taken together, they are bordered by major features such as Heron's Head Park on the north, the Executive Park area and San Mateo County line on the south, Bayview Hill, the Bayview neighborhood, Yosemite Slough, and Hunters Point Hill on the west, and San Francisco Bay on the east. Figure 1, illustrates the regional location of the Project and the location of the Project within San Francisco. [The] Development Plan would comprise approximately 688 acres. The India Basin Plan area would comprise 76 acres. The sites together comprise approximately 764 acres, occupying the waterfront from the northern boundary of the India Basin Shoreline area to the western edge of Candlestick Point, and extending inland from the waterfront."[2]

CANDLESTICK POINT – HUNTERS POINT SHIPYARD PHASE II DEVELOPMENT PLAN

"The Candlestick Point area of the Development Plan is immediately east of Executive Park, with the Bayview neighborhood to the north, the HPS to the north and east, and Candlestick Point State Recreation Area (SRA) along the Bay frontage, shown in Figure 2. The Candlestick Point area of the Development Plan is generally bounded by Hawes Street to the northwest, Candlestick Cove and the San Francisco Bay to the south, South Basin to the east, and Jamestown Avenue to the southwest. The northern boundary of Hawes Street is limited to the San Francisco Housing Authority's (SFHA) Alice Griffith public housing site between Gilman and Carroll Avenues, which extends north from Arelious Walker Drive.

[2] PBS&J for SFRA, Bayview Waterfront Project, Administrative Draft EIR – June 2009, p. II-10 – II-12.

"The HPS Phase II area is to the southeast of the Bayview Hunters Point neighborhood. As shown in Figure 2, the HPS Phase II area is generally bounded by the San Francisco Bay to north, south and east. The south end of the western boundary extends from Yosemite Slough along Arelious Walker Drive to approximately Crisp Avenue, excluding the University of California San Francisco (UCSF) property. The northern boundary generally extends along Crisp and Spear Avenues. The northernmost end of the HPS Phase II area is contiguous with Earl Street and the southeastern boundary of the India Basin Shoreline area."[3]

INDIA BASIN SHORELINE PLAN

"The India Basin Shoreline area is immediately north of the HPS Phase II. As shown in Figure 2, the India Basin Shoreline area is bounded generally by Jennings and Newhall Streets and Heron's Head Park to the north, the SFHA Hunters View public housing site and Innes Avenue to the west, and Earl Street to southeast. India Basin and San Francisco Bay forms the northeastern border."[4]

DOCUMENT ORGANIZATION

This document is organized into ten sections. Section I, the Introduction, provides project background and overview information and a summary of findings. Section II provides a more specific overview of the survey process including a discussion of the three survey sub-areas and methodology. A summary of historical background information is provided in Section III, though the full historic context is located in Volume I of this document. National, State and local guidelines and procedures for documenting and evaluating historical resources are outlined in Section IV Evaluative Framework and the findings of this survey are documented in Section V. Impacts and Mitigations are identified in Section VI, followed by Recommendations in Section VII.

[3] Ibid.
[4] Ibid.

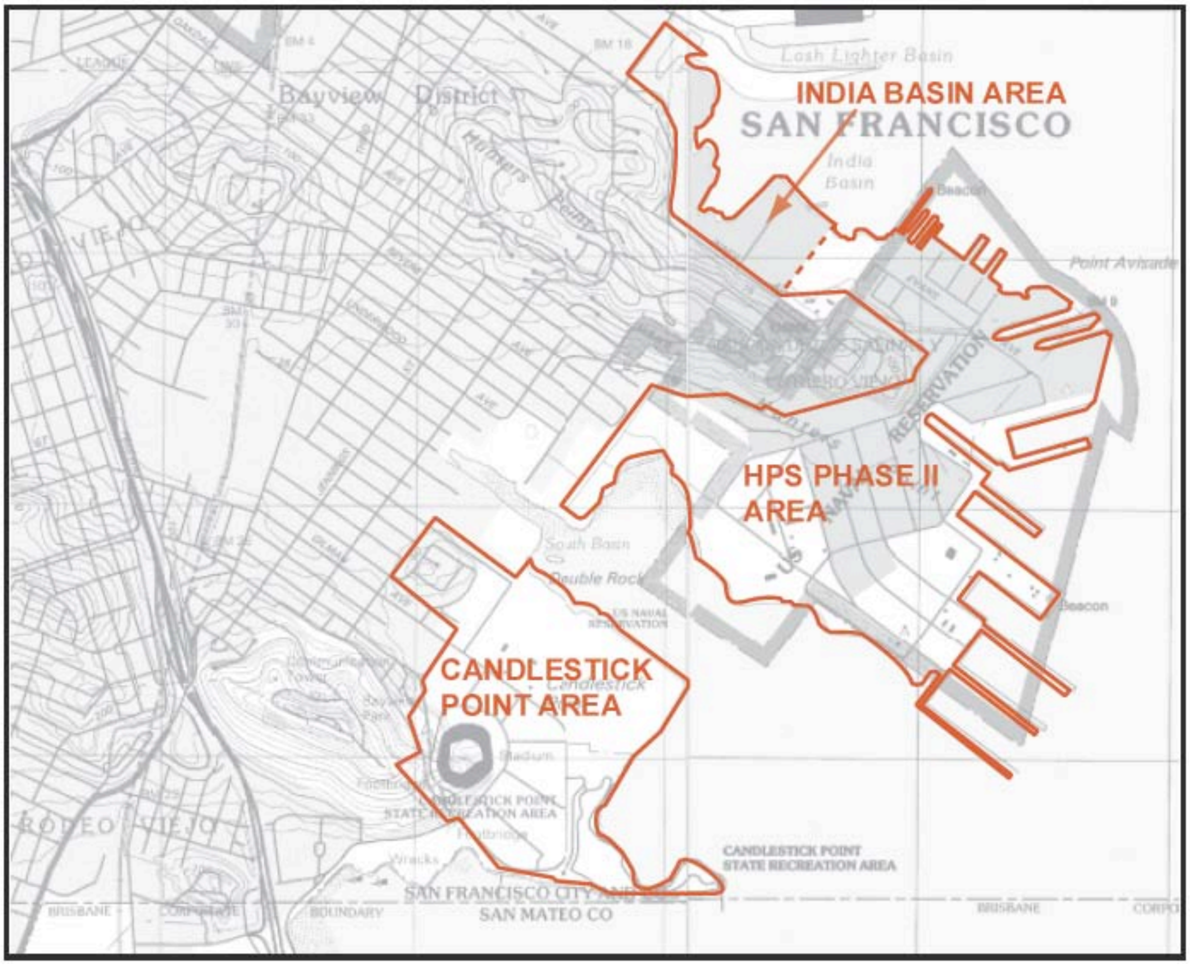

Figure 2. Map showing overview of Project site and survey sub-areas. Figure prepared by Archeo-Tec and excerpted with permission from their companion document, *Historic Context for the Archeology of the Bayview Waterfront Project, San Francisco, California.*

The Bibliography & Resources (Section VIII), Preparer's Qualifications (Section IX), and Appendices (Section X) conclude the report.

EXECUTIVE SUMMARY

Circa surveyed three different sub-areas within the Bayview Waterfront Project Area to identify potential historic resources. The following summarizes survey findings for each sub-area.

Updated: October 2009

INDIA BASIN

A number of parcels within the India Basin survey area had recently been surveyed and evaluated by Kelley & VerPlanck: Historical Resources Consulting. The study identified four properties that appear to be eligible for listing on the California Register of Historical Resources: 702 Earl Street, 900 Innes Avenue[5], 911 Innes, and 967 Innes Avenue. The former Albion Brewery building at 881 Innes Avenue was found to appear eligible for listing on the National Register of Historic Places. The India Basin survey also identified a potential California Register-eligible historic district, the India Basin Boatyards.

Also located within the India Basin survey area boundaries is the site of the former Pacific Gas & Electric (PG&E) plant. This building, constructed in 1929, was determined not to be a historic resource by the San Francisco Planning Department staff in 2006 and the building demolished in 2008. The remaining parcels within the India Basin survey area are comprised of unimproved public shoreline open space, India Basin Shoreline Park, and vacant land. No other buildings or structures over 45 years old were identified.

CANDLESTICK POINT/ALICE GRIFFITH SURVEY AREA

The Candlestick Point survey area encompasses the Candlestick Park sports stadium (formerly Monster Park), the Alice Griffith Public Housing site and Candlestick Point State Recreation Area. Circa evaluated the Alice Griffith Housing site and found it ineligible for listing on the NRHP, the CRHR or as a local landmark. With exception of Candlestick Park stadium, no other resources over 45 years of age exist within the survey area.

Jones & Stokes completed a recent evaluation of Candlestick Park sports stadium and found the property to be ineligible for listing on the NRHP. The property has not been evaluated for California Register eligibility and has not been previously included or listed

[5] In early 2008, the Shipwright's cottage at 900 Innes Avenue became San Francisco Landmark #250.

in any local survey of historic properties. It was beyond the scope of this project to conduct any additional review of the Candlestick Park stadium, however, Circa recommends that the property be evaluated for eligibility for listing on the California Register of Historical Resources and for local listing.

HUNTERS POINT SHIPYARD

In 1997, an inventory and evaluation of buildings and structures at Hunters Point Shipyard identified approximately 225 extant buildings and structures. All buildings on Parcel A, with exception of Buildings 101 and 110, were demolished in 2006-2007 as part of Hunters Point Shipyard Phase I. In July 2007, Circa: Historic Property Development began work on the development of a historic context and historic resources survey and inventory of extant buildings and structures at the Hunters Point Shipyard. A total of 134 buildings and structures were identified as existing properties at the shipyard in 2007. Since that time four buildings are known to have been demolished and a total of 130 buildings and structures were known to be extant at the conclusion of Circa's evaluation work in April 2009. Out of this total, a potential California Register eligible historic district was identified that contains five buildings and two structures previously determined eligible for the National Register of Historic Places (NRHP), as well as four additional buildings previously unevaluated for listing on the California Register of Historical Resources (CRHR). The potential Hunters Point Commercial Dry Dock and Naval Shipyard Historic District is comprised of the following resources:

- Dry Dock 2 (Previously determined eligible for NRHP by SHPO in 1998)
- Dry Dock 3 (Previously determined eligible for NRHP by SHPO in 1998)
- Building 140 (Dry Dock No. 3 Pump House) (Previously determined eligible for NRHP by SHPO in 1998)
- Buildings 204 (Gate and Pump House) (Previously determined eligible for NRHP by SHPO in 1998)
- 205 (Dry Dock No. 2 Pump House) (Previously determined eligible for NRHP by SHPO in 1998)
- Buildings 207 (Latrine building) (Previously determined eligible for NRHP by SHPO in 1998)

- 208 (Shop Service, Tool Room and Canteen Building)
- Building 211 (Shipfitters/Electronics Shop)
- Building 231 (Inside Machine Shop)
- Building 253 (Optical, Electronics and Ordnance Building)
- Building 224 (air raid shelter, NRDL Annex)

In addition, Circa found that Dry Dock 4 retained a good degree of integrity enabling it to remain eligible for individual listing on the NRHP.

Of the 121 remaining buildings on the shipyard, 11 were less than 45 years old and six were found to lack integrity; these properties were not evaluated for significance. The remaining 104 buildings and four structures were evaluated for eligibility for listing at the national, state and local levels. None of the remaining buildings or structures were found to be individually eligible for listing on the NRHP, the CRHR or as San Francisco Landmarks. Further, they were not found to be eligible as contributors to a national, state or local historic district.

Updated: October 2009

II. SURVEY OVERVIEW

The historic resources survey areas included specific parcels, as specified by the San Francisco Redevelopment Agency and PBS&J/EIP. Locations and boundaries of each survey area are represented in Figure 2 (page 7). Individual survey area maps identifying parcel and survey boundaries for each survey area are located in Section V of this report.

METHODOLOGY

The methodology used for completion of this historic resources survey and inventory included a literature review of all related existing information, completion of a historic context, field survey work and additional property-specific research. Each of these methodologies is described below. The SFRA, PBS&J, and members of the project team conducted an initial "kick-off" tour of the project areas on July 12, 2007, which included an overview introduction to the general project area and brief tours of each specific study area.

INFORMATION GATHERING AND REVIEW

An extensive review of existing documents was conducted prior to and concurrent with the survey fieldwork. Primary and secondary source research, including review of historic maps, newspaper archives, historic photographs and plans, utility records, military records, and U.S. census data was conducted. Property information data, CHRIS/NWIC search results[6], previous survey and evaluation reports, historic context statements and other related documents were provided by the SFRA, PBS&J/EIP and the San Francisco Planning Department for incorporation into the historic context statement. Some properties within the survey area have been evaluated for historic significance by other historic preservation consultants in recent years; these evaluations are discussed further in Section V of this report.

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[6] NWIC/CHRIS search conducted by Archeo-Tec (Access Agreement Number 07-1277, March 7, 2008) and resulting materials provided to Circa for review.

Updated: October 2009

Following review of existing documentation, additional property specific research was conducted to further develop the historic context. Research and other repositories consulted for the purposes of this study include the following (see Bibliography for complete list of resources):

- San Francisco Public Library (SFPL) – Main Branch and Bayview/Anna E. Walden Branch Library
- San Francisco History Center and Historical Photograph Collection, SFPL
- California Historical Society Archives
- J. Porter Shaw Library, San Francisco Maritime National Historic Park
- Navy BRAC Program Management Office West– Treasure Island
- Hunters Point Shipyard – Navy BRAC Drawing/document storage area (Building 383)
- National Archives and Records Administration (NARA) – San Bruno and College Park, MD
- University of California, Berkeley Libraries
- The Bancroft Library
- Environmental Design Archives and Library
- Earth Sciences and Map Library
- Engineering Library
- Navy Department Library, Naval Historical Center – Washington, D.C.
- San Francisco Planning Department

AGENCY CONSULTATION

See Appendix F for Agency Consultation/Notification list.

HISTORIC CONTEXT STATEMENT

An Administrative Draft of the Historic Context Statement was issued to PBS&J/EIP and SFRA for review in July 2008. The document was reviewed by the EIR consultant and by staff from the Historic Preservation division of the San Francisco Planning Department and all subsequent comments and changes have been addressed by Circa.

Updated: October 2009

The final draft is attached as *Bayview Waterfront Plan Historic Resources Evaluation, Volume I: Historic Context Statement.*

SURVEY FIELDWORK AND DOCUMENTATION METHODOLOGY

Prior to commencing fieldwork, Sheila McElroy, Principal, Circa: Historic Property Development; Becky Urbano, Preservation Services Manager with Garavaglia Architecture, Inc., and Sarah Hahn, Architectural Historian, Garavaglia Architecture, Inc., conducted an additional overview tour of Hunters Point Shipyard on May 7, 2008 to assess general conditions and to determine the general numbers and types of buildings and structures extant within the shipyard study area. Sheila McElroy and Sarah Hahn conducted specific site investigation of all survey areas in June 2008. At each site where buildings, structures, or objects were located, and as access was permitted, the consultants walked the site. Each building and structure was photographed and approximate dates of construction, architectural styles, primary character-defining features, conditions, and integrity were recorded. The consultant used survey maps and property information matrices provided by PBS&J and the SFRA to confirm whether potential resources were located within or adjacent to the study areas and to confirm addresses and other property data.

Circa then determined levels of condition and integrity for each property, comparing similar property types in order to organize extant buildings and structures into categories with high, medium and low integrity. Buildings with no to low integrity were not further researched or evaluated. Buildings with a medium to high degree of integrity were researched further as to use, the number remaining of that type, architectural merit and comparison to similar properties within the Hunters Point Shipyard and the Bay Area. These properties were also then evaluated to determine significance levels and whether they met National, California or local criteria for eligibility as historic resources. All properties were recorded on DPR Primary Record forms. Properties found to be significant were documented with District or Building Structure and Object Records. Though the Alice Griffith housing development was not found to be a historic resource, both Primary and BSO Record forms were prepared as requested (see Appendix A for all DPR forms).

Certain portions of the Shipyard were not accessible during the course of preparing this document due to hazardous waste remediation efforts and decontamination activities (see Figure 3.) Buildings and structures within these designated areas were identified and photographed by authorized Navy personnel. The photographs were then provided to Circa for use in the survey and evaluation process.

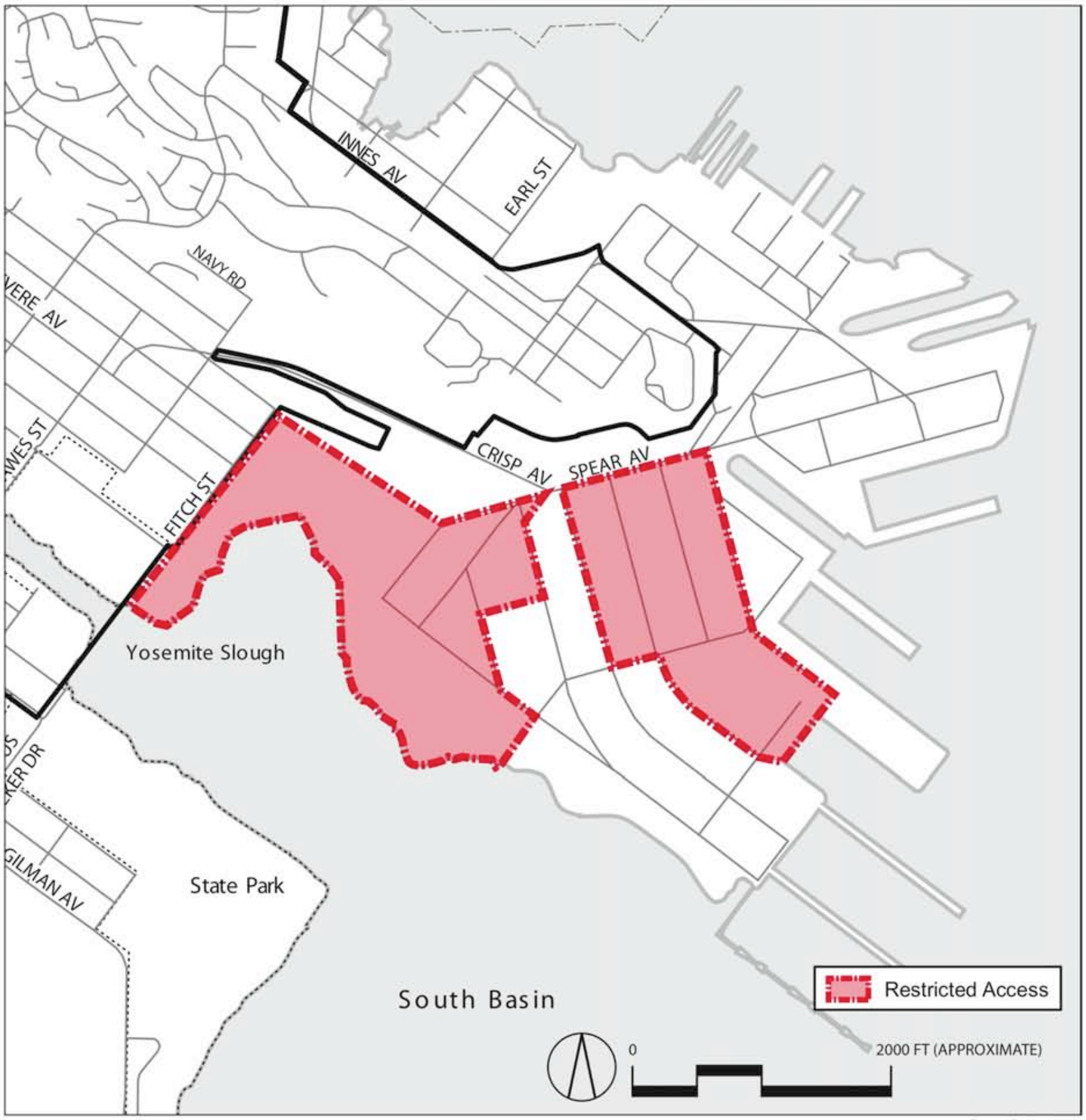
During the course of researching and preparing this technical report, four Shipyard buildings and some site features have been demolished as part of Navy environmental cleanup efforts. Most of what is discussed in the following sections is based on what remained of the built environment as of April 2009. This may or may not represent the state of the built environment as of the publishing of this report.

ADDITIONAL RESEARCH AND EVALUATION

Following completion of the *Bayview Waterfront Plan Historic Resources Evaluation, Volume I: Historic Context Statement*, Circa: Historic Property Development completed additional research related to supposed architect involvement in the design of certain buildings and structures at Hunter's Point Shipyard was conducted in April 2009 at the request of Planning Department staff. The following repositories were consulted to retain additional building-specific information:

- Navy Department Library/Naval Historical Center - Washington DC
- U.S. National Archives and Records Administration, College Park, MD and San Bruno, CA
- J. Porter Shaw Library, San Francisco Maritime National Historical Park
- Online Archive of California – Bancroft Library/UCB library holdings
- The California State Military Museum catalog
- Navy BRAC Program Management Office West– Treasure Island and Hunters Point Shipyard Drawing/document storage area (Building 383)
- San Francisco Public Library

Updated: October 2009



Source: US Navy BRAC PMO West, 2009.

Clement Designs, 2009.

FIGURE 3

OFF LIMIT AREAS AT HUNTER'S POINT SHIPYARD

Figure 3. This map indicates the restricted access areas within the boundaries of the Naval controlled shipyard property. Map courtesy of PBS&J.

Updated: October 2009

Efforts were also made to locate a specific document by Edwin G. Schmidt titled *The History of the Development and Operation of a Naval Repair Yard at Hunters Point During World War II* (c.1946), which is referenced in existing documents related to Hunters Point Shipyard. Circa contacted and/or searched the local and national repositories listed above regarding the document, however a copy of the report was never located.

Updated: October 2009

III. HISTORICAL BACKGROUND

Please find more detailed historic context information in *Bayview Waterfront Plan Historic Resources Evaluation, Volume I: Historic Context Statement* of this document. The following Historical Background information is provided below for summary purposes.

INDIA BASIN SURVEY AREA

India Basin is composed of approximately ten full and partial blocks ranging from Earl Street to the former Pacific Gas & Electric plant site along Jennings Street. Many of these blocks are occupied by small, light industrial enterprises and residential buildings. The area has historically been a small boatbuilding community since the middle of the 19th Century. This community was fairly self-sufficient, establishing their own churches, schools and social support network. Economically, they were dependent on the Bay for their livelihoods, whether they were involved with boat building or fishing. Today, several of the early religious institutions remain, as does at least one working boatyard and several residences from the 19th Century and early 20th Century.

Most of India Basin dates to the pre-World War II period (pre-1941). The boatyards were established throughout the late 19th Century, mostly by northern European immigrants. Today there remains several intact architectural reminders from this period, including the Anderson-Cristofani boatyard and 900 Innes Avenue. Many other boatyards and fisheries were once found along this shoreline, but few have any visible physical presence as of 2008.

The Pacific Gas & Electric Company (PG&E) power plant at Hunters Point was originally constructed in 1929 by Great Western Power Company. Over the years it has been expanded to keep up with improvements in power generation techniques as well as to increase capacity. The plant was closed in 2006 and demolished by 2008. The PG&E site is currently undergoing remediation.

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World War II greatly affected all the areas around India Basin, but there was relatively little effect on the built environment within India Basin. The boatyards continued to operate, although at a reduced capacity. The demand for larger ships resulted in the closing of the smaller yards and the consolidation of the remaining facilities. Those that survived into the post-WWII period did so by becoming specialty outfitters.

The shoreline of India Basin, its commercial enterprises and residential building stock have seen few changes since World War II. It remains a small pocket of late 19th Century and early 20th Century architecture amidst recent development. The hills above India Basin were first developed in World War II for housing. In the post-war years, much of the housing was transferred to public housing uses. Today, some of this remains but is interspersed with new development as the neighborhood continues to evolve.

CANDLESTICK POINT/ALICE GRIFFITH SURVEY AREA

CANDLESTICK POINT

The Long-billed Curlew is a large North American shorebird that was common along the shoreline of San Francisco in the early part of the 20th Century. Locally it was known as the Candlestick Bird and it is after this waterfowl that Candlestick Point was named.[7] Prior to being known as the site of a professional sports stadium, it was a quarry, a landfill and a proposed site for a quarantine hospital. At the time, it seemed a likely place, far from major settled areas, to put such an institution. 50 years later it was again at the center of controversy as it became the site for San Francisco's first professional sports facility. Today, the area has a sports stadium, as well as a state park, an executive park and a small number of residences.

At Candlestick Point, no architectural elements from the pre-1941 period have been identified. This area was largely created from fill after World War II. Those areas that

[7] San Francisco Department of Parks and Recreation website, *Welcome to Monster Park,* http://www.parks.sfgov.org/site/recpark_index.asp?id=18977, 2008.

were upland in the pre-war period were sparsely settled and largely used for industrial purposes.

During World War II, Candlestick Point was developed as a large multi-family housing complex for shipyard workers. These buildings were located along the southern shore, at the base of Bay View Hill. Landslides from the poorly graded and unstable hillside plagued the development and excavation was needed periodically to keep the units free from danger. Some areas to the east of the hill were filled in at this time, however much of the fill was not completed until the construction of Candlestick Park.

CANDLESTICK PARK

Candlestick Point was transformed in the late 1950s when the New York Giants relocated to San Francisco. A new baseball stadium was constructed on filled land just east of Bay View Hill. Well-respected local architect John Bolles designed Candlestick Park Stadium and it is considered one of the high points of his work. Unfortunately, the stadium was poorly sited and suffered from inhospitable weather patterns. Alterations in the post-war period include enlarging the seating, enclosing the stadium and reconfiguration of the stands to accommodate football and well as baseball. *Note: In addition to the historical background information provided in Volume I of this document, further discussion can be found in the evaluation completed by Jones & Stokes (Final Historic Property Survey Report, Bayview Traffic Improvements Project, Caltrans District 4, October 2007).* The evaluation is summarized in Section V of this report.

ALICE GRIFFITH PUBLIC HOUSING

In 1937, Congress passed the first United States Housing Act. This act established the Untied States Housing Authority (USHA) as a part of the Department of the Interior. It put the Federal government in the funding role while giving governance of the resulting housing to local housing authorities. San Francisco was one of the first cities to apply for the Federal program, establishing the San Francisco Housing Authority (SFHA) in 1938. By 1940, Holly Courts had opened, becoming the first public housing project completed west of the Rocky Mountains under this system.

The USHA was initially authorized for a period of three years but was not renewed. Instead, by 1939, the government began to shift its focus from providing public housing to building defense-related housing in preparation for entering World War II. As part of this shift, all housing construction was stopped to conserve construction materials for the war effort. Special provisions were made to those housing projects in strategic locations near defense bases and industrial zones.

An ideal location because if its proximity to the Shipyard and general lack of development in the area, the Hunters Point neighborhood of San Francisco was transformed by the war housing boom. The first of the war housing construction projects to open was the Middle Point War Housing complex between Evans Avenue and Innes Avenue in early 1943. In the next six months, five more war housing complexes opened in the area, including the Double Rock War Dwellings, the precursor to today's Alice Griffith Housing Development. By the war's end in July 1945, over 10,000 units of temporary wartime housing had been constructed to serve the Hunters Point Naval Shipyard.

After the war, many war workers began to transfer out of the temporary housing units and into the single-family dwellings that were showing up throughout the district. By this time, many of the temporary housing units were already showing signs of impermanence. However, because housing was in such short supply, the Federal government made provisions in the Housing Act of 1950 to transfer ownership to local housing authorities rather than require their immediate demolition (as originally mandated). The defense worker housing was officially transferred from the Federal government to the SFHA in 1954. In this same year, SFHA received its first challenge over the quality of the housing projects in the Bayview-Hunters Point area. By 1960, four of the original "temporary" housing complexes were still being used, including the Double Rock War Dwellings.

To address the extreme shortage of quality housing in the city, the SFHA's first priority after the war was to complete the remaining six public housing projects designed before the war. This included Ping Yuen in Chinatown, North Beach Place in North Beach, and

Bernal Dwellings in the Mission. The second priority was to deal with the problem of the temporary war dwellings in the Hunters Point area. The first units to be replaced were part of the Navy Point War Dormitories at Kirkwood Avenue and Earl Street, in 1953. This new complex was called simply "Hunters Point." It consisted of 317 apartments in a series of 2- and 3-story apartment buildings. This design became the standard for the area. In 1956, Hunters View and Harbor Slope opened up with 576 units, replacing the Middle Point and Harbor Slope War Dwellings along Innes Avenue. These units were largely constructed on existing foundations remaining from the demolition of the temporary war buildings. The Alice Griffith Garden Homes replaced the Double Rock War Dwellings in 1962.

Hertzka & Knowles and H.C. Baumann Associated Architects designed the Double Rock Low Rent Housing Project in 1953-4 and Douglas Bayliss designed the landscape. Construction of the approximately 250 units began in 1960 and was completed in October 1962. Initially referred to as Double Rock after the earlier temporary war housing development on the site, the project was later renamed after former SFHA board member Alice Griffith. Griffith opposed the SFHA's restrictive placement known as "neighborhood patterns." This policy allowed settlement within the housing projects only if the applicant reflected the predominate ethnicity of the neighborhood, or if they were White. In spite of the fact that the majority of the tenants were African-Americans who had difficulty finding housing because of rampant racial discrimination, only one permanent housing project, located in the Western Addition, was open to Blacks. The "neighborhood patterns" policy was the City's way to segregate housing in practice while condemning the practice in theory. Alice Griffith resigned her post over the matter and became a voice opposing the policy in public debate.

Wayne Solomon Hertzka and William Howard Knowles formed Hertzka & Knowles, the San Francisco-based architecture firm in 1932. Hertzka, a Washington native born in 1907, earned his masters degree in architecture from MIT in Cambridge and became a registered architect in California in 1956. Knowles, born in 1909, completed his undergrad work at UC Berkeley and also earned his masters degree in architecture from MIT in 1932. Together the architects worked on a number of projects including 1 Bush Plaza, Anza Elementary School, the Mission BART stations and the Hotel Empire in San Francisco.

Herman C. Baumann started his architectural practice in San Francisco in 1924. A prolific architect, Baumann designed hundreds of apartment buildings in the Bay Area over his career. He also designed hotels and commercial buildings in San Francisco, Oakland and Sacramento. During WWII, Baumann held a contract with the U.S. Navy Bureau of Yards and Docks, designing a number of buildings at Mare Island and other Naval outposts in the Bay Area. After the war, Baumann designed several multi-family housing projects. He is likely best known for his Art Deco apartment houses such as 1895 Pacific Avenue and 1950 Clay Street in San Francisco and the Bellevue-Staten building in Oakland.

Douglas Bayliss is best known for his work in the "California School" of landscape architecture in which the more structures Beaux-Arts conventions were replaced with an approach that centered around the California climate and lifestyle. Bayliss graduated with a Landscape Architecture degree from the University of California, Berkeley in 1941 and began working with Thomas Church. It was during his tenure in Church's firm that several government-funded housing projects were designed. Bayliss opened his own firm with wife Maggie Bayliss after the war and his projects over the next two decades included Washington Square in North Beach, San Francisco Civic Center Plaza, IBM Headquarters near San Jose and several BART stations. He is often credited along with Church, Garrett Eckbo and Robert Royston as one of the founders of the "California School" of modernism in Landscape Architecture.

Over the years, little has changed within the Alice Griffith Public Housing site and some residents still remain from its opening in 1962. Some upgrade work was completed in the 1980s, however the buildings appear to be in deteriorating condition. A new community facility has been constructed on the site in recent years.

Updated: October 2009

HUNTERS POINT SHIP YARD SURVEY AREA

PRE WWII PERIOD (PRE-1941)

At HPS, several pre-World War II buildings remain. They are clear representatives of the commercial importance of the shipyard when it was solely contained within the bounds of the Bethlehem Steel dry docks at Hunters Point. Portions of the dry docks area remain from the 19th Century. These elements have previously been determined eligible for listing on the National Register and as such, are the most important resources within the Project boundaries. However, they are not the only resources that remain from the pre-World War II period. Only one other building is extant related to the community that existed prior to the war years, Building 109; originally a restaurant that served the commercial dry dock community, the building was later used as the shipyard police station.

Existing Property Types from the Pre-1941 Period

The Hunters Point Shipyard closed in 1974. The residential area at the north part of the Shipyard was designated Parcel A as part of Phase 1 of the current Project. Within Parcel A and the adjacent Parcel B were at least two commercial buildings constructed to serve the residents of the area as well as the dry docks employees prior to Navy occupation. These two buildings served as restaurants in the pre-Navy period. The first was called The Venetian Villa (later Dago Mary's), and was located just inside the Phase 1 Hunters Point Shipyard (HPS) boundaries at the northeastern corner of Hudson Avenue and Galvez Avenue. The second was known as the Lincoln Restaurant and used as the Navy's police station after the Navy assumed ownership of the shipyard. Following transfer of Parcel A from City ownership to private hands circa 2005, the entire residential district and some Navy administration buildings were demolished and the land regraded as part of Phase 1 HPS.[8] Dago Mary's was demolished in 2008. The former Lincoln Restaurant, currently known as Building 109, a

[8] Buildings 101 and 110 were built by the Navy during the WWII period and are the only buildings still extant within Parcel A.

Spanish Revival style building built in 1934, is the only commercial building still extant at HPS and is near the northern entrance to Hunters Point Shipyard Phase II Area A.

Dry Docks 2 (1903) and 3 (1918) and Buildings 140 (1918), 204 and 205 (1901), and 207 (c.1930) have been previously determined eligible as contributors to a National Register historic district significant for its association with early commercial drydock operations at Hunters Point (see Figures 28 and 29.) These buildings, in addition to Building 208, a Tool Room constructed prior to the Navy's acquisition of the property and later remodeled, constitute the remainder of the pre-WWII buildings and structures within Hunters Point Shipyard sub-area.[9]

Figure 4. View of the Hunters Point dry docks as seen from Hunters Point Ridge, 1924. Dry Dock 2 is to the right in the image. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

[9] Though previous studies listed construction dates for Buildings 207 and 208 as 1942 and 1943 consecutively, research conducted at the Navy archives at Treasure Island for the purposes of this review indicate that the buildings were actually acquired with the property and remodeled by the Navy in 1942 and 1943.

Figure 5. View of Dry Dock 2, Photo: NAVSEA, 2004.

WORLD WAR II PERIOD

The World War II period brought the most profound physical changes to the shipyard. The land was significantly increased while Hunters Point Hill was dramatically leveled. Rail lines were laid, warehouses built, and the largest dry dock in the world (at that time) was constructed in record time. Hundreds of ships were repaired and returned to battle and thousands of employees worked around the clock to meet the demands of the Navy and its ships. Most of the built fabric remaining in 2008 dates to this period. The buildings range in size from small weighing stations to large warehouses and multiple level repair facilities. It should also be noted that a large number of buildings at the Shipyard have been demolished since the shipyard was decommissioned in 1976, many in recent years.

Zones of Use

As stated in Volume I: Historic Context of this report, the overall site plan for the Shipyard was a direct product of the World War II expansion. Prior to the war effort, the sparse amount of available land at the site did not necessitate a comprehensive site planning strategy. However, with an increased amount of land made available through the reclamation process, site planning became a necessity and the result was an orderly arrangement of buildings and structures in functional groupings. The first and most important influence was access to the water. Since the primary charge of Hunters Point Shipyard during World War II was the repair and retrofit of ocean-going military vessels, access to the various berths had a large impact on the location of storage, shops and administration buildings. Of secondary concern was the movement of equipment and personnel between buildings. Rail lines traced throughout the Shipyard, following wharfs and extending into warehouses. The sometimes massive scale of equipment and materials required the use of cranes and motorized transportation mechanisms to move objects from ships to repair facilities and back again. The consequence of these influences was a compartmentalized base with specific use zones, reflected largely in the numbering system (see Figure 6). In general, these zones were:

- Administration (100-series)
- Submarine Repair (100-series)
- Ship Repair and Outfitting (200-series)
- Warehousing, Supply and Industrial Support (300- and 400-series)
- Residential and related (500- and 600-series)
- Radiological (700- and 800-series)

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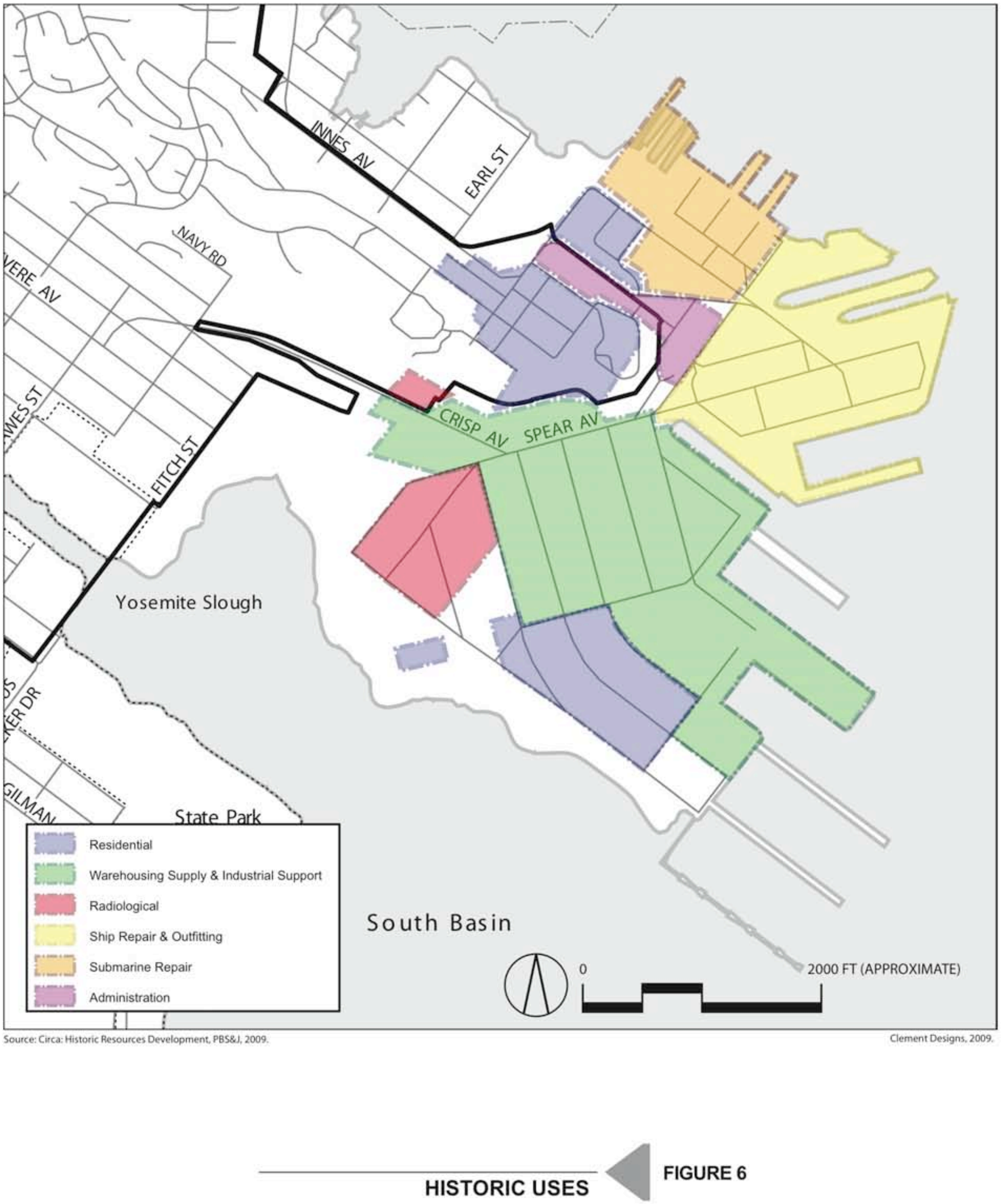

Figure 6. These areas represent general zones of use within Hunters Point Shipyard during World War II. Map courtesy of PBS&J.

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REPRESENTATIVE BUILDING TYPES FROM THE WWII PERIOD

Administrative

Figure 7. Building 101, Main Administration Building, Photo: Circa, 2008.

There are seven World War II-era Administrative buildings remaining at Hunters Point Shipyard. These include: Building 101 (see Figure 7) overlooking the heart of the Shipyard, Building 121 (the Submarine Offices and Apprentice School) in the Submarine Repair area, Buildings 129 and 132 (Submarine Pier offices) on Piers B and C, Building 154 (Area time office #1) in the Ship Repair and Outfitting area, Building 214 (The Accounting and Bond Office) southwest of Dry Dock 2, Building 215 (the Fire Station), and Building 238 (an office building) on the North Pier. All appear to have been built from standardized Bureau of Yards and Docks plans, except for Buildings 214 and 215. These buildings are quite similar to one another in design and materials and may have been designed as part of a larger A&E contract.[10]

The most prominent of these buildings, in terms of siting, is Building 101, the main Administration Building. It appears to be a standardized semi-permanent Bureau of Yards and Docks design, with a series of identical sections pieced together as wings projecting from a long central corridor. It is a wood frame building clad in wood shiplap siding and glazed with one-over-one wood windows. Most of the other administrative buildings also appear to be built around standard plans. Building and 121 closely resembles a World War II-era barracks designs, similar to buildings 103, 104 and 117. Buildings 129 and 132 are identical two-story office buildings on Piers B and C. Building 238 appears to be another office building located on the north pier but is not specifically

[10] Ibid, p. 22.

noted in Navy records. As previously noted, Buildings 214 and 215 are similar in design and research indicates that both are likely variations on standard plans.[11]

Figure 8. Building 110, Marine barracks.
Photo: Circa, 2008.

Residential and Related

As the Navy increased services at Hunters Point Shipyard, a vast increase in housing for enlisted men and their families was needed. This was beyond the thousands of units under construction for civilian shipyard workers. (See Volume I: Historic Context, Chapter VII: Housing, for more discussion on civilian housing construction during World War II). During the Shipyard's peak years of operation, residential and other related facilities for service personnel were located throughout the Shipyard, though chiefly concentrated in the 500 Series Area in the southwest corner of the shipyard and in the former neighborhood on the bluff. Facilities included not only barracks buildings for ships and submarine repair workers, apartment houses, officers quarters and family housing for non-commissioned personnel, but also recreational facilities, latrines, laundry and commissary facilities, a motion picture theater, a chapel, canteens and cafeterias, and a dental clinic.

Most of these buildings have been demolished in recent years because many were utilized by the NRDL as labs or storage facilities after they were no longer needed to service Navy personnel to the extent that they did during wartime. Today, only five barracks buildings remain at the site, most in the 100 series area in or near the Submarine repair Area. A more unique building in this grouping is Building 110, a stucco-clad Art-Deco style barracks building (see Figure 8), that was built from standard Bureau of Yards & Docks plans and housed the Marine detachment.[12] Typical of Navy

[11] Ibid, p. 23.
[12] Perhaps, since the Marine barracks building was more publicly visible than some of the other residential facilities because of its location on a main entry thoroughfare, a more distinctive design was chosen for the building.

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Figure 9. Building 117, Submarine barracks. Photo: Circa, 2008.

base layout, the Marine barracks were situated near the entry gate since the Marines served as armed guard for the facility. The other barracks buildings are standard, rectangular-plan buildings (103, 104 and 117) (see Figure 9) that functioned primarily as the Submarine repair workers' barracks. One barracks building does exist in the south waterfront area: Building 500, a two-story, wooden World War II semi--permanent building that served as a Bachelor Officers' Quarters and canteen.

Figure 10. Building 226, Standard plan latrine. Photo: Circa, 2008.

Standard-plan wood frame latrine buildings (see Figure 10) are found throughout the shipyard as are cafeteria facilities like Building 228, the Central Cafeteria, located within the Ship Repair and Outfitting area of the Shipyard. Other remaining buildings include Building 120 in the Submarine Repair Area, constructed as a variation on standard Bureau of Yards and Docks Plans as the Enlisted Men's' Club and Building 505, which housed the Navy Exchange, Gymnasium, a bowling alley and laundry facilities.

Figure 11. Building 236 is typical of the Utility buildings found at the Shipyard. Photo: Circa, 2008.

Utility

A number of reinforced concrete utility buildings remain from the WWII period and are located throughout the Shipyard grounds. Relatively uniform in their utilitarian design, these building house substations, pump houses and switching stations. Generally constructed of reinforced concrete, most of these buildings lack windows and have a single metal access door (see Figure 11.)

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Dry Docks

Figure 12. Dry Dock 4, 2008. This was the largest drydock in the world when it was constructed in 1943. Photo: Circa, 2008.

Four dry docks were constructed at the Shipyard during WWII: Dry Docks 4, 5, 6 and 7. Dry docks, also known as graving docks, are used for the construction, maintenance, and repair of ships, submarines and other watercraft. When a ship is to be repaired, the dry dock is flooded by opening the gate at the mouth of the basin. After the vessel enters the basin, the watertight gate is closed and the dock is pumped dry, bringing the craft to rest on supporting blocks secured to the floor.

Dry Dock 4, constructed in 1943, is a multi-purpose graving dock designed especially to accommodate aircraft carriers (see Figure 12.) This massive dry dock is 1092 feet long, 142 feet wide and 53 feet deep. It was carved into the natural serpentine stone that comprises Hunters Point ridge and finished in concrete. Access steps are built into the sidewalls and the floor of the dock is flat. Crane tracks surround the dry dock, permitting the ships to be accessed from all angles.

Figure 13. The Submarine Repair Area, 1946. Photo used with permission from the San Francisco History Center, San Francisco Public Library (United States Navy Photograph.)

Dry docks 4, 5 and 6, (see Figure 13) the Submarine Dry docks, are located in the Submarine Repair Area of the Shipyard and were designed to fully service underwater craft and smaller surface vessels.[13] Built in

[13] Hunters Point Naval Shipyard Association, untitled report, c.1974, pp. 15-16. Included as an appendix to *Hunters Point Naval Shipyard: A Historical Analysis* by Karl F. Kimbrough, August 1978.

1944, these dry docks are much smaller than Dry Dock 4, measuring about 420' long and between 60' and 75' in width, with a simple "flap gate" design. Originally designed for submarine, the structures were modified to accept destroyers as well.[14]

Warehousing , Supply and Industrial Support

Figure 14. Building 400, a typical warehouse building at Hunters Point Shipyard. Photo: Circa, 2008.

As part of the daily operations, the Shipyard had to be prepared for work on a wide variety of ships, ship components and weaponry as well as supplying repaired vessels for their return to duty. Storage was essential to these operations, as evidenced by the immediate construction of storage facilities when the Navy assumed full command of the site in late 1941. A series of supply storehouses, somewhat varied in design, are located in the south shipyard area, a predictable occurrence in a base dedicated to the repair of ships. Nearly all were built along standard Bureau of Yards and Docks designs, modified on occasions to fit specific requirements. The predominant warehouse type is a rectangular plan, wood warehouse building with a monitor roof. This standard plan was used alone or in groupings of three. Buildings 400, 404, 405, 406 and 407, supply storehouses built in 1943 are the best remaining examples of this building type (see Figure 14.)

Figure 15. Rail spurs are common throughout the Shipyard, especially on the south side. Photo: Circa, 2008.

Railroad tracks entered the Shipyard from the western entrance and ran throughout the shipyard, providing an essential mechanism for the transportation of goods between storehouse, shops and dry dock facilities; much of this extensive network was still extant when the survey process started (see Figure 15.) Tracks run along the north

[14] The following information is taken from Building the Navy's Bases in World War II.

sides of the 400 series listed above and directly into Building 808, a large steel framed and sided warehouse just north of these buildings.

Shops, Shipbuilding and Repair

Figure 16. Building 230, a typical WWII shop building at Hunters Point Shipyard. Photo: Circa, 2008.

Figure 17. Building 123, a typical monitor roofed shop. Photo: Circa, 2008.

Figure 18. Building 241, a two-story shop with a shallow gable roof. Photo: Circa, 2008.

Aside from the supply storehouses, the shops buildings are the other most common building type at the Shipyard. Like the warehouses, nearly all were built along standard Bureau of Yards and Docks designs and modified to fit specific functional requirements. The shops are generally large buildings, some being very substantial in footprint as well as height. Functionally, the buildings were used for a wide variety of purposes, although they may be roughly classified into industrial support and processing uses.

Most of the buildings are wood or steel framed and clad in a combination of metal, wood or corrugated transite panels. A secondary siding of asbestos shingles has been applied over the original wood siding of many buildings. The industrial shops ranged in size from smaller gable-roofed buildings (see Figure 16) to massive monitor roofed shops (see Figure 17), to one- and two-story full height buildings with a shallow gable roof and shed wings (see Figure 18.)

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Figure 19. Building 351, completed in 1945 at the close of World War II. Photo: Circa, 2008.

There are a few examples of reinforced concrete shop buildings, though concrete was a scarce construction material during the war and was use sparingly. It was generally used when the building was to be used for the handling of flammable or energetic materials or because the building was scheduled for permanent status. Building 351 is a large reinforced concrete shop building, constructed as the Optical Shop in 1945 but never used for that purpose (see Figure 19.) It was later used as an electronics shop, NRDL Annex E and for general research laboratories.

Figure 20. Building 231, constructed by the Navy in 1942 as the first major shop at the Shipyard. Photo: Circa, 2008.

Possibly most notable are the three large curtain wall shop buildings, Buildings 253, 411 and 231 (see Post-WWII section below for discussion of Building 253 and 411). Building 231 (see Figure 20,) the Inside Machine Shop, was the first major shop building constructed by the Navy in 1942. Steel framed and clad in corrugated iron siding and corrugated safety glass, the rectangular plan building has a sawtooth roof and is glazed with steel industrial sash windows.

WWII Period Summary

All of this construction was centered on the stated mission of Hunters Point Shipyard:

> "For all classes of vessels: interim docking, shaft and propeller repairs, repairs of major underwater damage; for carriers: interim overhaul of about three to four weeks comparable to overhaul by repair vessels afloat."[15]

In general, that is what occurred. However, sometimes Hunters Point Shipyard was used to load and outfit ships prior to embarkation. This was the case on July 15, 1945, while the USS Indianapolis was docked at Hunters Point awaiting orders. On this day, components of the atomic bomb "Little Boy" were loaded aboard the Indianapolis for transport to the South Pacific. It was reported to have contained half of the available uranium in the United States, valued at over $300 million at the time. The ship left Hunters Pont at 6:30 AM the next morning but was held in San Francisco, awaiting the results of the first atomic weapons test in New Mexico. The test was a success and the Indianapolis sailed out of the Golden Gate at 8:30 AM.[16] On August 6, 1945, the bomber Enola Gay dropped "Little Boy" on Hiroshima, essentially ending World War II.

POST WWII PERIOD

Hunters Point Shipyard continued to function as a Navy repair facility in the post-war period. It did not, however, continue to receive the same level of attention from the Navy. Other, newer shipyards were developed in Southern California during the 1950s and 1960s. By 1974, HPS had become obsolete.

In the post-WWII period the Shipyard became home to the Navy's Radiological Defense Laboratory, NRDL. NRDL came to dominate much of the space on the shipyard, at one time occupying over three-dozen different buildings. In 1955, these operations were

[15] Ibid, p. 15.
[16] NAVSEA, Hunters Point Shipyard: Final Historical Radiological Assessment: History of the use of General Radioactive Materials, 1939-2003. 2004, p. 6-4.

Figure 21. Building 367 is constructed of two Quonset huts placed end-to-end. This building type was used for housing along the south shore of Hunters Point during World War II. Photo: Circa, 2008.

partially consolidated in the newly constructed Building 815. The research and scientific advancements that occurred as a result of experimentation within Building 815 had a direct impact on development of practical uses for nuclear materials as well as protective measures and public policy regarding exposure and handling of such materials. NRDL was a unique and highly influential enterprise that brought a new level of prominence to Hunters Point Shipyard.[17]

REPRESENTATIVE PROPERTIES FROM THE POST - WWII PERIOD

Though the bulk of the buildings and structures remaining at Hunters Point Shipyard date to the WWII period, a number of buildings, constructed to supplement ongoing Naval ship repair activities, remain from the post-war period.

Administration and Support

Some expansion of administrative and other worker support facilities occurred in the post-war period, mostly concentrated within the Warehousing, Supply and Industrial Support Area in the south Shipyard. Buildings 367 and 424, small administrative

[17] Building 815 is not located within the survey area.

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buildings, served shipyard workers as Work Control center #3 and Area Time Office #4, respectively. Comprised of two Quonset huts, Work Control Center #3 sits along the southern edge of Dry Dock 4 (see Figure 21.) Over 130 Quonset huts, also known as Homoja Homes, were once located in the residential (500 series) area of the south Shipyard. Of this once common building type at the shipyard, Building 367 is one of only two Quonsets remaining at the site. It is possible that the Navy relocated two Quonsets to create Building 367 after the WWII demand for worker housing had subsided.

Figure 22. Building 709, the Navy Exchange Gas Station, built in 1952. Photo: Circa, 2008.

Additional employee support facilities were also constructed during this period including Buildings 159, 710 and 370, temporary wood frame latrines. Building 709, the Navy Exchange Gas Station, is a unique service station building constructed in 1952 with Art Deco design features unusual for the date of construction (see Figure 22.)

Figure 23. Building 521. One of several utility buildings. It was constructed in 1948. Photo: Circa, 2008

Utility services at the Shipyard were also improved during the post-war period, most notably with the construction of Building 521, a reinforced concrete power plant in the south shipyard area (see Figure 23.) Built by Barnes Construction Company in 1948, the building is a prominent structure and one of the last standing in this formerly residential part of the shipyard. Other utility buildings completed during this period include a one-story brick salt water pump house (Building 523) near the South Slip and a concrete sewage pump station (Building 819) located just north of the Crisp Road and Spear Avenue intersection.

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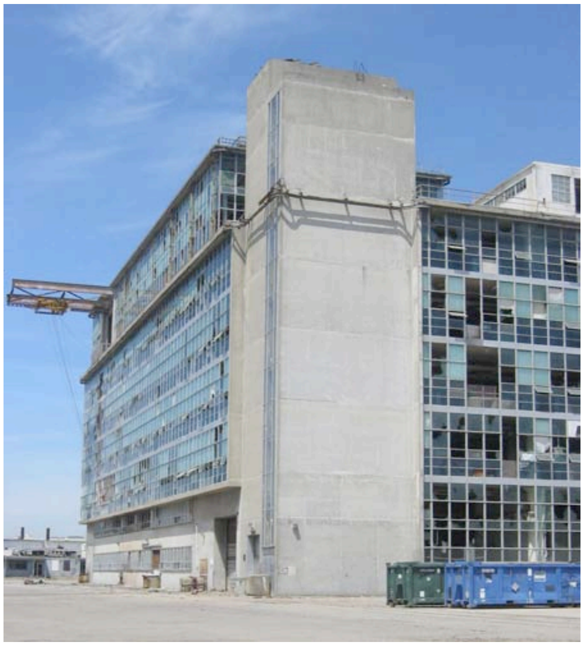

Figure 24. Building 253. The Optical, Ordnance and Electronics Building was built in 1947. Its green glass façade can still be seen from Highway 101. Photo: Circa, 2008.

Ship Repair and Outfitting

Several shipbuilding and repair-related buildings were constructed at the shipyard after 1945. These generally fall into two categories: large specialized shop buildings and smaller, pre-fabricated support buildings.

Buildings 253 and 411 are the most notable post-WWII industrial buildings at the shipyard, both visually and architecturally. They were planned, and in the case of Building 253, under construction during wartime but not completed until 1947 and hail from a long-standing Navy practice of designing large shops using the curtain wall system. The Navy's use of this form dates to the years just before World War I, when Albert Kahn, a pioneer in the field of American factory design, developed a curtain wall shop building for the Navy shipyard in Philadelphia. The Bureau of Yards and Docks quickly recognized the utility of the form for the metalworking, assembly, and other aspects of mass production that required large clear spans and ample natural light. The Bureau of Yards and Docks built curtain wall shops buildings at Mare Island, Terminal Island, Hunters Point, Puget Sound and other Naval shipyards throughout the country from World War I through the end of World War II.

Building 253, the Optical, Ordnance and Electronics Building, is a six-story, concrete framed, glass curtain wall building located in the Ship Repair and Outfitting area of the Shipyard (see Figure 24.) Designed by the architecture firm of Ernest J. Kump Co. and Mark Falk, structural engineer, the building cost over $2,000,000 to build. More than 80 percent of the structure's walls and roof are comprised of glass providing abundant natural light to the building interior. A large overhead crane attaches to the south side of the building and was used for external lifting of equipment. A periscope tower extends

Figure 25. Building 411 has been partially attributed to Albert Kahn & Associates Architects and Engineers, Inc. Photo: Circa, 2008.

vertically from the roof and was part of the sixth floor Optical Shop where rangefinders from naval ships were repaired and submarine periscopes calibrated by sighting on known points throughout the Bay Area.

Building 411 is a steel-framed curtain wall building located in the Warehousing, Supply and Industrial Support Area in the south Shipyard (see Figure 25.) According to an earlier evaluation of the building, it was designed in part by Albert Kahn and exhibits several common features of his industrial buildings including a saw tooth roof, bands of steel industrial sash windows and massive glazed industrial doors. The building housed the Shipfitters and Boilermakers Shop and Ship Repair shop as well as a civilian cafeteria, mold loft, radiography shop and storage areas. The plate yard was located directly north and assembly yard directly south of the building.

The second grouping of industrial buildings extant from the post-war period, and the most common building type, is the metal-sided Butler (or Butler-type) building. All of the Butler Buildings at Hunters Point date to the immediate post-war era (1947-1953) and include Buildings 156, 271, 274, 275, 323, 324, 368, 369, 415/416, 525, 526, 530 and 704. Butler Buildings are of varying sizes and are sometimes paired. This prefabricated, standard building was used on military bases throughout the nation in the immediate post-war era, when construction budgets were quite limited and were utilized for various industrial support activities and supply storage.

Radiological Laboratories

The NRDL primarily occupied buildings in the 800 and 700-series areas of the Shipyard, though portions of other buildings were utilized for NRDL storage, administrative offices and other purposes throughout the course of their work at Hunters Point. Many buildings in the 500-series area were used for radioactive waste storage, personnel decontamination, research and offices related to NRDL activities. The center for NRDL research, Building 815, also known as the Radiological Laboratory or RADLAB is still extant but located outside of the study area (see Figure 27). Buildings such as Building 820, the Navy Radiation Laboratory and Building 830, a Navy Biological Laboratory, as well as most of the 500 series buildings have been demolished in recent years. Extant NRDL related buildings include Buildings 707 and 708, NRDL animal research facilities and study colonies, and Building 366, which housed the NRDL Electronics Laboratory.[18]

Other

Warehousing and Supply

Building 813, built in 1947, is the only reinforced concrete warehouse built during the postwar period and stands on Parcel A, just north of the Warehousing, Supply and Industrial Support Area. This four-story warehouse is glazed with bands of industrial steel sash windows and functioned as a supply storehouse.

Figure 26. 450-ton crane. Photo: Circa, 2008.

450-Ton Crane

One of the more impressive structures built just after the WWII-era was a large bridge crane, installed on the 405-foot-wide Gun Mole Pier at the south waterfront area (see Figure 26). The bridge crane is constructed of riveted and welded braces and plates and measures 730 feet in length, rising 182 feet above the water. The fixed cantilevered arms at each end project 162.5 feet over the water on either side of the pier. The support towers are 35 feet by 50 feet at the base and are 320 feet apart across the pier. Two trolley cranes were self-contained units with a cab

[18] The area around Building 707 was known as the "707 Triangle." It was formed by the intersections of I Street, J Street and Manseu Street. It was used as a staging area for radiologically contaminated waste prior to its disposal at sea.

for the operator and cable extensions to lift and move large objects. The trolley cranes were removed in about 1970.[19]

Other buildings constructed in the post-war period include series of later pre-fabricated, metal-clad buildings, built near the base of the 450-ton bridge crane in the 1960s (Buildings 377, 379 and 380).

Figure 27. Building 815 was constructed in 1955 to consolidate laboratory and office facilities for NRDL. The building has historically been referred to as RADLAB. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

[19] Bonnie Baumburg, Urban Programmers, National Register of Historic Places Nomination: 450-ton Bridge Crane, Hunters Point Shipyard, 1988. As cited in JRP Historical Resources Consulting Services, Historic Context and Inventory Evaluation of Buildings and Structures: Hunters Point Shipyard, September 1997. The crane is not currently listed on the NRHP.

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IV. EVALUATIVE FRAMEWORK

Cultural resources are defined as buildings, sites, structures, or objects, each of which may have historical, architectural, archaeological, cultural, or scientific importance. Numerous laws, regulations, and statutes, on both the federal and state levels, seek to protect and target the management of cultural resources. Depending upon a variety of preconditions such as the inclusion of federal monies or significant effects on wetlands, federal or state law may be the primary governing code. These laws include the National Environmental Policy Act (NEPA), the National Historic Preservation Act (NHPA), and the California Environmental Quality Act (CEQA). For the purposes of the environmental documentation for the project, cultural resources are considered under Section 106 of the NHPA and CEQA.

SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the NHPA requires federal agencies and those they fund or have approval authority over to consider the effects of their actions on properties that may be eligible for listing or are listed in the NRHP. To determine whether an undertaking could affect NRHP-eligible properties, cultural resources (including archaeological, historical, and architectural properties) must be inventoried and evaluated for listing in the NRHP. Although compliance with Section 106 is the responsibility of the lead federal agency, others can undertake the work necessary to comply with Section 106. The Section 106 process entails the six primary steps listed below[20]:

- Initiate consultation and public involvement.
- Identify and evaluate historic properties.
- Assess effects of the project on historic properties.
- Consult with the SHPO regarding adverse effects on historic properties, resulting in a memorandum of agreement (MOA).

[20] Not all steps are necessary for all projects. If no historic properties are identified, no additional steps are taken. If the project will not have an adverse effect on historic properties, no MOA is necessary.

- Agency official (from USACE) submits the MOA to the Advisory Council on Historic Preservation (ACHP).
- Proceed in accordance with the MOA.

NATIONAL REGISTER OF HISTORIC PLACES (NRHP)

The National Register is the nation's master inventory of known historic resources. It is administered by the National Park Service (NPS) in conjunction with SHPO. The National Register includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state, or local level. The National Register criteria and associated definitions are outlined in National Register Bulletin Number 15: How to Apply the National Register Criteria for Evaluation. The following is a summary of Bulletin 15:

Generally, resources (structures, sites, buildings, districts and objects) over 50 years of age can be listed in the National Register provided that they meet the evaluative criteria described below. Resources can be listed individually in the National Register or as contributors to an historic district.[21] The National Register criteria are as follows:

A. Resources that are associated with events that have made a significant contribution to the broad patterns of history;

B. Resources that are associated with the lives of persons significant in our past;

C. Resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

[21] A "contributor" is a building, site, structure, or object that adds to the historic associations or historic architectural qualities for which a property is significant. The contributor was present during the period of significance, relates to the documented significance of the property, and possesses historic integrity or provides important information about a period; or the contributor independently meets National Register criteria. A "non-contributor" does not add to the historic associations or historic architectural qualities as it was not present during the period of significance; it has experienced alterations, disturbances, additions, or other changes; or it does not independently meet the National Register criteria.

D. Resources that have yielded or may likely yield information important in prehistory or history.

Certain resources are not usually considered for listing in the National Register. These properties can be eligible for listing, however, if they meet special requirements, called Criteria Considerations (A-G), in addition to meeting the regular requirements (that is, being eligible under one or more of the four significance criteria and possessing historic integrity). Generally, such properties will qualify for the National Register if they fall within the following seven criteria considerations:

A. A religious property deriving primary significance from architectural or artistic distinction or historical importance;

B. A building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event;

C. A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his or her productive life;

D. A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events;

E. A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived;

F. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or

G. A property achieving significance within the past 50 years if it is of exceptional importance.

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When nominating a resource to the NRHP, one must evaluate and clearly state the significance of that resource to American history, architecture, archaeology, engineering, or culture. A resource may be considered individually eligible for listing in the NRHP if it meets one or more of the above listed criteria for significance and it possesses historic integrity. Historic properties must retain sufficient historic integrity to convey their significance.

The National Register recognizes seven aspects or qualities that define historic integrity:

- **Location**. The place where the historic property was constructed or the place where the historic event occurred.
- **Design**. The combination of elements that create the form, plan, space, structure, and style of a property.
- **Setting**. The physical environment of a historic property.
- **Materials**. The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- **Workmanship**. The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- **Feeling**. A property's expression of the aesthetic or historic sense of a particular period of time.
- **Association**. The direct link between an important historic event or person and a historic property.

To retain historic integrity, a resource should possess several of the above-mentioned aspects. The retention of specific aspects of integrity is essential for a resource to convey its significance. Comparisons with similar properties should also be considered when evaluating integrity as it may be important in deciding what physical features are essential to reflect the significance of a historic context.

THE CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

The California Environmental Quality Act (CEQA) provides the legal framework by which historical resources are identified and given consideration during the planning process. The law was adopted in 1970 and incorporated in the Public Resources Code §§21000-21177. CEQA's basic functions are to:

- inform governmental decision makers and the public about the potential significant environmental effects of proposed activities;
- identify ways to reduce or avoid adverse impacts;
- offer alternatives or mitigation measures when feasible; and
- disclose to the public why a project was approved if significant environmental effects are involved.

CEQA applies to projects undertaken, funded or requiring an issuance of a permit by a public agency. The analysis of a project required by CEQA usually takes the form of an Environmental Impact Report (EIR), Environmental Impact Statement (EIS), Negative Declaration (ND), or Environmental Assessment (EA).[22]

CALIFORNIA REGISTER OF HISTORICAL RESOURCES (CRHR)

The CRHR is a guide to cultural resources that must be considered when a government agency undertakes a discretionary action subject CEQA. The CRHR helps government agencies identify and evaluate California's historic resources, and indicates which properties are to be protected, to the extent prudent and feasible, from substantial adverse change.[23] Any resource listed in, or eligible for listing in, the CRHR is to be considered during the CEQA process.

1. A cultural resource is evaluated under four CRHR criteria to determine its historical significance. A resource must be significant in accordance with the one or more of the following criteria (as defined in §15064.5(a)(3):

2. Is associated with events that have made a significant contribution to the broad pattern of California's history and cultural heritage;

3. Is associated with the lives of persons important in our past;

[22] http://www.aqmd.gov/ceqa/
[23] PRC §5024.1(a)

4. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

5. Has yielded, or may be likely to yield, information important in prehistory or history.

In addition to meeting one or more of the above criteria, the CRHR requires that sufficient time must have passed to allow a "scholarly perspective on the events or individuals associated with the resource." Fifty years is used as a general estimate of the time needed to understand the historical importance of a resource.[24] The OHP recommends documenting, and taking into consideration in the planning process, any cultural resource that is 45 years or older.[25] As such, this report evaluates all resources 45 years or older for the purposes of CEQA.

CRHR criteria are similar to National Register criteria, and are tied to CEQA, as any resource that meets the above criteria, and retains a sufficient level of historic integrity, is considered an historical resource under CEQA. Integrity is the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Historical resources eligible for listing in the California Register must meet one of the criteria of significance described above and retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register.[26]

Resources that are significant, meet the age guidelines, and possess integrity will generally be considered eligible for listing in the CRHR.

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[24] CCR 14(11.5) §4852 (d)(2).
[25] California Office of Historic Preservation, 1995, p.2. Instructions for Recording Historical Resources. Office of Historic Preservation, Sacramento.
[26] California Office of Historic Preservation, 2006, p.2. California Register and National Register: A Comparison. Technical Assistance Series No. 6. California Department of Parks and Recreation, Sacramento. Assistance Series No. 6. California Department of Parks and Recreation, Sacramento.

HISTORIC DISTRICTS

According to National Register Bulletin 15 (NRB15), a historic district "possesses a significant concentration, linkage, or continuity of sites, buildings, structures, or objects united historically or aesthetically by plan or physical development." Bulletin 15 continues:

CONCENTRATION, LINKAGE, & CONTINUITY OF FEATURES

> "A district derives its importance from being a unified entity, even though it is often composed of a wide variety of resources. The identity of a district results from the interrelationship of its resources, which can convey a visual sense of the overall historic environment or be an arrangement of historically or functionally related properties. For example, a district can reflect one principal activity, such as a mill or a ranch, or it can encompass several interrelated activities, such as an area that includes industrial, residential, or commercial buildings, sites, structures, or objects. A district can also be a grouping of archeological sites related primarily by their common components; these types of districts often will not visually represent a specific historic environment.

SIGNIFICANCE

> "A district must be significant, as well as being an identifiable entity. It must be important for historical, architectural, archeological, engineering, or cultural values. Therefore, districts that are significant will usually meet the last portion of Criterion C plus Criterion A, Criterion B, other portions of Criterion C, or Criterion D.

TYPES OF FEATURES

> "A district can comprise both features that lack individual distinction and individually distinctive features that serve as focal points. It may even be considered eligible if all of the components lack individual distinction,

provided that the grouping achieves significance as a whole within its historic context. In either case, the majority of the components that add to the district's historic character, even if they are individually undistinguished, must possess integrity, as must the district as a whole...A district can contain buildings, structures, sites, objects, or open spaces that do not contribute to the significance of the district. The number of noncontributing properties a district can contain yet still convey its sense of time and place and historical development depends on how these properties affect the district's integrity.

GEOGRAPHICAL BOUNDARIES

A district must be a definable geographic area that can be distinguished from surrounding properties by changes such as density, scale, type, age, style of sites, buildings, structures, and objects, or by documented differences in patterns of historic development or associations. It is seldom defined, however, by the limits of current parcels of ownership, management, or planning boundaries. The boundaries must be based upon a shared relationship among the properties constituting the district.

DISCONTIGUOUS DISTRICTS

A district is usually a single geographic area of contiguous historic properties; however, a district can also be composed of two or more definable significant areas separated by non-significant areas. A discontiguous district is most appropriate where:

- Elements are spatially discrete;
- Space between the elements is not related to the significance of the district; and
- Visual continuity is not a factor in the significance."[27]

[27] U.S. Department of the Interior, National Park Service. National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation, Section IV. Online at : http://www.nps.gov/nr/publications/bulletins/nrb15/nrb15_4.htm#district (Accessed: 7.10.2009).

SAN FRANCISCO LANDMARKS AND HISTORIC DISTRICTS

According to the San Francisco Planning Department:

> "The City of San Francisco maintains a list of locally designated City Landmarks and Historic Districts, similar to the National Register of Historic Places but at the local level. Landmarks can be buildings, sites, or landscape features. Districts are defined generally as an area of multiple historic resources that are contextually united. The regulations governing Landmarks, as well as the list of individual Landmarks and descriptions of each Historic District, are found in Article 10 of the Planning Code."[28]

According to San Francisco Preservation Bulletin #5, the San Francisco Landmarks Advisory Board and the Planning Commission use the National Register Criteria for evaluating potential historic properties.

HISTORICAL RESOURCE STATUS CODES

Properties included in the survey were assigned California Historic Resource Status Codes. Status codes reflect the eligibility of a resource at a specific point in time (the time the evaluation was performed) and therefore do not necessarily reflect the eligibility of a resource at a later point in time. If a resource is altered and changed in the future, it may no longer be eligible for the same historic resource designation.

New California Historical Resource Status Codes were instituted by the California State Office of Historic Preservation effective August 2003. The updated codes were used for this study. All applicable codes were assigned in order to provide as much information as possible for local planning officials.

[28] San Francisco Planning Department website, Historic Preservation: http://www.sfgov.org/site/planning_index.asp?id=77300#landmarks (accessed 5.14.2009).

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V. SURVEY RESULTS

INDIA BASIN SURVEY AREA

DESCRIPTION

According to the Project Description, the India Basin Shoreline Plan area, also known as Bayview Hunters Point Redevelopment Area C, encompasses:

> "…approximately 76 acres, including approximately 59.5 acres that are privately owned, 7.2 acres that are publically owned, and about 9.3 acres in public right of way…Existing land uses include residential, industrial, unimproved public shoreline open space, India Basin Shoreline Park, and vacant land. Residential uses, with some commercial uses, generally front on Innes Avenue. Industrial uses are interspersed among residential uses near the shoreline, including a boatyard on India Basin east of Innes Avenue. Activities at the boatyard are limited by tidal flows and shallow water depth. The former PG&E Hunters Point Power Plant, on a 35-acre site near Jennings Street and Hunters Point Boulevard, has been dismantled. The adjacent existing PG&E switching station is operational. A former PG&E fuel tank site is directly across Hunters Point Boulevard from the PG&E power plant site. Heron's Head Park is immediately north of the area, with industrial uses and Port of San Francisco maritime uses further north.

> "There are many vacant and underused parcels in India Basin. One of the largest vacant properties is a 13.5-acre privately owned parcel fronting the Bay northeast of Innes Avenue and bisected by Arelious Walker Drive, just north of the HPS. This site was previously referred to as the "Ferrari Site" and more recently as the "India Basin Flats." The shoreline band adjacent

to India Basin Flats site is open space owned by the San Francisco Recreation and Park Department."[29]

PREVIOUS SURVEY FINDINGS

India Basin neighborhood

Kelley & VerPlanck Historical Resources Consulting recently completed a historical resources survey of a large portion of the India Basin neighborhood for the Bayview Historical Society. The complete historical background and findings of this survey are documented in the report titled *India Basin Survey, San Francisco, California (Final Report, 1 May 2008)*.[30] The findings of this survey are summarized as follows.

Kelley & VerPlanck (K&VP) surveyed a roughly six-block area of the India Basin neighborhood including 113 single-family, industrial, maritime, and vacant properties. The boundaries of the India Basin survey area include the San Francisco Housing Authority's (SFHA) Westbrook and Hunters Point housing projects to the west and south, Earl Street to the east, and Hudson Avenue to the north. It also includes portions of two partially submerged blocks between Hudson and Galvez Avenues. (See survey area map with parcel ID numbers below).

Out of the 113 properties surveyed, K&VP identified four properties that appear to be eligible for listing on the California Register of Historical Resources: 702 Earl Street (APN: 4644/001 & 011); 900 Innes Avenue (APN: 4646/003); 911 Innes Avenue (APN: 4653/019); and 967 Innes Avenue (APN: 4653/012A). In early 2008, the Shipwright's cottage at 900 Innes Avenue became San Francisco Landmark #250. The former Albion Brewery building at 881 Innes Avenue (APN 4654/013) was found to appear eligible for listing on the National Register of Historic Places. The India Basin survey also identified a potential historic district, the India Basin Boatyards. According to the Department of Parks and Recreation District Record form for the proposed district:

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[29] PBS&J for SFRA, Bayview Waterfront Project, Administrative Draft EIR – June 2009, p. II-12.

[30] Kelly and VerPlanck, Historical Resources Consulting. *India Basin Survey*, *Final Report.* Prepared for the Bayview Historical Society (1 May 2008).

> "The India Basin boat yards are located on the southern side of India Cove in the India Basin neighborhood of San Francisco. The proposed district is comprised of eight parcels within an area bounded roughly by Hunters Point Boulevard, Innes Avenue, Fitch Street and Galvez Avenue. The core of the proposed district centers on the intersection of Hudson Avenue and Griffith Street, neither of which is an officially opened street according to the Department of Public Works. The eight parcels are identified by their APN (Assessor Parcel Number): 4629A/010, 4630/002 and 006, 4645/010, 010A, and 011; and 4646/001 and 002. Although the ownership of these parcels is divided between several different owners and two boat yards have occupied the area since the 1960s, the entire survey area historically operated as a single yard (Anderson & Cristofani) before ca. 1965 and will therefore be described and evaluated as a single continuous property. The proposed district slopes gently downhill from near Innes Avenue to India Cove and extends into open water. Most of the land was historically either submerged tidelands or tidal flats that have since been filled. Remnants of piers and wood pilings extend into the shallow waters of India Cove, an area still occupied by submerged water lots and unopened 'paper' streets."[31]

Kelley & VerPlanck found that "the boat yards of India Basin appear eligible for listing in the California Register under Criteria 1 (Events) and 3 (Design/Construction)…as the last remaining historic boat yard at India Basin, the center of the bay scow building and repairing industry from the early 1870s to the mid-1930s."[32]

Pacific Gas & Electric (PG&E) Plant – Hunters Point

Blocks 4580, 4604A, 4603A and a portion of Block 4602A (Parcel ID# 1, 8, 7 and 6) are owned by PG&E and are the site of the former PG&E Hunters Point Power Plant, a

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[31] Kelly and VerPlanck, Historical Resources Consulting. *India Basin Survey*, *Final Report.* Prepared for the Bayview Historical Society (1 May 2008), Appendix – District Record Form.
[32] Ibid.

35-acre site near Jennings Street and Hunters Point Boulevard that has been dismantled. The existing PG&E switching station is operational. A former PG&E fuel tank site is directly across Hunters Point Boulevard from the PG&E power plant site (Parcel ID # 7).

San Francisco Planning Department staff determined that the PG&E power plant building, constructed in 1929, was not a historic resource in a memorandum dated October 26, 2006. The planning department finding supported an earlier evaluation completed in September 2006 by Roland Nawi Associates and the building was demolished in 2008.[33] No other historic resources are present on the former PG&E Hunters Point Power Plant site (Parcel ID# 1, 8, 7 and 6) (see Figure 28.)

CIRCA SURVEY RESULTS

The remaining parcels within the India Basin survey area are comprised of unimproved public shoreline open space, India Basin Shoreline Park, and vacant land. No buildings or structures over 45 years old were found. This includes the following parcels, as identified in the survey map above by ID numbers: 2-5, 9-16, 17-35, 37-40, 43-45, 47, 49, 50-52. As such, no evaluation of historic resources is necessary. A survey matrix with property information and survey ID numbers keyed to the map below is located in Appendix C of this report.

[33] See: Planning Department, *Historic Resources Evaluation Response Memorandum for 1000 Evans Avenue*, October 26, 2006. Also see: Roland Nawi Associates: Preservation Consultants, PG&E Hunters Point Station P Evaluation of Eligibility, September 2006. A copy of each document is available for public review by appointment at the Planning Department as part of Case File No. 2006.1297E.

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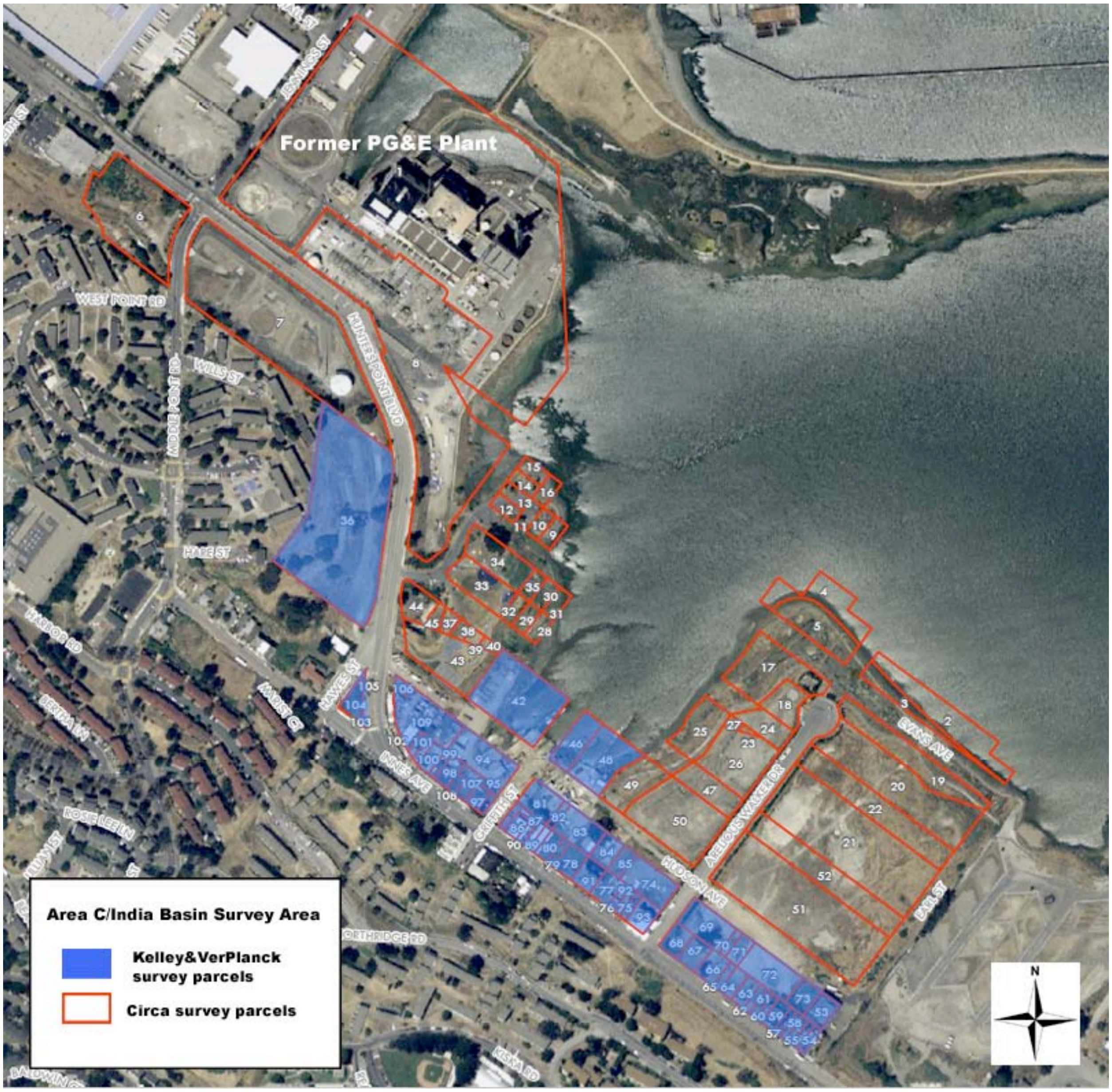

Figure 28. India Basin survey area showing lot lines and area boundaries. Base map courtesy of PBS&J.

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CANDLESTICK POINT SURVEY AREA

DESCRIPTION

The Candlestick Point survey area encompasses most of the Candlestick Point part of the BVHP Plan ("Area B"), including the Candlestick Park sports stadium (formerly Monster Park), the Alice Griffith Public Housing site and Candlestick Point State Recreation Area (See survey area map with parcel ID numbers below). According to the Project Description:

"The Candlestick Point area is approximately 267 acres, including the Alice Griffith public housing site. Current land uses in the Candlestick Point area include Candlestick Park stadium, owned by the City and County and leased by the San Francisco 49ers National Football League team, and associated parking lots and access roadways. The stadium and parking lot areas are under the jurisdiction of the San Francisco Recreation and Park Department. The area includes several privately owned parcels near Gilman Avenue and Arelious Walker Drive, north of the stadium. That area is primarily vacant and used for stadium parking. A recreational vehicle park occupies a portion of the site on Gilman Avenue. The Candlestick Point area also includes the Alice Griffith public housing site, which is bounded by Gilman Avenue on its southwest, Hawes Street on the northwest, Carroll Avenue on the northeast and Arelious Walker Drive on the southeast."[34]

Please see Figure 29 for a visual overview of the Candlestick Point survey area. A survey matrix with property information and survey ID numbers keyed to the map below is located in Appendix C of this report.

[34] PBS&J for SFRA, Bayview Waterfront Project, Administrative Draft EIR – June 2009, p. II-11. (Confirm proper citation for final).

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Figure 29. Candlestick Point survey area showing lot lines and area boundaries. Base map courtesy of PBS&J.

PREVIOUS SURVEY FINDINGS

Candlestick Park

In May 2007, Architectural Historian Kathryn Hayley of Jones & Stokes completed a review of Monster Park (APN: 5000 001 30), a.k.a. Candlestick Park, for its eligibility for listing in the National Register of Historic Places (NRHP) as part of the Bayview Transportation Improvements Project.[35] This evaluation determined that Monster Park, which was constructed in 1960, did not meet the criteria that would qualify it as exceptional as a property that is less than 50 years of age. The conclusions are quoted below:

> "Although Candlestick/Monster Park is a well-known building in San Francisco, California, it does not appear to meet the threshold of NRHP exceptional significance for buildings less than 50 years old (Criterion G)…Although a number of culturally important events have occurred at Candlestick Park, in comparison to [other properties that have met this criterion such as the Whitney Museum of American Art in New York City], the building, one of many sports stadiums located in the United States, does not appear to embody qualities and characteristics (outstanding cultural, engineering or architectural significance) that would allow it to meet the 'exceptional significance' threshold, and therefore requires no further formal consideration.
>
> "In addition, Monster Park has been extensively altered since its initial construction in 1960, including ongoing maintenance and upgrades, the extensive expansion and enclosure of the structure in 1970, and the recent conversion of the park to a football-only facility. Because of these

[35] For full evaluation see: Memorandum, Kathryn Hayley to Meg Scantlebury, Re: Bayview Transportation Improvements Project – Evaluation Exemption for Monster Park (APN 5000 001 30) as per Attachment 4 of the Programmatic Agreement (15 May 2007). Memorandum in Appendix B of the Final Historic Property Survey Report, Bayview Traffic Improvements Project, Caltrans District 4, San Francisco, CA (October 2007), 1-13.

> changes, Monster Park does not appear to meet the high level of integrity necessary for the property to be considered exceptionally significant under NRHP Criterion G.[36]

The report concludes with the recommendation that the property be reevaluated for NRHP eligibility when it reaches the 50-year mark (in 2010). The property has not been evaluated for California Register eligibility and has not been previously included or listed in any local survey of historic properties.

Alice Griffith Public Housing

No previous studies have evaluated Alice Griffith Public Housing for eligibility for the National, State or local registers.

CIRCA SURVEY RESULTS

All parcels along the south side of the survey area (ID# 155, 134-143, 145-147, 150-154) and the large parcel that forms the eastern boundary (ID# 112) are State and privately owned property occupied by Candlestick Point State Recreation Area. The park is minimally developed with vehicle and pedestrian access paths. No buildings or structures over 45 years old are present.

The two parcels along the west side of Jamestown Avenue are vacant parcels that border the eastern side of Bayview Park. The south parcel (ID# 144) is owned by the City's Recreation and Park Department and the north parcel (ID# 148) is privately owned. No buildings or structures over 45 years old are present.

The four blocks bounded by Egbert Avenue (NE), Donahue Street (SE), Gilman Avenue (SW) and Arelious Walker Drive (NW) are occupied by vacant land used for parking lots and the Candlestick RV Park. The Candlestick RV Park property (parcel ID # 116-127, 129-130) is comprised of a paved parking area for RV parking and a modern building that faces Gilman Avenue. A sheltered storage area is located along the Egbert Avenue border. Just northwest of the RV Park are three vacant parcels (ID# 131-133) that

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[36] Ibid, 9-10.

appear to be used for event parking. Two additional vacant parcels (ID# 114-115) and one largely open parcel (ID# 113) containing three modern storage buildings are located just northeast of this parking area. Across Aurelious Walker Drive, an additional parcel (ID# 111) is cleared and used for event parking. No buildings or structures over 45 years old are present.

The remaining parcels comprise Candlestick Park (ID# 149) and Alice Griffith Public Housing (ID# 110).

Candlestick Park

It was beyond the scope of this project to conduct any additional review of the Candlestick Park stadium, however, Circa recommends that the property be reevaluated for eligibility for listing on the National Register of Historic Places once it meets the 50-year mark in 2010. Additionally, since the California Office of Historic Preservation recommends recordation of buildings 45 years old or older, Circa recommends the building be evaluated for the California Register of Historical Resources and for local listing as a San Francisco Landmark

Alice Griffith Public Housing

At the time of this evaluation the property is 47 years old. In general, in order to qualify for listing on the National or California Registers, a property must be 50 years old, meet one of the four criteria for significance and retain integrity. Unless the property demonstrates exceptional significance, a property less than 50 years old is not eligible for listing. However, the California Office of Historic Preservation recommends the recordation of properties 45 years or older, recognizing that there is commonly a five year lag between resource identification and the date that planning decisions are made. As such, an evaluation has been provided below.

<u>Description</u>

The Alice Griffith Housing Development sits on a single large parcel in the Bayview-Hunters Point neighborhood of San Francisco. Set on a rise overlooking Monster Park to the south, the development is generally bound by Carroll Avenue (north), Arelious Walker Drive (east), Gilman Avenue (south) and Hawes Street (west). A guard kiosk secures the property's Fitzgerald Avenue entrance at Cameron Way. The housing stock consists of 33 apartment buildings, constructed from standardized plans using five slightly different building types. The six (6) Type A buildings and eight (8) Type B buildings contain six (6) apartments each, the four (4) Type C buildings and seven (7) Type E buildings have ten (10) apartments per building, and the eight (8) Type D buildings each contain seven (7) apartments. The buildings line a simple circulation network of streets including Double Rock Street, a cul-de-sac named after the geologic formation visible at low tide nearby. (This is also the name of the war housing development that occupied this site during WWII – see *Bayview Waterfront Plan Historic Resources Evaluation, Volume I: Historic Context Statement*).

Rectangular in plan, the concrete buildings are topped by a side-facing, gravel covered gable roof and exterior walls are clad primarily in stucco with board and batten panels surrounding the second-story windows. The number of windows per building varies by building type, though the metal sash windows are consistent throughout. These are three-lite vertical windows with central awning sash at the ground level and two-lite windows at the upper level with fixed transom and lower awning sash. Each building has a concrete front walk and entry step and a rear, shared rectangular concrete patio with concrete planters and clotheslines. Simple flat roofs project over both the front and rear entry porches. A community garden and basketball court are located along the east side of the development, and the modern Alice Griffith Opportunity Center building is located at the southeast corner, adjacent to the development's Griffith Street entrance. The housing development was completed in 1962 and rehabilitated in 1980. Common alterations include installation of metal screen doors and window bars at the first floor windows. Some window and door openings have been covered with plywood panels. Though most of the original concrete planters are still extant, the original plantings have not been maintained. The property appears to be in good to fair condition.

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Evaluation

Under Criterion A/1, archival research yielded no information indicating that Alice Griffith Housing complex is strongly associated with an event or pattern of events important to local or regional history, or to the cultural heritage of California or the United States. The development was one of a number of housing developments constructed as part of the San Francisco Housing Authority's (SFHA) post WWII campaign to replace temporary war housing and address the need for public housing in the city. Though associated with this pattern of events, "mere association with historic events or trends is not enough to qualify under this criterion, and the property's specific association must be considered important as well". Since the property is not notably associated with the SFHA's building campaign or public housing in San Francisco, the development does not appear to be eligible for listing on the NRHP/CRHR under Criterion A/1.

The subject property also does not appear to be eligible under Criterion B/2 for association with persons significant in local, state or national history. Although later named for former SFHA board member Alice Griffith, the housing equality advocate died in 1959 and therefore has no direct involvement with the housing development. The property is not directly associated with Griffith's productive life and is therefore not eligible for listing on the NRHP/CRHR under Criterion B/2.

The subject property does not notably embody the distinctive characteristics of a type, period, region or method of construction, or represent the work of a master or possess high artistic values. While representative of its period, the overall architectural design displays no exceptional design characteristics. Further, though the property was designed by notable architects (Hertzka & Knowles and H.C. Baumann Associated Architects) and a well-known landscape architect (Douglas Bayliss), it is not particularly illustrative of any one of their characteristic design styles. A property is not eligible as the work of a master simply because it was designed by a prominent architect. Therefore, the subject property does not appear to be eligible for listing on the NRHP/CRHR under Criterion C/3.

Archival research provided no indication that the property has the potential to yield information important to prehistory or history, therefore the property does not appear to be eligible for the NRHP/CRHR under Criterion D/4.

Additionally, for the reasons noted above, the Alice Griffith Housing site does not appear to be eligible for local listing as a San Francisco Landmark or historic district.

HUNTERS POINT SHIP YARD SURVEY AREA

The Hunters Point Shipyard is comprised of approximately 420 acres of dry land and contains many buildings and structures associated with ship repair including, berths, piers, dry docks, warehouses, industrial shops, administrative buildings, and other structures, largely from the World War II and immediate post-war eras. Several former Navy buildings are currently leased and occupied as artist studios. The Hunters Point Shipyard survey area primarily consists of Navy Parcels B, C, D and E; most of the residential, commercial and administrative buildings on Parcel A were demolished in 2006-2007. Parcel F is comprised of approximately 440 acres of submerged lands in the San Francisco Bay surrounding the central portion of HPS to the north, east, and south.[37] Figure 30 below illustrates the existing Navy parcels and survey boundaries. The entire Hunters Point Shipyard survey area is currently under the jurisdiction of the U.S. Navy.[38]

PREVIOUS EVALUATIONS

Two prior historic resource evaluation reports for HPS have been completed since it was decommissioned in the 1970s. Bonnie L. Baumberg, of Urban Programmers in San Jose, prepared an historic context and evaluation document for the Navy in 1988. The report, entitled, *Historical Overview of Hunters Point Annex, Treasure Island Naval Base and Descriptions of Properties that Appear to Qualify for Listing in the National Register of Historic Places*, included a historical overview and evaluation forms (DPR 523 forms)

[37] Portions of Parcel F in HPS Phase II are proposed for water-related uses.
[38] PBS&J for SFRA, Bayview Waterfront Project, Administrative Draft EIR – June 2009, p. II-11 – II-12.

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Figure 30. Map of the Hunters Point Shipyard survey boundaries. Map courtesy of PBS&J.

for buildings and structures that appeared to qualify for listing in the National Register. That report found that the following four properties were eligible for listing on the NRHP:

1. Dry Dock #4

2. Building 253, the Ordinance and Optical Building

3. 450-Ton Bridge Crane

4. The "Hunters Point Commercial Dry Docks Historic District," which included Dry Dock No. 2; Dry Dock No. 3; remnants of Dry Dock No. 1, Pumphouse No. 2 (Building 205); Pumphouse No. 3 (Building 140); a Paint and Tool building (Building 207); a gatehouse (building 204); and the seawall and wharves in the area. Two non-contributing elements were included within the boundaries of this district: a Tool Room (Building 208) and a Shop Building (Building 141).

The report further concluded that no other buildings or structures at HPS qualified for listing on the NRHP.

In a June 1993 response letter to Louis S. Wall of the Naval Facilities Engineering Command in San Bruno, California, Steade R. Craigo, Deputy State Historic Preservation Officer, concurred with the above historic resources survey findings that Dry Docks 2, 3 and 4; Pumphouses No. 2 (Building 205) and 3 (Building 140) and their respective pumping machinery; gatehouse Building 204; wharves; the site of the western tip of Dry Dock No.1; Paint and Tool building (Building 207); and Building 253 were eligible for inclusion on the NRHP as members of a historic district. The letter states that:

> "Each of these resources are significant reminders of the historic function of Hunters Point during its period of significance as both a private and military shipbuilding and dry dock facility. Dry Docks No. 2 and 3 and their respective structures have been suggested as a potential district apart from Dry Dock 4 and Building 253. This is because of the association of

> Dry Docks 2 and 3 with the commercial dry docking enterprises that arose [in that area] in 1866 (when Dry Dock No.1 was constructed) to 1940. This seems appropriate since Dry Dock No.4 and Building # 253 are more closely associated with [the World War II-era function of Hunters Point under the command of the U. S. Navy]."[39]

The letter also upheld the findings that Buildings 208 and 141 were not eligible for listing on the NRHP.

In September 1997, JRP Historical Consulting Services completed an updated report entitled, *Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard, San Francisco, California* for the Naval Facilities Engineering command in San Bruno, California. This report provided the following conclusion regarding properties previously found eligible for the NRHP.

1. Dry Dock #4: Dry Dock # 4 "appears to qualify for listing in the National Register [because] it was and is one of the largest structures of its type on the West Coast and made a significant contribution to the American war effort during World War II. It also retains a high degree of integrity." The California State Historic Preservation Officer (SHPO) concurred with this finding of eligibility.[40]

2. Building 253: "does not meet the criteria for listing in the National Register because it is not significant and because of modifications to it since 1988, attributable chiefly to vandalism and neglect." [The building was also not found to retain a level of significance or integrity that would make it eligible for listing on the NRHP].[41]

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[39] Letter to Louis S. Wall of the Naval Facilities Engineering Command in San Bruno, California, from Steade R. Craigo, Deputy State Historic Preservation Officer, Re: Lease of Parcel A at the Naval Station Treasure Island Hunters Point Annex to the City of San Francisco, 16 June 1993.

[40] JRP Historical Consulting Services, *Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard, San Francisco, California. (*Completed for the Naval Facilities Engineering command in San Bruno, California, 1997), 3.

[41] Ibid, 4.

3. The 450-Ton Bridge Crane: “does not meet the criteria for listing on the National Register. The [SHPO] has agreed that the property does not meet the eligibility criteria for listing in the National Register because it lacks integrity.” The traveling cranes were removed c.1970 and the basic bridge structure is all that remains of the original 1948 crane. In a 1993 letter to the Navy, acting SHPO Steade Craigo concurred that the structure had lost integrity and therefore did not qualify for listing in the National Register.[42]

4. The “Hunters Point Commercial Dry Docks Historic District”: was found to appear eligible for listing in the NRHP with some revisions to the number of contributing buildings. JRP found that the following buildings contributed to the district: Dry Dock No. 2; Dry Dock No. 3; remnants of Dry Dock No. 1, Pump House No. 2 (Building 205); Pump House No. 3 (Building 140); a Paint and Tool building (Building 207); a gatehouse (Building 204). The seawall and wharves were found to no longer retain integrity and therefore no longer qualified as contributors to the district. It was further concluded that the remnants of Dry Dock 1 may or may not exist in the area, a fact that can only be proven by archaeological investigation, and therefore the location should be treated as an archaeologically sensitive area and potential contributing element of the historic district.

In a May 1998 letter to the Navy, the SHPO concurred with the Navy’s findings that the Dry Dock 4 and the Commercial Dry Dock Historic District, which included as contributing structures Dry Dock 2, Dry Dock 3 and Buildings 140, 204, 205 and 207 appeared to qualify as eligible for inclusion in the NRHP.[43]

Currently, the following resources are listed in the Office of Historic Preservation Directory of Properties in the Historic Property Data File with the California Historical Resource Status Code of 2S2 – Individual property determined eligible for the NR by a consensus through Section 106 process and are currently listed on the CRHR:

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[42] Ibid, 4. Also: Letter from Steade Craigo, Acting SHPO to Louis S. Wall, U.S. Navy, 1 April, 1993.
[43] Louis S. Wall, Department of the Navy to Lee Keatinge, Advisory Council on Historic Preservation, October, 15 1998. Findings of May 29, 1998 letter from SHPO to Navy are stated in this letter.

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- Dry Docks No. 2 and No. 3 and associated wharves and seawalls;
- Pump Houses No. 2 and No. 3 (Buildings 205 and 140);
- the (potentially extant) western portion of Dry Dock 1 and;
- the Gatehouse (Building 204).

No other buildings at the Hunters Point Shipyard have been found to be eligible for listing on the NRHP. In these previous studies, however, none of the buildings at HPS have previously been evaluated for listing on the California Register of Historical Resources or for local listing.

CIRCA FINDINGS: RESOURCES PREVIOUSLY FOUND ELIGIBLE FOR NRHP

Note: See Appendix B for DPR forms and Appendix D for a survey matrix with property-specific information and CA Status codes.

Dry Dock 4

Circa concurs with the SHPO finding that Dry Dock 4 appears to qualify for individual listing in the National Register "[because] it was and is one of the largest structures of its type on the West Coast and made a significant contribution to the American war effort during World War II. It also retains a high degree of integrity." Buildings, structures and objects that have been officially determined eligible for listing on the NRHP are automatically considered eligible for listing on the California Register. As such, Dry Dock 4 qualifies as a historic resource for the purposes of CEQA.

Building 253

Circa has found that Building 253, the Optical & Ordnance Building, appears eligible as a contributor to a potential CRHR historic district. See discussion of Hunters Point Commercial Dry Dock and Shipyard Historic District below.

450-Ton Bridge Crane

Circa concurs with the SHPO finding that this crane structure does not meet the criteria for listing on the National Register because it lacks integrity. The traveling cranes were removed c.1970 and the basic bridge structure is all that remains of the original 1948 crane. Additionally, the bridge crane does not appear to have been significantly associated with people or events important to California or local history, and therefore does not appear to be eligible for listing on the CRHR (under Criteria 1 or 2) or for local listing. Because of later alterations, the bridge crane structure does not appear to qualify for listing on the CRHR (Criterion 3) or for local listing as a significant example of a type, period, or method of construction or a representative of a significant technological advance in engineering. As such, the bridge crane does not appear to qualify as a historic resource for the purposes of CEQA. However, the structure has been a prominent point of visual interest along the waterfront since it was constructed and as such may warrant special consideration in the local planning process.

Hunters Point Commercial Dry Dock and Shipyard Historic District

Overview

Hunters Point Shipyard (Shipyard) occupies the eastern end of Hunters Point Hill. What was originally a narrow, steeply sloped finger of bedrock extending into San Francisco Bay has been transformed over the years into a flat expanse of reclaimed land. Part of the reclamation was accomplished through the leveling of portions of the original landform. Today, the Shipyard covers approximately 936 acres, of which approximately 493 acres are dry land and approximately 443 acres are under water.[44] By the time the Navy closed the Shipyard in 1974, the Shipyard contained over 337 industrial buildings, 57 housing and non-industrial buildings, 24,000 linear feet of pier, wall and wharf space, 21 repair berths, 10 additional deep water berths, 6 dry docks and a 225-ton crane (modified from the former 450-ton crane.)[45] As of July 2009, only 137 buildings and structures remain extant on the shipyard property, including only five residential buildings and roughly 15 non-industrial buildings. The piers, seawalls, berths and wharves appear to be generally extant though portions have deteriorated significantly

[44] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Reuse FEIR,* certified February 8, 2000, File No.1994.061E, pp. ES-1.
[45] City and County of San Francisco, Planning Department, *Hunters Point Shipyard Study Options for Future Use*, June 1974, p. 2-12.

due to neglect and exposure. The former 450-ton crane appears to be the last remaining large crane structure on the nearly 500 acres of available land.

The Shipyard has traditionally played a primary role in the development and definition of the Bayview and Hunters Point neighborhoods. In its early days as a private dry dock, it was the largest single commercial entity in the Project vicinity as well as the largest and most modern dry dock on the Pacific Coast.[46] This early enterprise represented a new era in maritime history, spanning from large wooden shipping craft to new steel-hulled vessels. After Navy acquisition in 1939, it brought national attention to the district and eventually resulted in the complete transformation of the economy and demographics of the area.

Naval interest in Hunters Point corresponded to a dramatic expansion in the size and importance of the United States Navy, as well as a general increase in the military's presence on the West Coast. Continued Pacific military campaigns (Philippine War, World War I, World War II) only emphasized the importance of West Coast military facilities. As part of this, the Navy became affiliated with the Hunters Point dry docks during this period, first as a client of the privately held shipyard then as owner of the shipyard. The continued expansion and successful operation of Naval campaigns in the Pacific Ocean was dependent on the availability of the facility's ship-servicing capacity. In 1939, when the Navy purchased Hunters Point, the facility became only the third Naval shipyard on the West Coast and the only one south of Puget Sound capable of handing modern military ships.[47] It retained this status until well after World War II when the Navy changed its policies to rely on private shipyards instead of maintaining its own facilities.

As important as Hunters Point was to the World War II Naval campaigns, it gained significance in its own right in the post-war period through its role as home to the Naval Radiological Defense Laboratory (NRDL). This facility was borne out of necessity in the

[46] "San Francisco Dry Dock: Its Location, Dimensions, Machinery, Etc.," *Daily Alta California*, April 16, 1867.

[47] Twelfth Naval District, Physical Properties Facilities and Services: Naval Activities and Principal Offices, June 1948.

latter war years and grew into a major research facility dedicated to studying the physiological impacts of radiological exposure as well as the detection of and protection from such nuclear hazards. This facility was established at Hunters Point Shipyard because of its many geographic, political and logistical advantages, and operated there from 1944 to 1969. It was one of the only facilities of its kind in the United States in either private or military control, was recognized as a leading research facility on a national scale and played a major role in every U.S. nuclear weapons test during its 25-year history.

Together, these areas of importance are reflected in the built environment. There are a small number of buildings that pre-date the Navy and comprise an already identified potential historic district near Dry Docks 2 and 3. The rest of the Shipyard building stock was historically almost evenly split between World War II era construction and post-war era construction, although recent demolitions have left more World War II structures at the expense of the post-war buildings. While not as impressive architecturally as the earlier dry dock buildings, these later military buildings and structures carried out operations critical to the United States' success during World War II. After the War, the shipyard continued to contribute to the success of military campaigns both as a shipyard as home to the Naval Radiological Defense Laboratory (NRDL, RADLAB).

<u>District Description</u>

The proposed Hunters Point Commercial Dry Dock and Naval Shipyard California Register Historic District is comprised of a collection of buildings, structures and objects associated with the area's transition from early commercial dry dock operation through its period of Radiological research. Hunters Point Shipyard began as the California Dry Dock Company in 1867-1868 when the first dry dock (Dry Dock #1) was cut from solid rock at the northeastern tip of Hunters Point. The dry dock facilities expanded in 1901-1903, when the newly formed San Francisco Dry Dock Company completed Buildings 204 (Gate and Pump House), 205 (Dry Dock No. 2 Pump House) and Dry Dock 2.[48] At the time it was the most modern dry dock on San Francisco Bay. Dry Dock 3 replaced

[48] Building 141, previously identified as a contributor to the potential NR district, has been demolished.

Dry Dock 1 in 1918, in response to an increase in Naval contracts.[49] Building 140 (Dry Dock No. 3 Pump House, 1918) was constructed in conjunction with this phase of development. Buildings 207 (Latrine building) and 208 (Shop Service, Tool Room and Canteen Building) were acquired with the property when the Navy took over in 1939 and were likely built c.1930. Navy records indicate that these two buildings were remodeled in 1942 and may have been moved to their current locations at that time. In 1939, in preparation for WWII, the Navy purchased the dry docks and adjacent support buildings. They then began the first direct government improvements (Building 231, 1942-1945) to expand the existing facilities. When the United States entered WWII in 1941, the Navy dramatically increased construction at Hunters Point to create a high tech shipyard capable of assisting with the maintenance and repair of the Pacific fleet.

The Historic District encompasses a range of buildings from each of the three primary periods of significance for Hunters Point Shipyard: early dry docks, Navy use during WWII, and radiological research in the WWII and post-WWII periods. This is represented by the early dry dock facilities (the previously identified Hunters Point Commercial Dry Dock District), the first building built by the Navy in preparation for WWII (Building 231, completed 1942), buildings important to the functioning of a high-tech mid-century Naval facility (the Optical, Electronics and Ordnance Building (Building 253, completed 1947), the original Shipfitters Shop (Building 211, completed 1942), and an air raid shelter (Building 224, completed 1944), later used for NRDL purposes. Buildings 224 and 253 were also utilized for radiological work at Hunters Point Shipyard in the post-war period. In addition, the chosen boundaries include relevant site features such as rail spurs, crane ways, light standards, bollards, dry dock pumping equipment and other built-ins, fencing and wharves. The remaining buildings (Buildings 214, 218 and 219) within the boundaries of the proposed historic district did not rise to a level of associative or architectural significance to qualify for inclusion.

[49] Dry Dock 3 was partially funded by the Navy to support the ever-increasing size of Naval vessels. This was done as a stop-gap measure while the Navy studied locations in the vicinity upon which to construct their own ship repair facilities.

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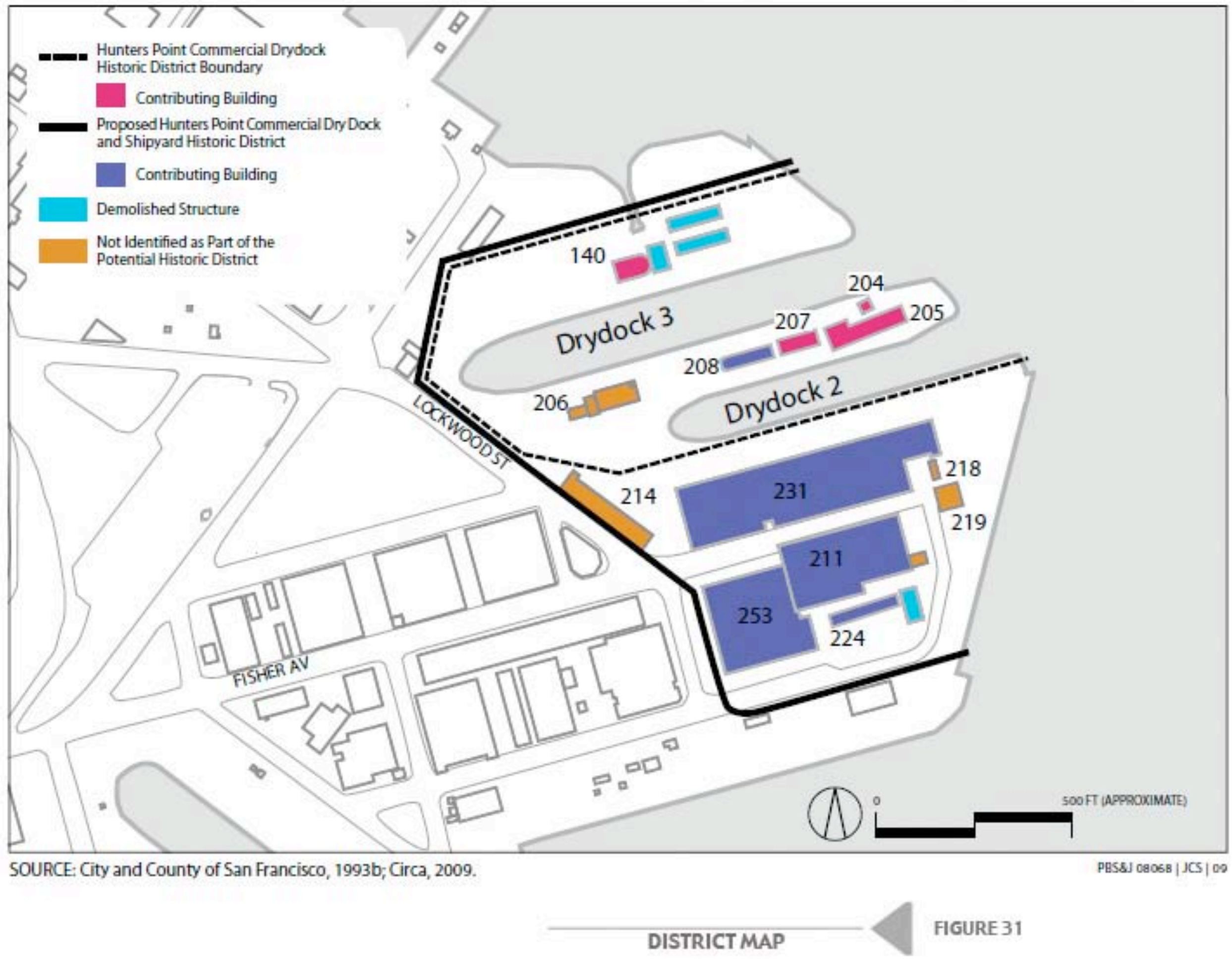

Figure 31. Map of the Hunters Point Shipyard Historic District boundaries. Map courtesy of PBS&J.

Boundary Justification

The proposed district is a potentially California Register-eligible district that circumscribes a previously identified, potentially eligible National Register Historic District (The Hunters Point Commercial Dry Docks Historic District). The boundaries of the new proposed California Register district encompass contributing buildings and structures determined in previous evaluations to be eligible for the National Register of Historic Places (Dry Dock 2, Dry Dock 3, Buildings 140, 204, 205, and 207) as a historic district under Criteria A and C. This eligibility was confirmed by the California State Historic Preservation Office (SHPO) and is therefore automatically considered as an eligible district for the California Register.

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This evaluation proposes to extend the existing National/California Register eligible district boundaries to include contributing buildings and site features constructed by the Navy in both the WWII and post-WWII periods that are significant under Criterion 1 and 3, therefore creating a larger California Register eligible historic district comprised of both NRHP eligible and CRHR eligible resources. The potential CRHR-eligible district possesses a significant concentration of buildings, structures and objects that together convey a visual sense of the overall historic environment that existed at the shipyard throughout the period of significance and includes representative buildings from all phases of development.

Period of Significance

The Period of Significance for the proposed expanded district is from 1903, the date of completion of the oldest extant buildings and structures at the Shipyard (Dry Dock 2, Buildings 204 and 205), through 1969, the year NRDL was decommissioned. Throughout this period, the proposed Hunters Point Commercial Dry Dock and Shipyard Historic District represents early commercial dry docking activities, state-of-the-art ship repair facilities and activities associated with a major national research institution (NRDL).

Evaluation

The Hunters Point Shipyard has a long history that began during a period of transition between wood-hulled sailing vessels and steel-hulled motor-driven vessels and ended with modern military warcraft. It serviced private ships during the height of water shipping on San Francisco Bay as well as military ships during four major wars/conflicts (Philippine-American War, World War I, World War II and the Korean Conflict.) During this time, it also served as a major radiological research facility that was unique within the United States military. This evaluation includes buildings that individually represent these various areas of significance and collectively demonstrate the broad spectrum of historical development at the Shipyard.

The first building built by the Navy in preparation for WWII was Building 231 (1942-1945), the Inside Machine Shop. Constructed by the San Francisco-based firm of Barrett & Hilp and situated adjacent to Dry Dock 2, the curtain-wall building was for a brief period the only major functional shop at the Shipyard as the United States headed into WWII. Building 211 was also one of the first erected by the Navy. Constructed in 1942 by Barrett & Hilp, the building was the original Shipfitters Shop and is a good representation of the typical semi-permanent, monitor-roof shop building constructed throughout the Shipyard during the WWII era. Building 224, a concrete air raid/bomb shelter building built in 1944, and later used as an annex for the Naval Radiological Defense Laboratory (NRDL, RADLAB), is a unique representative of its type at the Shipyard. The only building within the proposed district completed after WWII is the Optical, Electronics and Ordnance Building (Building 253) finished in 1947 and attached to the west elevation of Building 211. This concrete frame curtain wall building, designed for the Navy by local architect Ernest J. Kump, was a highly specific repair and research facility. Related site features associated with the district include light standards, rail spurs, crane tracks, dry dock perimeter fencing, bollards and cleats.

According to the California Office of Historic Preservation, historic districts "consist of a significant concentration or continuity of associated historical resources. [They] may be recognized and documented at the time a survey is conducted, or they may become apparent only after several survey efforts reveal the historical relationships among the individually recorded resources in a given geographic region." National Register Bulletin No. 15, *How* to *Apply the National Register Criteria for Evaluation,* states that, "A district derives its importance from being a unified entity, even though it is often composed of a wide variety of resources. The identity of a district results from the interrelationship of its resources, which can convey a visual sense of the overall historic environment or be an arrangement of historically or functionally related properties."

The potential historic district encompasses a cross section of buildings, structures and objects, varying in age and function from the early commercial dry dock operations (1903), through the Shipyard's function as a high tech naval ship repair and decontamination facility in WWII, and as a ship repair and radiological research facility in the post WWII-period (1946-1969). The industrial buildings (140, 204, 205, 207, 208, 211, 231, 224 and 253), Dry Docks (#2 and #3), and other related site features represent a microcosm of the historical development and context of the Hunters Point Shipyard. The potential district contains previously determined National Register eligible buildings (automatically listed as a district on the California Register) as well as recommended contributors to a new expanded California Register Historic District. Though the condition of the buildings ranges from good to fair, the potential district as a whole retains a high degree of integrity of location, design, setting, workmanship, materials, association and feeling.

A district can comprise both features that lack individual distinction and individually distinctive features that serve as focal points. While buildings 207, 208, 231, 211, 224 and 253 may not be individually eligible for listing on the California Register, when combined with the historic dry docks and associated buildings, the district is a physical representation of the broad history of the Hunters Point Shipyard.

Note: no buildings remain from the earliest dry dock operations within the proposed historic district boundaries. Remnants of Dry Dock 1 (1868), which was replaced by Dry Dock 3 in 1918, may or may not exist in the area with sufficient potential to yield information that make the property eligible for the National Register. That point can only be proven through subsurface investigation. Until existence of the remnants of Dry Dock 1 has been demonstrated, its location should be treated as an archaeologically sensitive area and as a potential contributing element of the district.

CIRCA FINDINGS: RESOURCES PREVIOUSLY FOUND INELIGIBLE FOR NRHP

As part of the evaluation process, Circa completed additional research and analysis on a number of the more architecturally and/or functionally notable buildings from the Pre-WWII, WWII and Post WWII eras that retained a relatively good degree of integrity in order to determine if they displayed a level of significance that would make them individually eligible for listing on the NRHP, the CRHR or for local listing. These buildings and our evaluations are discussed below.

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Note: Please see DPR Primary A forms in Appendix B for photographs and physical descriptions of the following buildings. Those buildings that lacked integrity and those that are not yet 45 years old were not recorded but are noted in the matrix of shipyard buildings found in Appendix D.

Pre-WWII Buildings[50]

Building 109

Building 109 is a one-story, Spanish Revival style building constructed on Robinson Street in 1934. Triangular in plan and set into the hillside, the building is topped by a flat roof with Spanish-tiled parapets along the primary (south) elevation. The building was originally a restaurant that the Navy later adapted for use as a police station during World War II. Building 109 does not appear to qualify for listing in the NRHP, the CRHR or for local listing because it is not strongly associated with a significant historic event or person. Though the building is the only Spanish Revival style building at the shipyard, it is not a rare or distinctive example of the style. Additionally, original architectural elements appear to have been removed and some window openings have been infilled, alterations that have resulted in a diminished degree of historic integrity. As such, the building does not appear to be individually eligible for listing on the NRHP, CRHR or local register.

WWII-era Buildings[51]

Building 101 – Main Administration Building

This two-story Main Administration Building, built in 1943, sits on a rise overlooking the shipyard's heavy industrial center (200 series buildings). The compound plan building is organized around a central core that runs east to west, with five cross wings that extend across the core from north to south, creating courtyards on either side. Fenestration

[50] Except for Building 109, all other remaining Pre-WWII buildings are contributors to the Hunters Point Commercial Dry Dock and Shipyard Historic District.
[51] For buildings 224, 231 and 211 see District evaluation above. For Dry Dock 4 see evaluation discussion above.

consists primarily of paired, one-over-one wood windows and wood shiplap siding clads the exterior wall surfaces.

The building has had few major exterior alterations but records indicate that upgrade work (new roof, exterior paint, electrical and plumbing upgrades, minor interior upgrades) was completed in 1972-1973. Building 101 was the Main Administration Building for the Hunters Point shipyard providing general administrative oversight for daily operations the base. However, Hunters Point was an annex to the Mare Island Shipyard, which was the primary administrative headquarters for the Navy in the Bay Area during WWII.

Though somewhat architecturally interesting when compared to the other administrative buildings at the shipyard, Building 101 itself does not appear to have made a significant contribution to the ship repair function at Hunters Point during or after the WWII-era. Though it was the on site headquarters for the shipyard, most operations functions were directed from Mare Island. Research does not indicate that it was directly associated with any specific events notably important in the war effort or to post-war radiological research (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction (Criterion C/3). Built from a standardized plan, the building is similar to hundreds of other semi-permanent buildings built on Navy bases throughout the United States. Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

<u>Building 110 Marine Barracks</u>

Building 110 faces Robinson Drive, just west of Building 101. Its design is evocative of the Art-Deco style, although the construction date of 1943 places the building at the latter end of that stylistic period. Rectangular in plan and topped by a flat roof, the building is constructed of reinforced concrete. Contractors Barrett & Hilp built this standard mess hall/barracks building using Bureau of Yards & Docks Drawings #184765. Minor upgrade work was completed in the galley and shower areas of the building in 1951.

Though architecturally distinctive when compared to the other barracks buildings at the shipyard, Building 110 itself does not appear to have made a significant contribution to the ship repair function at Hunters Point during or after the WWII-era (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction (Criterion C/3). Built from a standardized Bureau of Yards & Docks plan, the building is similar to hundreds of other semi-permanent buildings built on Navy bases throughout the United States. Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Building 134 Outside Machine Shop

Building 134, the Outside Machine and Diesel Engine & Gun Overhaul Shop is a two-story reinforced concrete building located at the southern end of the submarine repair area of the shipyard. Likely built using a standard plan, Walter L. Huber and Edward K. Knapik were the consulting civil engineers for this building. Though functionally related to the ship repair function of the shipyard, Building 134 itself does not appear to have made an individually significant contribution to the ship repair function at Hunters Point during or after the WWII-era (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction. Though Walter L. Huber was a noted local engineer, the building was likely built using standard plans and does not represent the work of a master or possess high artistic value. (Criterion C/3). Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Building 214 Administration Building

Building 214, originally two separate buildings housing an administration building and a cafeteria, later functioned as an accounting office and a credit union. This two-story building was adapted from standard Bureau of Yards and Docks plans and is similar in design to Building 215, the fire station. Plan drawings in the Navy's archives indicate that Barrett & Hilp (contractors) designed a central addition to connect the existing

Administration and existing cafeteria buildings in 1942. Various interior alterations were also made at that time.[52]

Building 214 itself does not appear to have made a significant contribution to the ship repair function at Hunters Point during or after the WWII-era (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction (Criterion C/3). Built from a standardized Bureau of Yards & Docks plan, the building is similar to other semi-permanent buildings built on Navy bases throughout the United States during the WWII-era. Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Building 215 HPSY Fire Station

Building 215 was constructed in 1942 to serve as the fire station for the base, a function that continues to this day. The second story addition was added shortly after construction and the building appears to be in good condition.

Building 215 itself does not appear to have made a significant contribution to the ship repair function at Hunters Point during or after the WWII-era (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction (Criterion C/3). Built from a standardized Bureau of Yards & Docks plan, the building is similar to other semi-permanent buildings built on Navy bases throughout the United States during the WWII-era. Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Building 351/351A Electronics Shop

Building 351 is a reinforced concrete industrial building constructed in 1945 and enlarged, with the addition of Building 351A, in 1960. Building 351 is a three-story, rectangular plan building with a flat roof and a tall freight elevator tower at the northwest

[52] See Drawing nos.110457-110461 on microfiche at Treasure Island Navy BRAC office.

corner. Bands of concrete spandrels and continuous steel sash glazing stretch around the second and third stories of the north, west (front) and south elevations. The corner tower is given a vertical emphasis with the use of both projecting and incised decorative vertical bands and two, tall window openings with multi-pane steel sash windows. The vertical emphasis of the tower, enhanced by the raised, fluted vertical bands on either side of the tower, lend a slightly Art Deco feel to the building.

Structural engineer W.P. Day, a structural engineer from San Francisco who was primarily involved in bridge design during much of the 20th century, designed building 351. This building was originally planned to serve as the Ordnance and Optical Shops (prior to the construction of Building 253), but was never used for this purpose due to inadequacies in design resulting from miscommunication among Navy personnel.[53] Records indicate that the building was used primarily as the Electronics Shop after the war and as NRDL Annex E from the late 1940s to the early 1950s.

Though somewhat architecturally distinctive when compared to the other shops buildings at the shipyard, Building 351/351A itself does not appear to have made a significant contribution to the ship repair function at Hunters Point during or after the WWII-era (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction (Criterion C/3). The building also does not appear to be a significant example of engineering design by W. P. Day, who was known primarily for his work in bridge design. Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Buildings 400, 404, 405, 406 and 407 – Supply Storehouses

Buildings 400, 404, 405, 406 and 407 are identical "Supply Storehouses," built in two rows, facing one another on "H" Street in the southern industrial area of the shipyard. All are rectangular and comprised of three identical sections with slight variations. Each

53 JRP, DPR series form for Building 351/351A, p. 3 of 4.

section is a one-story, wood frame storehouse with monitor, sided in wood shiplap siding. Sliding industrial doors constructed with diagonal wood boards are located beneath each monitor, at either end of each building. Concrete and wood loading platforms attach to the buildings' north elevations, between the building and the adjacent rail spur.

Buildings 400, 404, 405, 406 and 407 do not appear to have made a significant contribution to the ship repair function at Hunters Point during or after the WWII-era (Criterion A/1). The buildings were not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and are not a distinguished example of their type, period or method of construction (Criterion C/3). Likely built from standardized Bureau of Yards & Docks plans, these supply storehouses are similar to other semi-permanent buildings built on Navy bases throughout the United States during the WWII-era. Therefore, the buildings do not appear to qualify for individual listing on the National, California or local registers.

Building 505 Navy Exchange/Gymnasium

Building 505, the Navy Exchange and Gymnasium, is located in the southern shipyard area. Generally U-shaped in plan, the wood frame building was originally clad in wood shiplap boards but is now covered with asbestos shingles. The various roof projections are topped with flat and shallow gabled roofs and the building is punctuated with vertical bands of awning type windows, many covered by plywood boards. Tennis courts, a basketball court and an archery field are located adjacent to the building at the north.

Navy records indicate that the building was reroofed in 1960 and exterior trim painted in 1970. Minor interior modifications were made in 1972 and 1973 including plumbing, electrical and general equipment upgrades. Navy records also indicate that Timothy Pflueger designed the barbershop and chaplain’s office portions of this otherwise standard plan building. These additions are located on the rear of the building and are architecturally compatible with the rest of the building.

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Though somewhat unique as one of the remaining personnel and social services buildings extant at the shipyard, Building 505 itself does not appear to have made a significant contribution to the ship repair function at Hunters Point during or after the WWII-era (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction (Criterion C/3). The involvement of notable architects and engineers in the design of military buildings during wartime was not uncommon and the portions of Building 505 designed by the firm of Timothy Pflueger are not distinguished examples of his work. Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Building 809 Storehouse

Building 809 is a square plan, wood frame building with monitor roof and wood shiplap siding. Large, central, sliding industrial doors are located at each end, allowing for a railcar to pass through the length of the Engine House. Two, sliding, diagonal shiplap-clad industrial doors are also located on the north wall, facing the four rail spurs that run parallel to this elevation. A pair of silos, set between two temporary trailers, are set to the east of the building and a bridge crane structure and two ancillary buildings are located near the building's west end.

Though Building 809 appears to be in excellent condition and retains a high degree of integrity, individually it does not appear to have made a significant contribution to the ship repair or NRDL operations at Hunters Point during or after the WWII-era (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction (Criterion C/3). Likely from a standardized Bureau of Yards & Docks plan, the building is similar to hundreds of other semi-permanent buildings built on Navy bases throughout the United States. Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

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Dry Docks 5, 6, and 7

Built in 1944, the chief function of Dry Docks 5, 6 and 7 was submarine repair, but it was also capable of housing destroyers and other relatively small vessels. Each dry dock is 420 feet by 60 feet, with a gate that is hinged at the bottom that flaps down to allow the vessel to enter. They were dewatered by four 20,000-gallons per minute (gpm) pumps. Two pumps were located at each side of the Bay end of the docks. Dry Docks 5, 6 (and possibly) 7 were used for decontamination of ships from OPERATION CROSSROADS and submarine repair (NAVSEA). Railroad spur lines run the length of each dock projection.

These Dry Docks do not appear to have achieved national, state or local significance for their role in submarine repair during the WWII-era (Criterion A/1) or as distinguished examples of naval engineering (CriterionC/3). The primary responsibility for submarine repair during the war was assigned to Mare Island and the submarine function at Hunters Point, by contrast, was relatively insignificant. As such, Dry docks 5, 6, and 7 do not appear eligible for listing on the NRHP, CRHR or for local listing.

Remaining Buildings

See tables on pages 91-92 below for findings evaluation for remaining WWII-era buildings.

Post WWII-era Buildings[54]

Building 411 Shipfitters, Welders & Boilermakers Building

Building 411 is a large, rectangular plan, steel framed curtain wall building, completed in 1947. Essentially four to five stories in height and topped by a bi-level sawtooth roof, the building has a concrete base and exterior walls clad in corrugated transite. Bands of multi-pane, steel sash windows stretch across each elevation of the principal building. Both the north and south elevations feature four sets of massive, multi-pane glazed,

[54] For the 450-Ton Bridge Crane see findings above.

steel sliding industrial doors. The eastern additions consist of two, two-story reinforced concrete buildings with vertical elevator shafts reaching four stories. Each building is glazed on both the first and second stories with continuous bands of steel, multi-pane industrial sash windows, the upper level with operable awning sashes in each window.

Austin Willmott Earl, a San Francisco Structural Engineer designed Building 411 for the Navy and Albert Kahn & Associates Architects & Engineers, Inc. appear to have been contracted as for additional design consultation. Retained as the consulting structural engineer for a number of projects at Hunters Point Shipyard, Austin W. Earl received the Civilian Merit Award for his work during World War II for the Navy's Bureau of Yards and Docks. Earl became a recognized authority on waterfront construction and was responsible for the engineering of many industrial structures at Mare Island, Hunters Point and Port Chicago. It is unclear to what extent the firm of Albert Kahn & Associates was involved in the design of this building, however, Albert Kahn himself was not involved n the design or construction for Building 411 as he died in 1942. The architectural plans are dated 1945 and the building was not completed until 1947. Barrett & Hilp constructed the building.

The sheer size of this massive industrial building distinguishes it from other shops buildings at the shipyard, however, Building 411 itself does not appear to have made a significant contribution to the ship repair function at Hunters Point during the WWII-era as it was not completed until 1947 (Criterion A/1). The building was also not found to be notably associated with persons significant to National, California, or local history (Criterion B/2). Further, it is not a distinguished example of its type, period or method of construction as steel framed, curtain wall shop buildings were a common building type for the Navy since World War I. While notable within the shipyard setting, other examples of this type can be found within the Bay Area (Mare Island) and throughout the United States. Additionally, the building is not significant as the work of a master. Austin W. Earl served as a supervising engineer in charge of the engineering section at Mare Island Naval Shipyard during World War I, where he designed many of the original seawall and harbor installations. In the early 1920s, he was the Chief Design Engineer for Alameda County, CA, where he worked on the Posey Vehicular Tunnel (a.k.a. the

"Posey Tube") connecting Oakland and Alameda, one of the first precast concrete tunnels to be constructed. After working with a private company in Vancouver, Canada, during the 1930s, Earl and opened his own firm as a consulting civil engineer in 1940. During World War II, Earl designed wharves, piers, ammunition and fuel storage facilities and other buildings for the U.S. Navy and received a Civilian Merit Award in recognition of his services.[55] As noted above, the building was not directly associated with the architect Albert Kahn and while likely designed using architectural and design principled pioneered by Kahn, Building 411 is not an example of his work. As such the building is not significant for architecture or engineering (Criterion C/3). Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Building 521 – Power Plant, South Area

Building 521 is a reinforced concrete and steel building in the south shipyard area with a rectangular plan and a flat roof. A full-height water tank with metal stairs and bi-level walkways is attached to the north elevation and two metal smokestacks pierce the roof to the south. Both the east and west elevations feature three large, vertical stacks of multi-pane steel sash windows and each end has a wall of fixed, square, 25-lite windows arranged in a six-by-six block.

Built by Barnes Construction Company, Building 521 was completed in 1948 and appears to have been built from a standard plan. It is one of two suspected sites of fuel oil burning from three OPERATION CROSSROADS target ships. The power plant building itself does not appear to have made a significant contribution to the ship repair function at Hunters Point (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is a typical utility building and not a distinguished example of its type, period or method of construction (Criterion C/3). Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

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[55] Earl, Austin Wilmott, ASCE Life Member (1880-1965). (Transactions of the American Society of Civil Engineers, 1966), 894.

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Buildings 707 - Animal Hospital and waste disposal

Building 707 is a one-story, stucco clad, wood frame structure with a flat roof and irregular plan. It is located along the western edge of the shipyard in what is known as the "707 triangle".

From the beginning, NRDL occupied many buildings at the shipyard but in 1955, most of the 600 staff members moved into Building 815, which had been specifically design and built for NRDL activities and came to be known as the RADLAB. Building 707 was used as a storage and disposal facility for radioactive waste processing in the 1940s and 1950s. Animal studies were also a large component of NRDL research at the shipyard as animals were used as human substitutes for hazardous materials exposure experiments. Animals were raised and kept on site and Building 707 was used as an animal hospital and animal colony. While Building 707 is associated with the activities of NRDL at Hunters Point Shipyard, it was used for only one aspect of the research and did not house active test subjects; special rooms in Building 815 were designated for this purpose. As such, the building does not represent the depth of work completed at HPS by the nationally recognized NRDL and is not significant under Criterion A/1.

The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and is not a distinguished example of its type, period or method of construction (Criterion C/3). Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Building 709 Naval Exchange Gas Station

Building 709 is a one-story, reinforced concrete with Art Deco features. Set facing the intersection of Manseau and "I" Streets, the building has a number of large vehicular entrances, and smaller pedestrian entry openings. Any original doors and/or glazing for these openings are no longer extant and all other window and door openings are covered with plywood boards. What appears to be a decorative band of shaped metal wraps around the top of the building and two Art Deco-style pillars flank the central entrance. The metal ornament has rusted and is staining the exterior walls.

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Though architecturally distinctive when compared to the other shops buildings at the shipyard, Building 709 was completed in 1952 and does not appear to have made a significant contribution to the ship repair function at Hunters Point in the post WWII-era (Criterion A/1). The building was not found to be notably associated with persons significant to National, California, or local history (Criterion B/2) and, while interesting, is not a distinguished example of its type, period or method of construction (Criterion C/3). Furthermore, due to vandalism, removal of historic materials and exposure to the elements, this building has lost a significant amount of historic integrity. Therefore, the building does not appear to qualify for individual listing on the National, California or local registers.

Remaining Buildings

The following buildings comprise the remainder of buildings and structures extant at the Hunters Point Shipyard that are over 45 years of age. None of the buildings appear to qualify for individual listing on the NRHP, the CRHR, or for local listing. The following buildings have no known associations with events or persons important to the history of the Nation, California or the City and are not notable examples of architectural design or engineering.

Though the buildings were constructed as part of a vast support facility built to assist with the activities carried out at Mare Island and at Hunter's Point through 1974, simple association with historic events or trends is not enough, in and of itself, to qualify under Criterion A/1. Each property's specific association must also be considered important. Since none of the buildings appear to have made particularly significant contributions to the Navy's war effort or to the operations of the NRDL during that time, they don't exhibit a level of associative significance necessary for listing on the NRHP, CRHR or for local listing. From a design standpoint, the majorities of these buildings were built using standard Bureau of Yards & Docks plans or variations thereof and are similar to other WWII-era military installations located throughout the Nation. While some notable architects, engineers and contractors were involved in the design and construction of a number of buildings at the shipyard, this owes more to the fact that civilian architectural contracts were scarce during the WWII-era and military contracts abundant. Even in cases where noted architectural firms were involved in the design/construction process, it was common practice to use the many standardized Bureau of Yards & Docks plans available, adapting them to specific conditions at each base. As none of the buildings appear to be distinguished examples of their type, period or method of construction, do not represent the work of a master or possess high artistic value, they do not appear to be eligible for the NRHP, CRHR or for local listing under Criterion C/3. Further, many exhibit diminished integrity due to additions, alterations and exposure to the elements.

In general, the buildings do not qualify as contributors to a larger historic district because 1) better examples of these types of buildings are found within the proposed district, within the Bay Area, and on military bases throughout the United States; 2) inclusion of these buildings within the proposed historic district would not expand or augment the historic context or architectural value of the proposed historic district; and 3) the buildings do not retain enough integrity as a whole to justify an expansion of the proposed district.

Radiological Buildings

As discussed in Volume I: Historic Context of this document, the development and use of atomic weapons at the close of WWII had broad impacts beyond the use of weapons in Japan and in weapons testing. The military realized the immediate need of developing a facility to study the affects of atomic weapons on living organisms and military assets, as well as to develop defensive and protective measures against the effects of the weapons. In 1946, the Chief Naval Officer stipulated that a group be developed to study and advance radiological safety for the Navy; this group was first known as the Radiological Safety Section (RSS) and headquartered at Hunters Point Shipyard. The original charge of the RSS included the development of radiological detection instruments for use onboard ships and the development of methods and equipment to decontaminate ships and other equipment that had been exposed to radioactive matter. The RSS played a key role in the decontamination of OPERATION CROSSROADS ships at Hunters Point.

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By 1948, the RSS was formalized as National Radiological Defense Laboratory (NRDL) and the mission was greatly expanded with a new focus on practical and applied While NRDL activities were scattered throughout the shipyard, the headquarters for radiological study was Building 815. Many of the buildings used for NRDL purposes have been demolished in recent years as part of environmental remediation efforts. Building 815 is located just outside of the study area and was not evaluated as part of this report. However, Circa recommends that a full historic resource evaluation be completed for this building prior to any demolition proceedings as it is the best representative example to the work of the NRDL remaining at the shipyard site.

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TABLE 1 REMAINING WWII BUILDINGS NOT FOUND TO BE SIGNIFICANT				
Administrative	**Residential & Related**	**Utility**	**Warehousing, Supply & Industrial**	**Shops, Shipbuilding & Repair**
Building 121 - Submarine Offices & Apprentice School	Building 103 - Submarine Barracks	Building 122 - Substation V	Building 304 - Service/Gas station	Building 113/113A - Torpedo Storage & Overhaul Building; Tug Maintenance
Submarine Pier Office; Administration Building	Building 104 - Submarine Barracks	Building 135 - Substation G and compressors	Building 307 - Storage: Electronics & Public Works	Building 123 - Battery Overhaul & Storage Building; Substation T
Submarine Pier Office/Tug Crew's Barracks	Building 115/116 - Submarine Training School; US Navy Drill Hall, Submarine Subsistence	Building 203 - Power Plant, Substation H	Building 401 - General Warehouse; building trades shop	Building 128 - Shop Service Building; Substation U; Work Control Center No. 1
Building 238 - Misc. Admin. Building.	Building 117 - Submarine Barracks	Building 206 - Substation A and compressors	Building 402 - Supply storehouse	Building 130 - Pipefitters' Shop
	Building 120 - Enlisted Men's Club	Building 219 - Substation E	Building 412 - RR Scales	Building 146 - Industrial Photo & Laboratory Building
	Building 125 - Submarine Cafeteria	Building 229 - Substation L	Building 413 - Cable Storage Building/Supply Storehouse	Building 217 - Sheetmetal & Ship Repair Shop
	Building 218 - Latrine	Building 236 - Salt Water Pump House	Building 414 - Supply Storehouse; mold loft (1945)	Building 230 - Machine Shop
	Building 226 - Latrine	Building 300 - Substation N	Building 808 - Industrial Storage Building	Building 225 - Shop Service
	Building 228 - Central Cafeteria	Building 306 & 306A-Substation I	Building 810 - Paint & Oil Storage	Building 241 - Boilermakers' & Blacksmiths' Shop
	Building 252 - Bus Terminal/Coffee Shop	Building 308 - Salt Water Pump House/Fire Protection Pumping Station		Building 251 - Electricians' Shop
	Building 301 - Latrine			Building 272 - Riggers' & Laborers' Shop
	Building 500 - Ship's Officers' Bachelor Quarters			Building 280 - Covered Work Area
				Building 302 - Transportation Shop; Automotive vehicle Maintenance facility
				Building 303 - Transportation Shop Annex

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TABLE 1 - CONTINUED REMAINING WWII BUILDINGS NOT FOUND TO BE SIGNIFICANT				
Administrative	**Residential & Related**	**Utility**	**Warehousing, Supply & Industrial**	**Shops, Shipbuilding & Repair**
				Building 363 - Shipwrights' & Joiners' Shop; Woodworking Shop

TABLE 2 REMAINING POST WWII BUILDINGS NOT FOUND TO BE SIGNIFICANT				
ADMINISTRATION & SUPPORT	**SHIP REPAIR & OUTFITTING**	**RADIOLOGICAL LABORATORIES**	**WAREHOUSING**	**MISCELLANEOUS SHEDS/SHOPS**
Building 159 - Latrine	Building 258 - Pipefitters Shop	Building 366 - Boat/Plastics Shop and NRDL Electronics work area &lab	Building 813 - Supply Office & Storehouse	Building 377 - Workshop & Poseidon Systems Test Engineering
Building 154 - Area Time Office No. 1	Butler Buildings - 156, 271, 274, 275, 323, 324, 368, 369, 415, 416, 525, 526, 530, 704 - Storage and misc. industrial uses	Building 707 - Animal Hospital and NRDL Annex N; Animal colony and waste processing		Building 379 - Instrumentation/Control
Building 367 - Work Control Center # 3	Building 371 - Transportation Shop Annex	Building 708 - NRDL Bio-med/animal research facility; Animal psychology study colony		Building 380 - Workshop & Poseidon Systems Test Engineering
Building 370 - Latrine	409/409A - Welder Motor Generator Building			Building 417 - Acetylene Manifolding Building
Building 378 - Latrine	Miscellaneous sheds (Buildings C-K, C-G, C-J, C-F and C-I) near Building 229 – poor condition.			Building 419 - Oxygen Converter Building
Building 424 - Area Time Office No. 4				Building 420 - Oxygen cylinder charging building
Building 523 - Salt Water Pump House				Building 527 - Motor Generator Building
Building 710 - Latrine				
Building 819/823 - Sewage Pump Station A/Storage				

Demolished Buildings

A comparison of existing buildings with the matrix included in the 1997 Survey & Evaluation Report by JRP: Historical Resources Consulting indicates that buildings demolished since 1997 include the shipyard post office (Building 102), industrial shop buildings of various sizes, latrine buildings, a sentry house, small office/administration buildings, lab buildings, storage sheds, a service station, a particle accelerator building, an Officer's Club building, water tower, clocking stations and 44 single family residences. Much of this demolition, including the entire residential district on Parcel A, was demolished as part of Hunters Point Phase I in 2006. Many buildings have been recently demolished because they were utilized for research or decontamination purposes by the NRDL and removal was necessary as part of ongoing decontamination/environmental remediation efforts by the Navy. The following buildings were extant at the time of the initial site tour for this study on July 12, 2007 but have since been demolished: Building 365 (1951), Personnel Decontamination Center; Building 408 (1947), Furnace Shelter; Building 421 (1947), Oxygen Control Building; and Building 916 (c.1930), Dago Mary's restaurant. The most recent research trip to Hunters Point Shipyard in April 2009 indicated that portions of roadways have been removed. The extent to which remaining site features such as rail spurs, paved circulation paths, light standards and street signs have been removed since that time is unknown.

Buildings that Lack Integrity

The following buildings are small utility and storage buildings that exhibit low material integrity and were not evaluated for significance; Buildings 435, 436 and 437, equipment storage sheds; Miscellaneous sheds (Buildings C-K, C-G, C-J, C-F and C-I) near Building 229; Building 410, welder motor generator building; and Building 418, metal spray building.

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Buildings Under 45 years

The following buildings are under 45 years of age and were not evaluated for significance as part of this survey: Building 281 (1970) Electronics, Weapons, Precision Facility/Antenna Repair; Building 282 (c.1970) Antenna Abrasive Cleaning Unit; Building 360 (c.1970) Test Building; Building 381 (1985) Shock test facility, Building 383 (1985) Poseidon Shipping & Receiving, Building 384 (1986) Poseidon Engineering, Building 385 (1985) Poseidon Engineering, Building 439 (1973) Equipment Storage; Sheet Metal Shop, Building 600 (1971) Bachelor Enlisted Quarters, Building 606 (1989) Police Station, Building 821 (1965) NRDL Research X-ray Lab.

CONCLUSIONS

India Basin

A number of parcels within the India Basin survey area had recently been surveyed and evaluated by Kelley & VerPlanck: Historical Resources Consulting. The study identified four properties that appear to be eligible for listing on the California Register of Historical Resources: 702 Earl Street, 900 Innes Avenue[56], 911 Innes, and 967 Innes Avenue. The former Albion Brewery building at 881 Innes Avenue was found to appear eligible for listing on the National Register of Historic Places. The India Basin survey also identified a potential California Register-eligible historic district, the India Basin Boatyards.

Also located within the India Basin survey area boundaries is the site of the former PG&E plant. This building, constructed in 1929, was determined not to be a historic resource by the San Francisco Planning Department staff in 2006 and the building demolished in 2008. The remaining parcels within the India Basin survey area are comprised of unimproved public shoreline open space, India Basin Shoreline Park, and vacant land. No other buildings or structures over 45 years old were identified.

[56] In early 2008, the Shipwright's cottage at 900 Innes Avenue became San Francisco Landmark #250.

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Candlestick Point/Alice Griffith Survey Area

The Candlestick Point survey area encompasses most of the Candlestick Point part of the BVHP Plan ("Area B"), including the Candlestick Park sports stadium (formerly Monster Park), the Alice Griffith Public Housing site and Candlestick Point State Recreation Area. Circa evaluated the Alice Griffith Housing site and found it ineligible for listing on the NRHP, the CRHR or as a local landmark. With exception of Candlestick Park stadium, no other resources over 45 years of age exist within the survey area.

Jones & Stokes completed a recent evaluation of Candlestick Park sports stadium and found the property to be ineligible for listing on the NRHP. The property has not been evaluated for California Register eligibility and has not been previously included or listed in any local survey of historic properties. It was beyond the scope of this project to conduct any additional review of the Candlestick Park stadium, however, Circa recommends that the property be evaluated for eligibility for listing on the California Register of Historical Resources and for local listing.

Hunters Point Shipyard Survey Area

In 1997, an inventory and evaluation of buildings and structures at Hunters Point Shipyard identified approximately 225 extant buildings and structures. All buildings on Parcel A, with exception of Buildings 101 and 110, were demolished in 2006-2007 as part of Hunters Point Shipyard Phase I. In July 2007, Circa: Historic Property Development began work on the development of a historic context and historic resources survey and inventory of extant buildings and structures at the Hunters Point Shipyard. A total of 134 buildings and structures were identified as existing properties at the shipyard in 2007. Since that time four buildings are known to have been demolished and a total of 130 buildings and structures were known to be extant at the conclusion of Circa's evaluation work in April 2009. Out of this total, a potential California Register eligible historic district was identified that contains containing five buildings and two structures previously determined eligible for the National Register of Historic Places (NRHP), as well as four additional buildings previously unevaluated for listing on the California Register of Historical Resources (CRHR). The proposed Hunters Point

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Commercial Dry Dock and Naval Shipyard Historic District is comprised of the following resources:

- Dry Dock 2
- Dry Dock 3
- Building 140 (Dry Dock No. 3 Pump House)
- Buildings 204 (Gate and Pump House)
- 205 (Dry Dock No. 2 Pump House)
- Buildings 207 (Latrine building)
- 208 (Shop Service, Tool Room and Canteen Building)
- Building 211 (Shipfitters/Electronics Shop)
- Building 231 (Inside Machine Shop)
- Building 253 (Optical, Electronics and Ordnance Building)
- Building 224 (air raid shelter, NRDL Annex)

In addition, Circa found that Dry Dock 4 retained a level of integrity enabling it to remain eligible for individual listing on the NRHP. A summary of findings for significant buildings is provided in Table 3 on the following page.

Of the 121 remaining buildings, 11 were less than 45 years old and six were found to lack integrity; these properties were not evaluated for significance. The remaining 104 buildings and four structures were evaluated for eligibility for listing at the national, state and local levels. None of the remaining buildings or structures were found to be individually eligible for listing on the NRHP, the CRHR or as San Francisco Landmarks. Further, they were not found to be eligible as contributors to a national, state or local historic district.

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TABLE 3
SUMMARY OF FINDINGS FOR SIGNIFICANT BUILDINGS

	1988 Urban Programmers Report	1993 SHPO Concurrence	1997 JRP Report	Current CRHR Status codes	2009 Circa Findings
Dry Dock 1	NR District Contributor	NR District Contributor	Potential contributor to district; subsurface investigation required		Potential contributor to district; subsurface investigation required to determine if any portion is extant
Dry Dock 2	NR District Contributor	NR District Contributor	NR District Contributor. SHPO Concurred 1998	2S2	NR Eligible/ Contributor to CR District (2D2)
Dry Dock 3	NR District Contributor	NR District Contributor	NR District Contributor. SHPO Concurred 1998	2S2	NR Eligible/ Contributor to CR District (2D2)
Dry Dock 4	NR Individually Eligible	District w/ Building 253	NR District Contributor. SHPO Concurred 1998	2S2	Concur Individually eligible for NR (252)
450-ton Crane	NR Individually Eligible	Not NR Eligible -> Integrity	Not NR Eligible -> Integrity		Not NR/CR or Local Eligible (6Z)
Building 140 Pump house 3	NR District Contributor	NR District Contributor	NR District Contributor. SHPO Concurred 1998	2S2	NR Eligible/ Contributor to CR District (2D2)
Building 204 Gatehouse	NR District Contributor	NR District Contributor	NR District Contributor. SHPO Concurred 1998	2S2	NR Eligible/ Contributor to CR District (2D2)
Building 205 Pump House 2	NR District Contributor	NR District Contributor	NR District Contributor. SHPO Concurred 1998	2S2	NR Eligible/ Contributor to CR District (2D2)
Building 207 Latrine	NR District Contributor	NR District Contributor	NR District Contributor. SHPO Concurred 1998	2S2	NR Eligible/ Contributor to CR District (2D2)

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Building 208 Shop/tool Canteen	Not Contributor to District			6Y	Contributor to CR District (3CD)
Building 231 Inside Machine Shop					Contributor to CR District (3CD)
TABLE 3 CONTINUED SUMMARY OF FINDINGS FOR SIGNIFICANT BUILDINGS					
	1988 Urban Programmers Report	**1993 SHPO Concurrence**	**1997 JRP Report**	**Current CRHR Status codes**	**2009 Circa Findings**
Building 211 Shipfitters; Machinery & Electric Shop					Contributor to CR District (3CD)
Building 253 Optical, Electronics & Ordnance	NR Individually Eligible	District w/Dry Dock 4			Contributor to CR District (3CD)
Building 224 Air Raid Shelter and NRDL Annex					CR Eligible District Contributor (3CD)

VI. HISTORIC RESOURCE IMPACTS AND MITIGATIONS

INTRODUCTION

This section describes the historic resources identified within the project area as described and evaluated in Sections III-V of this report, and the potential impacts on these resources that may occur as a result of the project

PUBLIC NOTICING AND COMMENTS

PUBLIC NOTICING

A Notice of Preparation (NOP) of an Environmental Impact Report (EIR) and a Notice of Public Meetings for the was issued by the Redevelopment Agency and the Planning Department of the City and County of San Francisco in August 2007. Two Public Scoping Meetings were held on Monday, September 17, 2007, at the Southeast Community Facility, located at 1800 Oakdale Avenue at Phelps Street, San Francisco, 94124 and on Tuesday, September 25, 2007, at the Earl P. Mills Community Auditorium, 100 Whitney Young Circle, San Francisco, CA 94124. The purpose of the meeting was to receive comments on the scope and content of the environmental review to be conducted on the proposed Bayview Waterfront Project.

The Bayview Waterfront Project requires numerous review and approval actions from the San Francisco Redevelopment Agency, the City and County of San Francisco, regional agencies, state agencies, and federal agencies, including:

- San Francisco Redevelopment Agency Commission
- City and County of San of San Francisco Planning Commission
- Municipal Transportation Agency
- Recreation and Park Commission
- Public Utilities Commission
- San Francisco Housing Authority

- Port Commission
- Board of Supervisors
- Regional Agencies
- State Regional Water Quality Control Board
- San Francisco Bay Conservation & Development Commission
- Association of Bay Area Governments
- State of California
- Department of Parks & Recreation
- Department of Fish & Game
- Department of Transportation
- State Lands Commission
- Department of Toxic Substances Control
- Federal Agencies
- US Navy
- US Army Corps of Engineers
- US Fish & Wildlife Service
- US Department of Housing & Urban Development

PUBLIC COMMENTS

As of the publication of this report no comments have been received regarding historic resources.

CONSISTENCY WITH APPLICABLE POLICIES, PLANS, AND REGULATIONS

In addition to the National and State laws and regulations described in Section IV of this report, the City and County of San Francisco Planning Department has a number of Plans, Policies and Regulations to address the issue of consistency when determining if a property is a historic resource and if a proposed project will have an adverse effect on that resource. These include, but are not limited to:

- Preservation Bulletin No. 11 - Historic Resource Surveys
- Preservation Bulletin No. 16 - CEQA Review Procedures for Historic Resources
- The City of San Francisco Urban Design Element
- Draft Preservation Element of the General Plan
- Articles 10 and 11 of the San Francisco Planning Code
- Chapter 31: California Environmental Quality Act Procedures And Fees of the City And County Of San Francisco Municipal Code
- Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings or The Secretary of the Interior's Standards for Rehabilitating Historic Buildings

IMPACTS AND MITIGATION MEASURES

STANDARDS OF SIGNIFICANCE

A project is considered to have a significant impact on the environment if it would cause a substantial adverse change in the significance of a listed historic resource or resource eligible for listing such that the resource would lose its state or local designation or eligibility status. When evaluating the impacts of a project that affects a broader area it is necessary to consider the impacts on: individual resources, the immediate site context of individual resources, and the broader area context of groups of resources.

For the purposes of this EIR the following thresholds were used for determining significant impacts to cultural or historic resources.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

For the purposes of CEQA, resources eligible for or listed in the California Register are, by definition "historical resources." Additionally, resources included in a local register of historical resources or deemed significant (i.e., given a Status Code of 3 through 5 in a survey meeting the applicable policy requirements from the State Office of Historic Preservation) are presumed to be historically or culturally significant for purposes of CEQA. CEQA uses a time frame of 50+ years old as a reference point for determining the need to evaluate potential impacts on historic resources (California Code of Regulations Chapter 14 s 4852).

Under CEQA, a project that results in a "substantial adverse change in the significance of a historical resource may have a significant adverse effect on the environment (Public Resources Code Section 21084.1). The PRC defines "substantial adverse change" as "demolition, destruction, relocation or alteration" activities that would impair the significance of a historical resource (PRC Section 5020.1(q) and CEQA Guidelines Section 15064.5 (b) (1).

CEQA Section 10564.5 (b) (2) also defines activities that would impair the significance of a historical resource (i.e. that alter the physical characteristics that justify or account for its inclusion in the California Register or a local register) as follows:

The significance of a historical resource is materially impaired when a project:

A. Demolishes or materially alters in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in the California Register of Historic Resources; or

B. Demolishes or materially alters in an adverse manner those physical characteristics that account for its inclusion in a local register of historic resources pursuant to Section 5020.1(k) of the Public Resources Code or its identification in an historical resources survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or

C. Demolishes or materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical

Resources as determined by a lead agency for purposes of CEQA." (CEQA Guidelines Section 15064.5(b)(2)(A)(B)(C).

According to CEQA, "generally, a project that follows the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings or The Secretary of the Interior's Standards for Rehabilitating Historic Buildings...shall be considered as mitigated to a level of less than a significant impact on the historical resource." (CEQA Guidelines Section 15064.5 (b) (3).

PROJECT AND ALTERNATIVES DESCRIPTIONS

Project as Proposed

The Bayview Waterfront Project proposes new plans for the Candlestick Point, Hunters Point Shipyard, and India Basin Shoreline areas of San Francisco and are fully described in Appendix A. The two plans, the CP-HPS Development Plan and the India Basin Plan, are designed as separate development projects.

The CP-HPS Development Plan will require the demolition of a number of buildings, structures and objects within the plan area to implement the Urban Design Plan aspect. The Plan includes the retention of the Hunters Point Commercial Dry Docks Historic District. The Plan area will be comprised of approximately 688 acres. For purposes of this report it is assumed that Candlestick Park sports stadium is not historic based on findings in the Jones & Stokes evaluation.

The India Basin Plan assumes development would occur on large parcels of land that are currently vacant or underutilized along the shoreline. When combine the parcels will be comprised of approximately 764 acres available for development. For purposes of this report it is assumed that no demolition of the identified historic resources is planned in the India Basin Plan area.

Alternatives to the Project[57]

The primary intent of the alternatives evaluation, as stated in CEQA Guidelines Section 15126.6(a), is to "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives." Further, CEQA Guidelines Section 15126.6(b) states, "the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly."

Alternative 1: No Project

Alternative 1 assumes that the buildout allowed under San Francisco Proposition G, the legislation that enabled the CP-HPS Development Plan, would not be pursued. Development regulations and zoning would revert to the regulations that were in place prior to passage of Propositions E and F and establishment of the Candlestick Point Special Use District. The Yosemite Slough bridge would not be constructed, and the circulation network would not be substantially altered. No new uses would be constructed at Candlestick Point, and the land use composition at Hunters Point Shipyard would be substantially different than under the Development Plan, with greater emphasis on retail and mixed-use development, and less emphasis on R&D uses. Development at India Basin would proceed as allowed under existing zoning and land uses controls.

Alternative 2: Project with No Yosemite Slough Bridge

The land use plan for Alternative 2 would be the same as that proposed under the BWP for CP-HPS Phase II Development Plan and India Basin Shoreline Plan. The number of housing units and buildout floor areas for non-residential uses would be the same as

[57] The following Alternatives are quoted from the Candlestick Point - Hunters Point Shipyard Phase II Administrative Draft EIR Ia - August 2009.

under the BWP. Population generated by this alternative would also be the same as for the BWP. As with the Development Plan, the Candlestick Point SRA land exchange would be pursued, resulting in a shift in open space area to Hunters Point Shipyard, as well as the proposed increase in the area of total open space available in the Development Plan area.

Alternative 3: Reduced Development, S.F. 49ers Remain at Candlestick Point

Alternative 3 is a reduced intensity alternative. This alternative assumes that no new non-residential growth would occur at Candlestick Point and that new residential uses would be scaled down by approximately 85 percent. Buildout at Hunters Point Shipyard would be similar to buildout proposed under the Development Plan; however, there would be an approximately 50 percent increase in housing over the levels proposed in the Development Plan (1,350 additional units). Total housing proposed under this alternative would represent about half of the units proposed under the BWP, excluding residential uses proposed in the India Basin Shoreline Plan. Consequently, the population growth anticipated under this alternative would be less than for the Development Plan. Land uses and development controls proposed in the India Basin Shoreline Plan would remain as proposed under the BWP.

This alternative assumes that the 49ers football team would continue to utilize the existing Candlestick Park stadium. The Candlestick Point SRA land exchange would also be pursued, resulting in a shift in open space area to Hunters Point Shipyard, as well as an increase in the area of total open space available in the Development Plan area. This alternative would also include installation of a bridge across Yosemite Slough and related circulation improvements.

Alternative 4: Reduced Development, No Bridge

Land uses proposed under Alternative 4 would be similar to those proposed under the BWP; however, proposed floor areas for most uses would be approximately 30 percent smaller at full buildout in comparison to buildout of the Development Plan. The 30 percent reduction would also apply to residential units; as a result, the population growth anticipated under this alternative would be less than for the BWP. This alternative also includes preservation of three potentially historic structures at HPS.

Similar to Alternative 2, this alternative does not include construction of a bridge over Yosemite Slough. Access between the two sites would be facilitated by a new bus rapid transit route that would travel along Carroll Avenue, Ingalls Street, Thomas Avenue, and Griffiths Street. This route would also serve as the main connector between the two sites for vehicles and pedestrians.

Alternative 4 assumes a scaled-back residential and commercial development program at India Basin, with a greater amount of open space combined with lower density and intensity development. The neighborhood retail square footage remains the same as in the India Basin Shoreline Plan.

<u>Alternative 5: 49ers Stay at Candlestick Point, No Parks Land Exchange</u>

Alternative 5 assumes that the 49ers football team would continue to utilize the existing Candlestick Park stadium. The total number of housing units would be the same as for the Development Plan; however, because this alternative would not implement the Candlestick Point SRA land exchange approximately 1,350 units would be shifted from Candlestick Point to Hunters Point Shipyard. Because the land exchange would not occur, the land area available for development would be smaller. As a result, densities at Candlestick Point would be higher than under the Development Plan and would include more mid-rise structures and towers.

Similar to Alternative 2, this alternative does not include construction of a bridge over Yosemite Slough. Access between the two sites would be provided via a bus rapid transit system that would travel along Carroll Avenue, Ingalls Street, Thomas Avenue, and Griffiths Street. This route would also serve as the main connector between the two sites for vehicles and pedestrians.

Land uses and development controls proposed in the India Basin Shoreline Plan would remain as proposed under the BWP.

IMPACTS AND MITIGATION ANALYSIS

With the exception of Alternative 4: *Reduced Development, No Bridge*, the Project and Alternatives 1,2,3,5, and 6 are identical regarding impacts to historic resources. The following impacts therefore apply to the Project and Alternatives 1,2,3,5, and 6 collectively.

Impact 1

As proposed, future redevelopment within the CP-HPS Development Plan area will result in the demolition of historic resources that are eligible for the California Register and are contributors to a proposed historic district. This is considered a significant Impact because the approach demolishes and materially alters in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its eligibility for inclusion in the California Register of Historical Resources.

Mitigation Measure 1a

Retain the historic resources identified as being eligible for the California Register and enlarge the National Register historic district to retain the district's historic integrity.

Implementation of this mitigation measure will reduce this impact to a less-than-significant level.

Mitigation Measure 1b

Rehabilitate, reuse and maintain the National Register and California Register historic resources in a manner that is consistent with the Secretary of Interior's Standards for Rehabilitation. This includes site features such as rail spurs, crane ways, light standards, bollards, dry dock pumping equipment and other built-ins, fencing and wharves that convey the district's historic significance.

Implementation of this mitigation measure will reduce this impact to a less-than-significant level.

Mitigation Measure 1c

New construction adjacent to historic resources should be designed in a manner that is consistent with the Secretary of Interior's Standards for Rehabilitation. This includes massing and scale of adjacent new construction

Implementation of this mitigation measure will reduce this impact to a less-than-significant level.

Updated: October 2009

VII. RECOMMENDATIONS

The following recommendations were developed to be consistent with applicable policies, plans, and regulations regarding the proposed Bayview Waterfront Project, specifically the CP-HPS Development Plan area where there will be a significant impact due to demolition of buildings and structures that contribute to a potential California Register historic district.

According to CEQA demolition will result in the loss of historic significance because the historical resource will be materially impaired, therefore, it will result in a significant impact.

To reduce the impact to less than significant, and thereby meet CEQA requirements, the following recommendations are presented:

1. It is recommended that Alternative 4 replace the Project and Alternatives 1,2,3,5, and 6 as part of the CP-HPS Development Plan.
2. It is recommended that Mitigation Measure 6.3-1a, b and c be adopted.
3. To avoid a significant impact in the future, Candlestick Stadium should be evaluated for the California and local register.
4. To avoid a significant impact in the future, the RADLAB should be evaluated as an individual historic resource.
5. Due to the importance of the radiological testing context, comprehensive oral histories of past employees, particularly those directly associated with the planning and testing, should be completed, professionally archived and available for research.

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IX. PREPARER'S QUALIFICATIONS

SHEILA MCELROY, Principal of Circa: Historic Property Development

Architectural Historian/Historic Preservation Specialist

Exceeds Qualification for Secretary of the Interiors Standards - for Architectural History

Ms. McElroy is dedicated to historic resource preservation by facilitating the revitalization and development of historic properties and districts. She has almost 20 years of historic preservation and architectural research, management and design-related experience with profit and non-profit corporations, including eight years of experience as executive director for Main Street towns.

Her responsibilities have included historic research, adaptive re-use, streetscape analysis, design assistance, and identification of funding resources. She works closely with local community development and planning departments, and historic commissions on issues of preservation planning, consistency with the Secretary of the Interior Standards, and historic resource development on a variety of projects.

Ms. McElroy earned a Master of Science Degree in Historic Preservation from the University of Pennsylvania, Philadelphia, PA, in 1987, with a concentration in Research and Documentation.

Her Bachelor of Art Degree is from Roger Williams College, Bristol RI, (1980) which included an emphasis on Historic Preservation, American Art, and History of Architecture. Supplemental studies included those at Columbia University, with classes in American Architectural History; Hunter College, History of American Art, and Museum Studies; The Cooper Hewitt Museum, classes in American Decorative Arts; the Main Street Certification Institute, National Main Street Center (National Trust for Historic Preservation) which included competitive sessions in design, economic restructuring, organization, and promotion.

SARAH HAHN, Architectural Historian

Qualifies under the Secretary of the Interior's Professional Qualification Standards -

Architectural History

Ms. Hahn came to Garavaglia Architecture and Circa: Historic Property Development with a broad background in historic preservation, art history, graphic and fine arts. She is an Architectural Historian with a range of experience in the field including hands-on conservation both in the U.S. and abroad, preservation planning, interpretation and education, and extensive cultural resource documentation and evaluation. Ms. Hahn's work at Garavaglia Architecture and with Circa: Historic Property Development includes historic resource evaluations, design review, historic context statements, environmental analysis, Secretary of the Interior's Standards compliance review, historic structure reports and reconnaissance and intensive level survey work. Professional affiliations include the National Trust for Historic Preservation; the Society of Architectural Historians; and the California Preservation Foundation. Ms. Hahn's educational background includes a Master of Science in Historic Preservation from the University of Oregon and a Bachelor of Science in Graphic Design and Art History from the University of Evansville, Indiana.

BECKY URBANO, Architectural Historian, Conservator

Qualifies under the Secretary of the Interior's Professional Qualification Standards -

Architectural History

Ms. Urbano is a talented architectural conservator and historian with a solid background in historic preservation, materials investigation and historic documentation. Recognized for laboratory expertise as well as research, leadership and project management skills, her experience includes architectural conservation management plans, existing condition analysis, repair recommendations and documentation, construction specifications and identification of historic resources through field surveys and archival research.

Ms. Urbano's work at Garavaglia Architecture to date has included involvement with historic structure reports and multiple historic context statements. Her thorough research capabilities have been complemented by her excellent report and writing skills. She currently manages all preservation services, including technical reports and reviews at Garavaglia Architecture, Inc.

Ms. Urbano educational background includes a Masters of Science in Historic Preservation from Columbia University and a Bachelor of Arts in Physics from Middlebury College with Departmental Honors. She meets or exceeds the Secretary of the Interior's Professional Qualifications Standards for Architectural Historians.

Updated: October 2009

X. APPENDICES

[Appendices are available for review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA.]

Appendix J3 CIRCA, Historic Resources Evaluation for Candlestick, April 2010

Historic Resource Evaluation for Candlestick Park Sports Stadium, San Francisco, CA

Final Draft

Prepared for PBS& J

Prepared by:

CIRCA: HISTORIC PROPERTY DEVELOPMENT

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2 APRIL 2010

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2 April 2010

Historic Resource Evaluation for Candlestick Park Sports Stadium, San Francisco, CA

INTRODUCTION

Circa: Historic Property Development has prepared this Historic Resource Evaluation (HRE) for the Candlestick Park Sports Stadium, or "Candlestick Park" (Assessor's Block 5000, Lot 001) as requested by PBS&J in conjunction with the Candlestick Point – Hunters Point Shipyard Phase 2 Waterfront Project Environmental Impact Report. Jones & Stokes evaluated the subject property in May 2007 for eligibility for listing on the National Register of Historic Places (NRHP) under Criteria Consideration G, since the building was less than fifty years of age at that time[1]. For a property to be eligible for listing on the National Register under Criterion G, exceptional significance must be demonstrated. Jones & Stokes found that Candlestick Park "did not appear to meet the threshold of NRHP exceptional significance for buildings less than 50 years old."[2] The 2007 Jones & Stokes report did not evaluate the property's eligibility for listing on the California Register of Historical Resources or as a San Francisco Landmark.

Andrew Hope, Principal Architectural Historian for the Caltrans District 4 office in Sacramento, completed a second evaluation of Candlestick Park at the request of State Historic Preservation Officer (SHPO) in January 2008. Like the Jones & Stokes report, this evaluation addressed only the National Register level of significance; however, the evaluation itself was quite thorough. Hope evaluated the property according to the standard criteria and concluded that while the subject property was found to meet National Register Criterion A (for association with the introduction of major league baseball on the west coast), and B (for association with the career of Willie Mays), "it lacks integrity to its period of significance under both criteria, due to the extensive alteration of the stadium in the early 1970s."[3] In a February 2008 letter from the California Office of Historic Preservation (OHP) to Jennifer Darcangelo of Caltrans District 4 in Oakland, OHP concurred with Caltrans' findings that Candlestick Park is not eligible for the National Register of Historic Places.[4] However, that conclusion was considered as an evaluation of the stadium as a structure less than fifty years old in 2008. Note: The Caltrans evaluation findings will be treated in the manner of a peer review in the Evaluation of Significance section of this report.

Candlestick Park stadium opened on April 12, 1960 and is 50 years old this year (2010). The stadium is presently subject to an evaluation for the National Register without Criteria Consideration G for exceptional significance. For the purposes of the California Environmental Quality Act (CEQA), "historical resources" are those properties that are listed in or formally

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[1] See documentation for Planning Department Case No. 2003.1211E and associated HRER dated 18 September 2007.
[2] Jones & Stokes, *Bayview Transportation Improvements Project (BTIP) – Evaluation Exemption for Monster Park*, Memo from Kathryn Hayley to Meg Scantlebury (15 May 2007), 9.
[3] Evaluation of Candlestick Park (Monster Park) For the Bayview Transportation Improvements Project, San Francisco City and County, California, January 2008 (DPR 523 set).
[4] Susan K. Stratton (for Milford Wayne Donaldson), OHP, to Jennifer Darcangelo, Caltrans, 6 February 2008, "Re: Determinations of Eligibility for the Bayview Transportation Improvements Project in the City and County of San Francisco, CA."

determined eligible for listing in the California Register of Historical Resources, or listed in an adopted local historic register. "Historical resources" also includes resources identified as significant in an historical resource survey meeting certain criteria.[5] To meet all levels of review required for the subject property, this HRE provides an evaluation of Candlestick Park for eligibility as a historic resource on the National, State and local levels.

Methodology
Circa: Historic Property Development Principal, Sheila McElroy and Garavaglia Architecture, Inc. Architectural Historian Sarah Hahn conducted a site visit and survey of the property's interior and exterior on January 30, 2010. Mike Gay, Chief Operations Engineer at Candlestick Park, led a tour of the property; Mr. Gay has been employed at Candlestick Park for the past 31 years. During this visit, the project team documented the building's configuration, architectural features, and alterations with photographs and field notes. Mr. Gay provided information about alterations to the property and a general historical overview. Selected historic and existing conditions photographs of the property can be found throughout the body of this document. See Appendix A for additional photographs of the subject property.

The San Francisco Planning Department and Department of Building Inspection provided selected copies of the property's building permit history for review. Since alterations have been made to the building almost continuously since it was originally constructed, and hundreds of building permit documents are on file with the City, only selected permit records were reviewed. All attempts were made to identify major alteration campaigns and review related building permits to establish a general record of alterations to the property. See Appendix B for building construction chronology matrix. (Note: this matrix is not meant to represent an exhaustive list of building alterations, but provides a record of notable changes to the building over time.)

No full size sets of original drawings were available for the subject property; however, the Department of Building Inspection uncovered a limited selection of reduced (11" x 17") plan drawings in their files. The 2007 Jones & Stokes report cited the John S. Bolles Collection held in the Special Collections Department at the Harvard University Graduate School of Design, Frances Loeb Library, in Cambridge, Massachusetts. The report noted that the author had contacted the library in an attempt to attain original drawings and other records related to Bolles' work on Candlestick Park, but the collection was in an unprocessed and inaccessible state. Circa also contacted this library in January 2010 to determine the current status of the collection and found that it remains unprocessed. Therefore, this evaluation has also been completed without the information from the John S. Bolles Collection.

Circa conducted additional archival research on the subject property and the following repositories/collections were used to complete the research process (see Bibliography section for complete list of resources):

- Department of Building Inspection, San Francisco (SF)
- SF Planning Department
- San Francisco Public Library (SFPL)
    - SF History Room
        - Biographical card files, vertical files by subject
        - SF Historical Photograph Collection
    - SF Chronicle Index (microfiche), SFPL
    - SF Chronicle/Examiner (microfilm), SFPL

[5] San Francisco Preservation Bulletin No. 16, City and County of San Francisco Planning Department, CEQA Review Procedures for Historic Resources.

Physical Description

Built in 1960, Candlestick Park is a sports stadium located at 490 Jamestown Avenue in the City and County of San Francisco and is owned by the same entity. It was originally built for baseball and is currently used primarily for football. The stadium is set on an irregularly-shaped parcel bound by Giants Drive and Gilman Avenue to the north, Hunters Point Expressway to the east, and Jamestown Avenue to the south and Jamestown Avenue/Giants Drive to the west. The large parcel, composed of artificial fill, is located adjacent to a large hill at the west, and bordered by Candlestick Point State Recreation Area to the east and south.

The stadium is surrounded by a large, paved parking lot on the north, east, and south sides, with parking space for roughly 8,000 cars, 300 buses, 200 limousines, and 300 motor homes.[6] A chain link fence surrounds the parking lot periphery and overflow parking is located on separate parcels to the northeast. Landscaping around the stadium itself is minimal and consists primarily of clusters of trees around both the north and south (main) gates. A succession of trees defines the outside border of the main access road immediately surrounding the stadium. A guard kiosk is located at the west parking lot entrance, off Jamestown Avenue, near Gate A. Additional guard/parking attendant kiosks and accessory buildings are located at major parking lot entry points to the north, east, and south of the main parking lot.

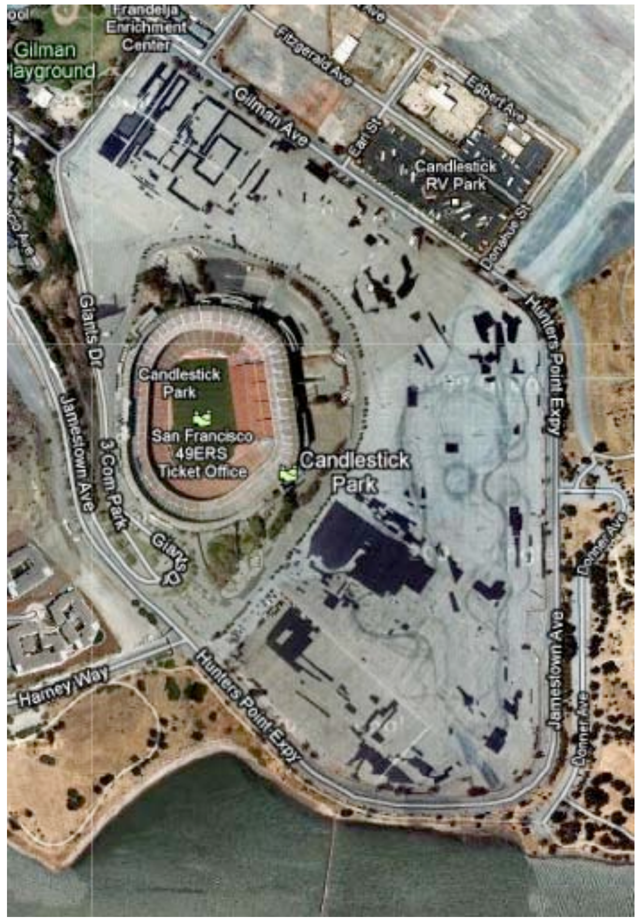

Figure 1. Aerial View, current configuration (Google maps, 2010).

The stadium is an enclosed, asymmetrical plan building with two main levels of seating. The upper deck seating is continuous around the perimeter of the stadium, and the lower deck has a section of retractable seating in the former right and right-center field areas. The upper deck is partially sheltered by a curved roof canopy. Curved concrete ribs support this roof and diagonal concrete braces, forming a continuous chevron-like band around the upper portion of the stadium, in turn support these ribs. An exterior concourse encircles the stadium at the upper level, between the chevron supports and the inner wall supporting the upper deck seating.[7]

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[6]San Francisco Department of Parks and Recreation website, *Welcome to Monster Park*, http://www.parks.sfgov.org/site/recpark_index.asp?id=18977 (accessed: 1 February 2010).

[7] Andrew Hope, *Evaluation of Candlestick Park (Monster Park) for the Bayview Transportation Improvements Project, San Francisco, City and County, California* (DPR 523 Series form), (Sacramento: California Department of Transportation, January 2008), pages 1 and 6 of 13.

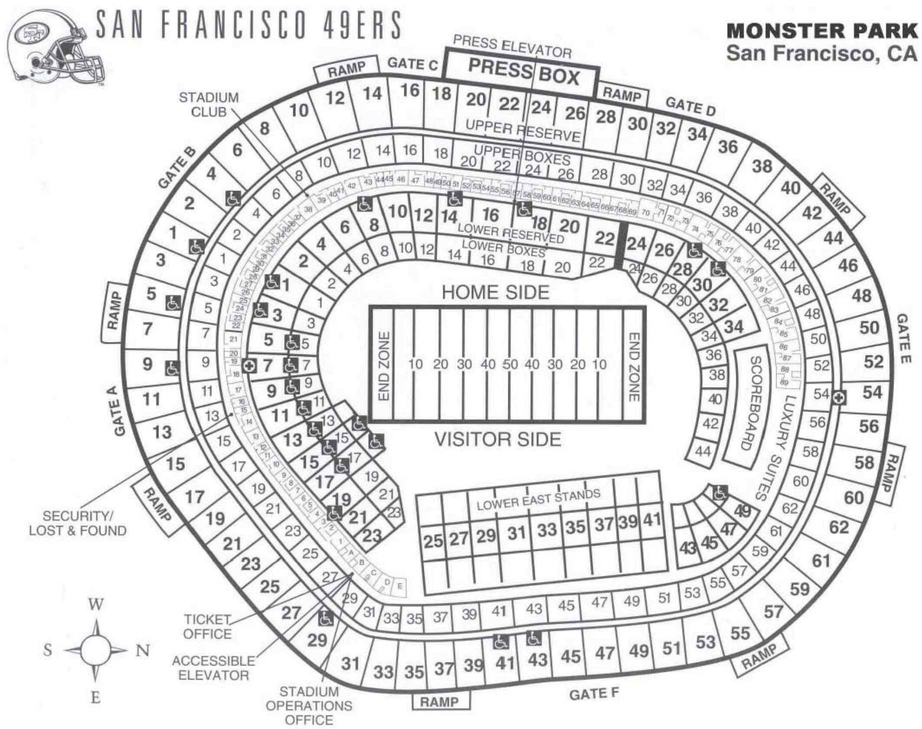

Figure 2. Candlestick Park seating map, courtesy of SF Recreation & Parks Website for Candlestick Park.

Six gates provide entrances into the stadium. The main entrances, with ticket booths and entry turnstiles, are Gates A, E, and F (south, north and east, respectively). On the south, east and north sides of the stadium, an extensive system of exterior ramps, stairs, and escalators provide access to the main entrances. Banks of lights on tall poles, standing just outside the stadium and extending above the stadium's roof, illuminate the playing field for night games.[8]

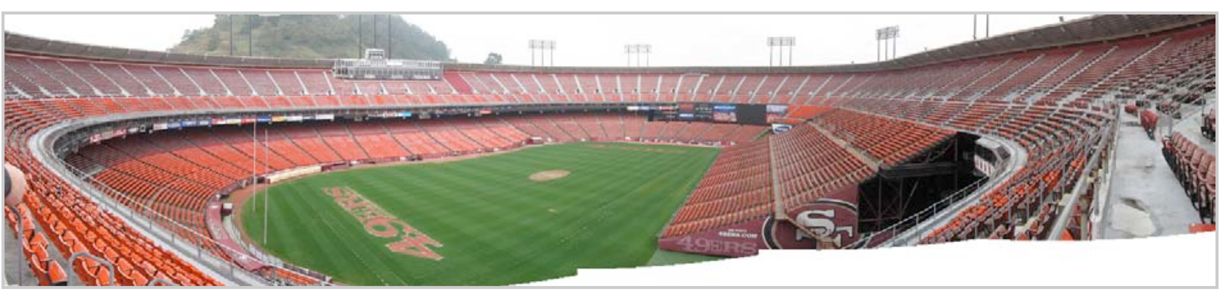

Figure 3. Interior panorama, looking northwest (Photo by Circa, January 2010).

The stadium has six escalators, three passenger elevators, and one freight elevator. There are four locker rooms, two first aid stations and 44 concession stands. The massive open-air structure is primarily comprised of reinforced concrete and steel. The current seating capacity is about 70,000. Orange plastic seats, located on multiple levels, encircle a 100-yard football field. The field is currently covered with natural grass turf. According to Chief Operations Engineer Mike Gay, Rye grass is used to cover the playing field in the winter months and Bermuda grass is used during the summer.

[8] Andrew Hope, *Evaluation of Candlestick Park, page 6 of 13*.

The west side of the stadium is the home side and the east side is for visiting fans. Enclosed suites wrap around the interior of the stadium, above the lower deck of seating, from the southeastern to the northwestern part of the building. The original baseball press box is located at the south end of the stadium in this bank of suites and has been remodeled for use by visiting press and private individuals. The current football press box is situated above the upper bank of stadium seats on the west side of the complex. The scoreboard is located at the north end of the stadium, between the upper and lower stands.

HISTORICAL BACKGROUND

Candlestick Point

The Long-billed Curlew is a large North American shorebird that was common along the shoreline of San Francisco in the early part of the 20th Century. Locally, it was known as the Candlestick Bird and it is after this waterfowl that Candlestick Point was named.[9] Prior to being known as the site of a professional sports stadium, it was a quarry, a landfill and a proposed site for a quarantine hospital, though the institution was never constructed. By the late 1950s, the area became the proposed site for San Francisco's first major league sports facility. As of this writing, the Candlestick Point vicinity is home to Candlestick Park stadium, Candlestick Point State Recreation Area, an RV park and residential buildings.

Baseball in San Francisco

Baseball has always been popular in San Francisco. Through the late 19th and early 20th centuries, the City sported several semi-professional teams that competed with other teams throughout California and the West Coast. In 1930, the owner of the minor league San Francisco Seals built a baseball stadium in the Inner Mission at 16th Street and Bryant Street.[10] The Seals enjoyed a long-term following in the first half of the 20th century. However, when the time came to lure a major league baseball team to San Francisco, the need for a new stadium was apparent. The largest stadium in the City at the time, Seals Stadium could seat only 18,600 people, nowhere near the capacity of stadiums in other cities.[11] If San Francisco wanted a professional team, they needed to provide state-of-the-art facilities.

Figure 4. Seals Stadium, 1958 Photo used with permission from the San Francisco History Center, San Francisco Public Library.

In 1954, voters approved a $5 million bond measure for the construction of a Major League Baseball stadium. This was done before any team had committed to moving to San Francisco. It was a major gamble that was soon to pay off. When Major League Baseball approved an

[9] San Francisco Department of Parks and Recreation website, *Welcome to Candlestick Park*, (accessed 25 February 2010).
[10] Matthew Weintraub, "Giant Footprints: Building The New Ballpark Landscape In San Francisco" (M.A. Thesis, San Francisco State University, 2004), p. 12.
[11] Ballparks of Baseball, *Seals Stadium*, http://www.ballparksofbaseball.com/past/SealsStadium.htm (accessed 24 February 2010).

expansion of teams west of the Rocky Mountains, they opened the door to the eager San Francisco fans. Ultimately, Horace, Stoneham, the owner of the New York Giants, agreed to move his team from New York City, where they competed with two other major league teams, to San Francisco where they would be the City's only Major League Baseball team. At that same time, the Brooklyn Dodgers, agreed to move to Los Angeles, thus bringing their rivalry to California.

The newly renamed San Francisco Giants began their relationship with the City in 1958, playing their first two seasons at the existing Seals Stadium (demolished by 1960).[12] The new baseball stadium was finished at the end of the 1959 season and was the first stadium built for a Major League Baseball team on the West Coast, closely followed by the completion of Dodger Stadium in 1962.[13] Vice President Richard Nixon threw out the first pitch at the Giants home opening game on April 12, 1960.

Candlestick Park

<u>Early Development</u>
As part of a national trend starting in the 1950s, and through the 1980s, "Public subsidies to lure relocating teams to new areas became common. Municipalities usually provided large tracts of undeveloped land ...as new building sites."[14] After passage of the bond measure in 1954 and before any team had committed to moving to San Francisco then-Mayor George Christopher began investigation of possible stadium sites as early as May 1957. At that time, Charles Harney, one of San Francisco's most well known contractors, offered his property on Candlestick Point to the City for $2.7 million.[15] When studies showed that a site closer to the downtown was more expensive, the City decided to accept Harney's offer and hired him as contractor for the project. San Francisco architect John Savage Bolles was hired as the architect for the project.[16]

Charles Harney had been purchasing property in the Bayview-Hunters Point area since the 1930s and in 1953 acquired 40 acres, which brought his total land holdings in the area to 67 acres. A considerable amount of Harney's land was comprised of water lots when he purchased it, though he had filled most of it with artificial fill by the time he sold it to the City of San Francisco.[17] Harney was an avid sports fan and one of the original owners of the Oakland Raiders football team. He died in 1962. The park was initially referred to as "Harney Stadium" during the design and construction phases of development and is noted as such on the original plan drawings. However, a 1960 naming contest sponsored by the San Francisco City Recreation and Parks Commission resulted in the official name of "Candlestick Park." Harney Way, an access road that links the stadium site to U.S. 101, was named in his honor.[18]

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[12] As soon as the season ended, the Giants left Seals Stadium to the bulldozers. Demolition began in November 1959 and was completed in early 1960, before the Giants had finished a single practice on their new field.
[13] Jones & Stokes, *Bayview Transportation Improvements Project-Evaluation Exemption for Monster Park*, 5.
[14] Weintraub, 8.
[15] Charles L. Harney, Inc. was responsible for a large number of Northern California Freeway construction projects, including the Caldecott Tunnel (Jones & Stokes).
[16] Jones & Stokes, *Bayview Transportation Improvements Project-Evaluation Exemption for Monster Park*, 5.
[17] Ibid, 6.
[18] Ibid.

John S. Bolles

John S. Bolles was the architect for Candlestick Park stadium. Except where noted, the following biographical summary is quoted from the *Bayview Transportation Improvements Project-Evaluation Exemption for Monster Park*, by Jones & Stokes (15 May 2007

> In 1958, prominent Bay Area Architect John S. Bolles designed the stadium. Born in Berkley on June 25, 1905, Bolles obtained his bachelor's degree in Engineering from the University of Oklahoma in 1926, and graduated from Harvard with a Master's degree in Architecture in 1932. During the 1930s, he worked as a structural engineer in Oklahoma and as an archaeologist for the Oriental Institute of the University of Chicago on the excavations at Persepolis, the ancient capital of Persia, and for Washington's Carnegie Institute on a comprehensive study of one of the most important Mayan sites in the Yucatan.
>
> In the late 1930s, Bolles moved back to the Bay Area and joined his father's architectural firm. Father and son designed the Temple of Religion and the Christian Science Monitor building on Treasure Island for the 1939 Golden Gate International Exposition. In 1941, he passed the State of California Architectural license examination and between 1943 and 1945 Bolles served as project engineer for the Federal Public Housing Authority in San Francisco. During this time he also began collaborating with architect Joseph Francis Ward, a New Zealander, who has been associated with architect Albert Farr since 1922. Together, Bolles and Ward designed several residences in San Francisco during the 1940s and early 1950s. In 1954, Bolles began working independently on commercial, industrial, and residential buildings.[19]

Bolles was active in the local architectural community and served as Secretary of the San Francisco chapter of the American Institute of Architects (AIA) in 1945-46. He was honored as a Fellow of the AIA in 1963. The architect was also influential in public housing affairs of the 1960s and chaired San Francisco Planning and Urban Research (SPUR) committees on housing and redevelopment. He also designed a number of buildings for the San Francisco Housing Authority, including the extant high-rise senior housing complex at 2451 Sacramento Street in the Fillmore neighborhood.[20]

> A Modernist, Bolles' work often displayed a bold incorporation of modern art and sculpture. Eventually he started his own firm in San Francisco called John S. Bolles and Associates. Noteworthy designs by Bolles in San Francisco include the 1959 Ping Yuen Annex housing project, Embarcadero Park, and the Anna E. Waden Library (Bayview Branch of the San Francisco Public Library) built in 1969. He also designed a number of buildings in Northern California including the McGraw-Hill complex in Novato [most recently occupied by Birkenstock], the General Motors assembly plant in Fremont, Gallo Winery in Modesto, Downtown Plaza in Sacramento and several Macy's department stores. Additionally, Bolles designed the IBM campus in San Jose of which IBM Building 25 was found eligible for the [National Register of Historic Places, California Register of Historic Resources,] and is a San Jose Landmark candidate. While his work throughout Northern California is extensive, he is best known for designing Candlestick Park. Bolles died in 1983.[21]

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[19] Ibid.

[20] David Perry, "Bolles, John Savage," Encyclopedia of San Francisco, A Project of the SF Museum and Historical Society. Online at: http://www.sfhistoryencyclopedia.com/articles/b/bollesJohn.html (accessed 24 February 2010). Also see the AIA Historical Directory of American Architects at http://communities.aia.org/sites/hdoaa/wiki/Wiki%20Pages/Browse%20Bo.aspx (accessed 24 February 2010).

[21] Jones & Stokes, *Bayview Transportation Improvements Project-Evaluation Exemption for Monster*

From opening day, Candlestick Park began to acquire a reputation for its harsh environment for both spectators and players alike. Strong gusts caused serious problems for the players during the 1961 All Star game. At that game, some of the nation's best ball players committed seven errors and the relief pitcher was nearly blown off of the mound and the stadium became known as "the cave of wind".[22]

Though Bolles did not complete an official wind study prior to construction, the architect included two notable design elements into the stadium plans in an attempt to combat the site's cool temperatures and gusty winds. The first was a heating system for the 20,000 reserved seats and the second was the rounded roof at the upper deck that was designed to act as a wind barrier. Unfortunately, both elements eventually proved to be unsuccessful.[23]

After the 1961 All Star game, a wind study of the stadium was conducted, which found that "local geographic features and the configuration of the structure itself was causing most, if not all of the negative wind effects. The study also indicated that these could have been prevented by sitting the facility a few hundred feet further to the north."[24]

Despite decades of criticism, Bolles cited Candlestick Park as his best work. A 1965 profile in the San Francisco Examiner states that Bolles "[was] proud and happy to have designed Candlestick Park…and [requested] all critics to stop worrying about it." The architect claimed, "It is not a building, but a sculpture."[25] However, the persistent wind problems and other technical issues soon prompted the architect [Bolles] and the City to plan for various modifications to the stadium in attempts to improve conditions.

John S. Bolles retired in 1978 and his eldest son, Peter P. Bolles, continued the practice, eventually moving it to Las Vegas. John Bolles died on March 5, 1983 at his home in Santa Rosa. For further discussion of Bolles career as an architect and for definition of the term "Master Architect" please see the Evaluation of Significance: Design/Construction sections of this report.

<u>Construction History and Development</u>
Stadium construction began in September 1958 and problems began almost immediately, including disagreements between Bolles and Harney about the facility's design and the construction schedule. Various delays, including "a San Francisco Grand Jury investigation into stadium financing and the postponed installation of the seats because of a Teamster strike," plagued the construction process. However, the stadium was finally completed at a cost of almost $15 million and the stadium opened on April 12, 1960.[26]

Park, 6-7.
[22] Ibid, 7.
[23] Ibid.
[24] Ibid.
[25] Horace Schwartz, "Snapshots: Architect John Bolles." San Francisco: San Francisco Examiner, 28 February 1965.
[26] Jones & Stokes, 7.

Figure 5. Candlestick Park under construction, 1958. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 6. Candlestick Park under construction, 1959. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Alterations to the building have been ongoing since the building's initial construction. In 1960, the seating capacity was 43,765 and by the early 1970s, it had increased to 59,000 for baseball and 62,000 for football. Today it seats over 70,000 (a roughly 60% increase in seating capacity).[27] Originally, the grandstand of the boomerang-shaped stadium:

> … consisted of two main seating decks. The lower deck extended from behind home plate down the first base line to the right field foul pole, and down the third base line and around the left field foul pole into left center field. The upper deck extended from home plate down both the first and third base lines. A small section of bleachers was located in right center field. The field surface was bluegrass and the scoreboard was located above the hitter's backdrop in center field. Behind the bleachers on the north elevation was an employee parking area.[28]

Shortly after the stadium opened it was used for both baseball and football. In 1961, the National Football League's Oakland raiders played a season at Candlestick and Bolles began working on plans to accommodate both the SF Giants and the SF 49ers by expanding the stadium and enclosing the outfield as early as 1966.[29] As part of the redesign, attempts were made to reduce some of the wind-contributing flaws of the initial construction and the San Francisco Department of Building Inspection approved Bolles' redesign plans in 1969.[30]

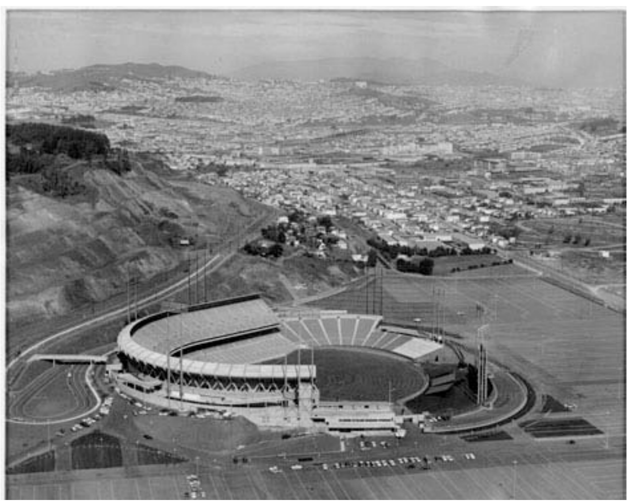

Figure 7. March 1960 view of the completed stadium, looking north. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

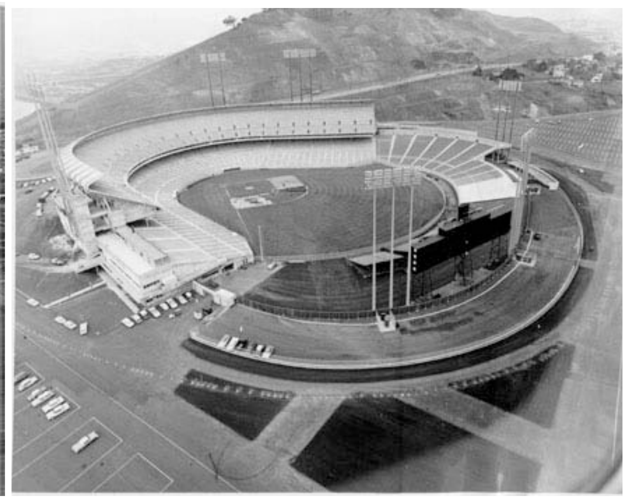

Figure 8. March 1960 view of the completed stadium, looking northwest. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

The stadium was enlarged in 1970-71 to accommodate the San Francisco 49ers. This expansion cost the City $16.1 million. As part of this expansion:

> The upper deck was extended completely around the outfield and retractable seating installed in the right-center field area at the lower level. With the sidelines of the football field roughly parallel to the third base line, this retractable seating could be extended onto the outfield area for football games. The original scoreboard was removed and a new scoreboard installed between the lower and upper decks in the left-center field area.

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[27] Ibid. Also http://www.parks.sfgov.org/site/recpark_index.asp?id=18977 (accessed 24 February 2010).
[28] Jones & Stokes, 7.
[29] Since 1946, the 49ers had played their games in Kezar Stadium near Golden Gate Park.
[30] Jones & Stokes, *Bayview Transportation Improvements Project-Evaluation Exemption for Monster Park*, 8.

> The current exterior ramps and stairs on the north and northeast sides of the stadium were installed as part of this expansion.[31]

Additional alterations that occurred during the early 1970s renovation of the stadium include the replacement of the natural grass field with Astroturf; installation of 30,000 new plastic seats to replace the original wood seats; construction of a new main Gate A, eight new ticket booths and special gates for ticket holders; construction of two new escalator towers at Gates A and E; and construction of a new entrance at Gate F. A rubberized track surrounding the field was installed; all restrooms were rehabilitated and upgraded; the baseball press box was enlarged and rehabilitated; a new press box in the upper deck for football was constructed, and foundation work including grade increases and foundation improvements at the northern part of the stadium were completed.[32] Additional concrete ramps were also installed near Gate A at this time.[33] Evidence of the expansion of Gate A is seen in the ghosting on the concrete floor (See Appendix A for existing conditions photographs). The playing field was converted back to grass in the late 1970s.[34]

The 49ers played their first season in Candlestick Park during the 1971-1972 season, winning a NFC West title that year. At the time, the stadium could seat 62,000 for football games and 59,000 for baseball.[35] Over the next decades, the stadium continued to do double duty as home to the Giants for seven months of the year and for the 49ers for four months after. Often, during football preseason games or because of baseball playoffs, the field hosted both teams simultaneously. Maintenance and conversion of the stadium between sporting seasons was expensive, costing about $150,000 per conversion for field, locker room and amenities upgrades.[36] General alterations and routine modification were ongoing.

According to building permits, eleven new exit gates were installed at the building exterior in 1982 and steel columns were installed under the existing concrete wind canopy in 1984. A number of major alterations also began in the early 1990s and continued throughout the decade.[37]

In 1991, fifty-five suites were renovated, ADA upgrades were completed at Ramps 1-8 and eight restrooms were rehabilitated. In 1992, twenty-six additional suites were upgraded, the exterior concourse was widened, the football press box windows were altered, old concrete exit stairs on the main level were replaced with new concrete stairs and the baseball press box was again renovated. The year of 1993 saw modifications to Gates A through D; main level concourse widening; seat additions at the main level; media compound site improvements; construction of Plazas A, F and E; construction of restrooms and stairs at Gate C; and the closure of twenty-two vomitories at the upper level.[38] In 1994, the stadium was further enlarged at a cost of nearly $3 million to accommodate up to 71,000 football fans.

[31] Andrew Hope, *Evaluation of Candlestick Park,* page 6 of 13.
[32] Interview with Mike Gay, Chief Operations Engineer at Candlestick Park, 30 January 2010. Also "What it's Like at Candlestick Now," San Francisco, *San Francisco Progress*, 14 April 1971.
[33] Interview with Mike Gay.
[34] Andrew Hope, *Evaluation of Candlestick Park,* page 6 of 13.
[35] San Francisco Department of Parks and Recreation website, *Welcome to Candlestick Park!*, http://www.parks.sfgov.org/site/recpark_index.asp?id=18977 (accessed 25 February 2010).
[36] Interview with Mike Gay.
[37] See Building Construction Chronology matrix in Appendix B.
[38] See Building Construction Chronology, Appendix B. According to Merriam-Webster Online, a vomitory is "an entrance piercing the banks of seats of a theater, amphitheater, or stadium." Source: http://www.merriam-webster.com/dictionary/vomitory (accessed 25 February 2010).

Figure 9. c.1980s postcard view.

As stated previously, general alterations and facilities upgrades have been ongoing since the stadium opened in 1960. Building permit, newspaper articles and an oral interview with Mike Gay, the Chief Operations Engineer at Candlestick since 1978 describe the following regular upgrades to the facility:

- Field turf changes (ongoing since the late 1970s early1980s - Bermuda grass is used in the summer and Rye grass in the winter
- Regular systems and signage upgrades
- Alterations to food/beverage vendor facilities
- Regular expansion, alteration and replacement of stadium seating
- Lighting and scoreboard upgrade and replacement
- Regular remodel/reconfiguration of suites, skyboxes, office spaces and restrooms

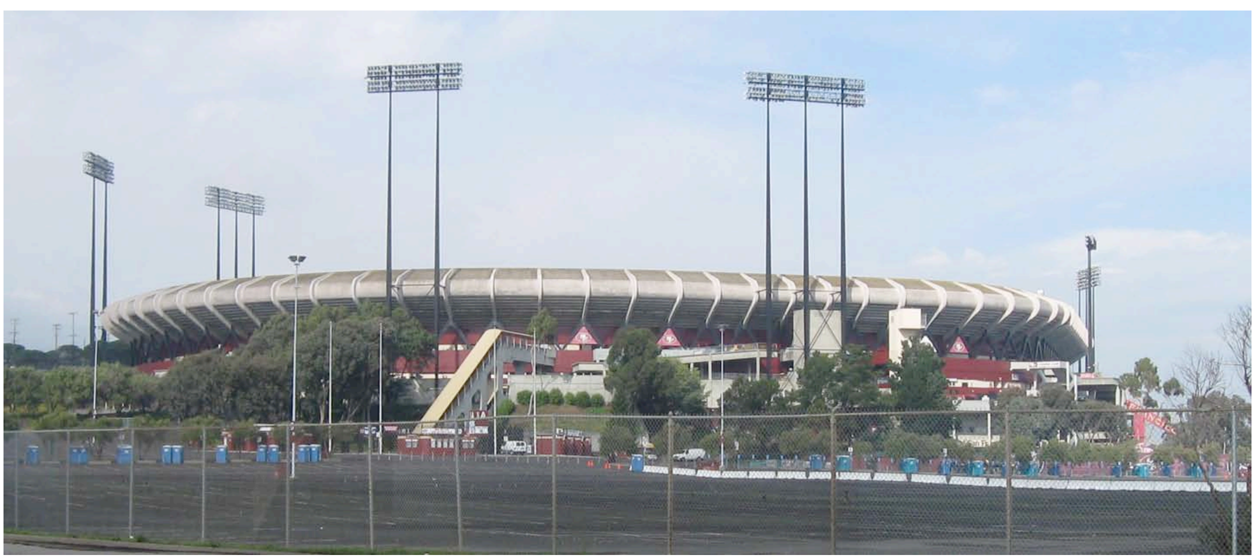

Figure 10. Current view, looking north from Hunters Point Expy. South parking lot then Gate A in foreground.

CIRCA Historic Property Development

In the early 1990s, the Giants had begun to campaign for a new, baseball-only stadium closer to downtown San Francisco, though they did not leave Candlestick Park until 1999. They moved into their new stadium, now known as AT&T Park, at Mission Bay in 2000 and remain there today. The 49ers continue to play football at Candlestick Park, under a lease with the City and County of San Francisco. The Candlestick Point – Hunters Point Shipyard Phase II project under review would include a new 49ers stadium at Hunters Point Shipyard. However, the 49ers are also pursuing development of a new stadium in the City of Santa Clara.

Beyond Sports

Candlestick Park has played an important cultural role in the lives of San Franciscans beyond its nearly 40-year relationship with the Giants (1960-1999). It served as the site for numerous concerts, public events and other great sporting moments. On August 29, 1966, it hosted the Beatles last live commercial concert. It is the only stadium in the United States to host six National Football Conference championship games, three NFL Western Division Championships, 12 National Football Conference West Conference Games, two Major League Baseball World Series, and two Major League Baseball All-Star games. It was just before Game three of the 1989 World Series between the Oakland Athletics and the San Francisco Giants that the Loma Prieta earthquake was broadcast to millions of homes around the world. Remarkably, the 7.1 magnitude earthquake caused minimal damage to Candlestick Park and none of the 65,000 spectators were injured. The World Series was delayed 10 days while engineers verified the safety of the stadium.

EVALUATIVE FRAMEWORK

Evaluation Framework - National

The National Historic Preservation Act

The National Historic Preservation Act (NHPA), 16 U.S.C. §§ 470a to 470w-6, is the primary federal law governing the preservation of cultural and historic resources in the United States. The law establishes a national preservation program and a system of procedural protections that encourage the identification and protection of cultural and historic resources of national, state, tribal and local significance. Key elements of the act include:

- Establishment of a comprehensive program for identifying historic and cultural resources for listing in the National Register of Historic Places (NRHP).
- Creation of a federal-state/tribal-local partnership for implementing programs established by the act.
- Requirement that federal agencies take into consideration actions that could adversely affect historic properties listed or eligible for listing on the National Register of Historic Places, commonly known as the Section 106 Review Process.
- Establishment of the Advisory Council on Historic Preservation, which oversees federal agency responsibilities governing the Section 106 Review Process. [39]

The National Register Criteria for Evaluation

The National Register is the nation's master inventory of known historic resources. It is administered by the National Park Service (NPS) in conjunction with SHPO. The National Register includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, state,

[39] National Trust for Historic Preservation website, *National Historic Preservation Act*, http://www.preservationnation.org/resources/legal-resources/understanding-preservation-law/federal-law/nhpa.html (accessed 25 February 2010).

or local level. The National Register criteria and associated definitions are outlined in National Register Bulletin Number 15: How to Apply the National Register Criteria for Evaluation. The following is a summary of Bulletin 15:

Criteria
Generally, resources (structures, sites, buildings, districts and objects) over 50 years of age can be listed in the National Register provided that they meet the evaluative criteria described below. Resources can be listed individually in the National Register or as contributors to an historic district.[40] The National Register criteria are as follows:

A. Resources that are associated with events that have made a significant contribution to the broad patterns of history;

B. Resources that are associated with the lives of persons significant in our past;

C. Resources that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. Resources that have yielded or may likely yield information important in prehistory or history.

Integrity
When nominating a resource to the NRHP, one must evaluate and clearly state the significance of that resource to American history, architecture, archaeology, engineering, or culture. A resource may be considered individually eligible for listing in the NRHP if it meets one or more of the above listed criteria for significance and it possesses historic integrity. Historic properties must retain sufficient historic integrity to convey their significance.
The National Register recognizes seven aspects or qualities that define historic integrity:

- **Location**. The place where the historic property was constructed or the place where the historic event occurred.

- **Design**. The combination of elements that create the form, plan, space, structure, and style of a property.

- **Setting**. The physical environment of a historic property.

- **Materials**. The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.

- **Workmanship**. The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.

[40] A "contributor" is a building, site, structure, or object that adds to the historic associations or historic architectural qualities for which a property is significant. The contributor was present during the period of significance, relates to the documented significance of the property, and possesses historic integrity or provides important information about a period; or the contributor independently meets National Register criteria. A "non-contributor" does not add to the historic associations or historic architectural qualities as it was not present during the period of significance; it has experienced alterations, disturbances, additions, or other changes; or it does not independently meet the National Register criteria.

- **Feeling**. A property's expression of the aesthetic or historic sense of a particular period of time.

- **Association**. The direct link between an important historic event or person and a historic property.

To retain historic integrity, a resource should possess several of the above-mentioned aspects. The retention of specific aspects of integrity is essential for a resource to convey its significance. Comparisons with similar properties should also be considered when evaluating integrity as it may be important in deciding what physical features are essential to reflect the significance of a historic context.

Evaluation Framework - California

<u>The California Environmental Quality Act (CEQA)</u>
The California Environmental Quality Act provides the legal framework by which historical resources are identified and given consideration during the planning process. The law was adopted in 1970 and incorporated in the Public Resources Code §§21000-21177. CEQA's basic functions are to:

- Inform governmental decision makers and the public about the potential significant environmental effects of proposed activities;
- Identify ways to reduce or avoid adverse impacts;
- Offer alternatives or mitigation measures when feasible; and
- Disclose to the public why a project was approved if significant environmental effects are involved.

CEQA applies to projects undertaken, funded or requiring an issuance of a permit by a public agency. The analysis of a project required by CEQA usually takes the form of an Environmental Impact Report (EIR), Environmental Impact Statement (EIS), Negative Declaration (ND), or Environmental Assessment (EA).[41]

<u>The California Register Criteria for Evaluation</u>
The California Register of Historical Resources is the official list of properties, structures, districts, and objects significant at the local, state or national level. California Register properties must have significance under one of the four following criteria and must retain enough of their historic character or appearance to be recognizable as historical resources and convey the reasons for their significance (i.e. retain integrity). The California Register utilizes the same seven aspects of integrity as the National Register. Properties that are eligible for the National Register are automatically eligible for the California Register. Properties that do not meet the threshold for the National Register may meet the California Register criteria.

1. Associated with events that have made a significant contribution to broad patterns of local or regional history, or cultural heritage of California or the United States;

2. Associated with the lives of persons important to the local, California or national history

[41] South Coast Air Quality Management District, CEQA, http://www.aqmd.gov/ceqa/ (accessed 25 February 2010).

3. Embodies the distinctive characteristics of a design-type, period, region, or method of construction, or represents the work of a master, or possesses high artistic value; or

4. Yields important information about prehistory or history of the local area, California or the nation.

In addition to meeting one or more of the above criteria, the CRHR requires that sufficient time must have passed to allow a "scholarly perspective on the events or individuals associated with the resource." Fifty years is used as a general estimate of the time needed to understand the historical importance of a resource.[42] The OHP recommends documenting, and taking into consideration in the planning process, any cultural resource that is 45 years or older.[43]

CRHR criteria are similar to National Register criteria, and are tied to CEQA, as any resource that meets the above criteria, and retains a sufficient level of historic integrity, is considered an historical resource under CEQA. Integrity is the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance. Historical resources eligible for listing in the California Register must meet one of the criteria of significance described above and retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register.[44] Resources that are significant, meet the age guidelines, and possess integrity will generally be considered eligible for listing in the CRHR.

To be listed on the California Register a formal application must be completed and sent to the State Historic Resources Commission (SHRC) for consideration. Consent of the property owner is not required, but a resource cannot be listed if the owner's objects. The SHRC can, however, formally determine a property eligible for the California Register if the resource owner objects.

Evaluation Framework - Local

City of San Francisco Criteria for Evaluation[45]
City and County of San Francisco criteria for evaluation of historic resources is based on Planning Code Section 1004(a)(1): having a special character or special historical, architectural or aesthetic interest or value.

The following information is quoted from *San Francisco Preservation Bulletin #5: Landmark and Historic District Designation Procedures*:[46]

> The City of San Francisco maintains a list of locally designated City Landmarks and Historic Districts, similar to the National Register of Historic Places but at the local level. Landmarks can be buildings, sites, or landscape features. Districts are defined generally

[42] CCR 14(11.5) §4852 (d)(2).
[43] California Office of Historic Preservation, 1995, p.2. Instructions for Recording Historical Resources. Office of Historic Preservation, Sacramento.
[44] California Office of Historic Preservation, 2006, p.2. California Register and National Register: A Comparison. Technical Assistance Series No. 6. California Department of Parks and Recreation, Sacramento. Assistance Series No. 6. California Department of Parks and Recreation, Sacramento.
[45] San Francisco Preservation Bulletin #5 is quoted here as no criteria for evaluation are presented in Article 10 of the San Francisco Planning Code. Article 10 establishes only the procedures for designation.
[46] This bulletin is available on the SF Planning Department website: http://www.sfgov.org/site/planning_index.asp?id=24996.

as an area of multiple historic resources that are contextually united. The regulations governing Landmarks, as well as the list of individual Landmarks and descriptions of each Historic District, are found in Article 10 of the Planning Code.

A landmark may include any structure, landscape feature, site or area having historic, architectural, archaeological, cultural or aesthetic significance in the history of San Francisco, the State of California or the nation. Examples of local landmarks include such diverse structures as monumental as City Hall and the Ferry Building as well as small scaled, rare, surviving structures such as a Blacksmith Shop and a 1906 Refugee Shack.

According to San Francisco Preservation Bulletin #5, the San Francisco Landmarks Advisory Board and the Planning Commission use the National Register Criteria for evaluating potential historic properties.[47]

These criteria are quoted below for informational purposes. Properties considered historically significant are those:

Criterion A: that are associated with events that have made a significant contribution to the broad patterns of our history; or

Criterion B: that are associated with the lives of persons significant in our past; or

Criterion C: that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

Criterion D: that have yielded, or may be likely to yield, information important in prehistory or history.[48]

EVALUATION OF SIGNIFICANCE

National Register of Historic Places (NRHP)

<u>Criterion A (Associative Value - Event)</u>:
To be considered for listing under Criterion A, a property must be associated with one or more events important within a defined historic context. Criterion A recognizes properties associated with single events, such as the founding of a town, or with a pattern of events, repeated activities, or historic trends, such as the gradual rise of a port city's prominence in trade and commerce. The event or trends, however, must clearly be important within the associated context: settlement, in the case of the town, or development of a maritime economy, in the case of the port city. Moreover, the property must have an important association with the event or historic trends, and it must retain historic integrity.[49]

[47] It should be noted that the San Francisco Landmarks Advisory Board was replaced by the Historic Preservation Commission in November 2008.
[48] San Francisco Preservation Bulletin No. 5: Landmark and Historic District Designation Procedures (page 6). SF Planning Department website: http://www.sfgov.org/site/planning_index.asp?id=24996.
[49] National Park Service, National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation, Rebecca H. Shrimpton, ed., 2002.

The following is a direct quote from the historic resource evaluation completed by the California Office of Transportation (Caltrans) in 2008. The California Office of Historic Preservation (OHP) concurred with this finding in 2008. Circa: Historic Property Development also concurs with the finding.

> *Criterion A: Association with significant events - expansion of Major League baseball to the West Coast*
>
> Prior to the 1958 baseball season, the 16 Major League teams (eight in the American League and eight in the National League) were concentrated in the northeastern quarter of the country. The westernmost teams in 1957 were the Kansas City Athletics of the American League and the St. Louis Cardinals of the National League. The Athletics had relocated from Philadelphia only in 1955. The Brooklyn Dodgers and New York Giants, both of the National League, relocated to California prior to the start of the 1958 baseball season, with the Dodgers going to Los Angeles and the Giants to San Francisco.
>
> The Dodgers and Giants were not the first teams to move from one city to another. In addition to the previously mentioned Athletics, the Boston Braves moved to Milwaukee in 1953 and the St. Louis Browns moved to Baltimore in 1954, changing their name to the Orioles. However, the relocation of the Dodgers and Giants to the West Coast greatly expanded the geographical reach of Major League baseball. The two teams' move west reflected the rapid postwar population growth of California and other Western states, compared to the relatively slower rate of growth in the Northeast and Midwest.
>
> The Dodgers and Giants took advantage of the expanding market for professional sports in the West. The relocation of these two teams initiated the westward expansion of Major League baseball, which currently has teams in Houston, the Dallas-Fort Worth area, Denver, Phoenix, and Seattle, in addition to the California cities of San Diego, Anaheim, Los Angeles, Oakland, and San Francisco. The move to the West Coast in the late 1950s also reflected improvements in transportation, with the advent of jet travel making the nationwide distribution of sports teams feasible. In November of 1954, San Francisco's voters approved a bond measure for the construction of a baseball stadium, in the hope of enticing a major league team to move to their city. However, no team acted on this offer until 1957. Horace Stoneham, owner of the New York Giants, and Walter O'Malley, owner of the Brooklyn Dodgers, jointly considered moving to the West Coast at that time. It was thought that two teams needed to move in order to make the relocation economically feasible. The cost of travel to games would be prohibitive for a single team, with every other team in their league more than 1,500 miles away.
>
> On August 19, Stoneham announced his intention to move the Giants to San Francisco, and O'Malley announced on October 8 that the Dodgers would move to Los Angeles. The Dodgers played their home games from 1958 through 1961 at the Los Angeles Coliseum, until the completion of Dodger Stadium at Chavez Ravine in 1962. The Coliseum was built as a football stadium in the early 1920s and enlarged for the 1932 summer Olympics. Inserting a baseball diamond into the Coliseum was a difficult fit, with the left-field foul line only 250 feet from home plate to the outfield fence and the right-field line a very deep 390 feet. (Although distances to the outfield fences are not uniform among Major League ballparks, 330 feet is typical.)
>
> The Giants played their first two seasons in California at Seals Stadium, while Candlestick Park was under construction. Seals Stadium, built in 1931 at the comer of 16th and Bryant Streets, had been the home of the minor league San Francisco Seals of the Pacific Coast League. The city purchased the land at Candlestick Point in

southeastern San Francisco from Charles Harney, a contractor who also built the stadium. Construction began in September 1958 and the stadium opened on April 12, 1960. The cost of the new stadium was nearly $15 million.

The stadium was named Candlestick Park as a result of a naming contest run by the city's Recreation and Parks Department. It was renamed 3 Com Park in 1996, when the 3 Com Corporation paid for the naming rights. The Giants left the stadium after the 1999 season, moving to a new baseball-only stadium in the city's South-of-Market area. The Monster Cable Products Company bought the naming rights in 2004, and the stadium has been called Monster Park since that time.

...The stadium meets criterion A for its association with the expansion of Major League baseball to the West Coast in the late 1950s. Although the stadium was not ready for the Giants until the 1960 season, planning and financing began even before Stoneham's announcement of his intent to relocate the team to San Francisco, and the move was predicated on the city's construction of a stadium. Completed two years before Dodger Stadium in Los Angeles, Candlestick Park was the first stadium built for Major League baseball west of Kansas City.

Criterion A: Association with significant events - sporting, entertainment and other events

Sports stadiums and arenas are inherently important as the home field for their cities' professional sports teams. They are places of tradition and accumulated memories for thousands of sports fans, and an important component of each metropolitan area's civic identity. Candlestick Park has hosted many memorable sporting events since its opening in 1960. The Giants played two World Series' at the stadium, losing to the New York Yankees in 1962 and to the Oakland Athletics in 1989. The 1989 series was disrupted by the Loma Prieta earthquake, which occurred during the third game of the series with a sellout crowd at Candlestick Park. Although there was some damage to the stadium, no one at the game was injured. One of the greatest pitching duals of all time took place at Candlestick Park on July 2, 1963. Juan Marichal of the Giants and Warren Spahn of the Milwaukee Braves, both later inducted into the baseball Hall of Fame, battled for 16 innings. Neither team scored a run until a home run by Willie Mays in the bottom of the 16th inning gave the Giants a 1-0 victory. The most notable events in football occurred in 1980 and 1982. Described by sportswriter Nick Peters as "the greatest comeback in NFL history," the 1980 contest between the 49ers and the New Orleans Saints was 35-7 in favor of the Saints at halftime. Quarterback Joe Montana passed for 247 yards in the second half to tie the game which the 49ers won with an overtime field goal. Two years later, in a game against the Dallas Cowboys, Montana completed a touchdown pass to Dwight Clark, known simply as "the catch" to football fans, to give the 49ers their first conference championship. In addition to baseball and football games, Candlestick Park has hosted many other notable events, such as the last live performance of the Beatles in 1966 and a Mass celebrated by Pope John Paul II in 1987.

Although these events are important to those who witnessed them, they do not qualify Candlestick Park for National Register listing under Criterion A. Over time, any major sports stadium will accumulate its share of memorable contests, championship victories, records set and broken, and feats of athleticism. Only a stadium's greater age, and therefore its greater store of memorable events, distinguishes one stadium from another in this respect. Such events are the common legacy of all major sports stadiums, and they do not qualify their respective venues for National Register listing, either individually or collectively. In addition, all of the notable sporting, entertainment, and other events at Candlestick Park have occurred since 1960, and none are of such exceptional significance that they would qualify the stadium for National Register listing under criteria consideration G for properties that have achieved significance within the last fifty years.[50]

Criteria Consideration G: The National Register Criteria generally exclude properties that have achieved significance within the past fifty years unless they are of exceptional importance. "Fifty years is a general estimate of the time needed to develop historical perspective and to evaluate significance. This consideration guards against the listing of properties of passing contemporary interest and ensures that the National Register is a list of truly historic places." The phrase "exceptional importance" may be applied to the extraordinary importance of an event...or association [and] "properties that are more than fifty years old, but whose significant associations or qualities are less than fifty years old, must be treated under the fifty-year consideration." [51]

Despite the fact that the Caltrans evaluation was developed before the stadium reached the fifty-year mark, the same conclusions discussed above regarding to Criteria Consideration G can be applied. [52] A property does not become a resource simply by crossing the 50-year mark and a collection of notable, but not nationally significant events, does not qualify the stadium for listing on the National Register.

A national historical event occurred here during the 1989 World Series when the Loma Prieta earthquake of October 17, 1989 shook Candlestick Park and postponed the World Series between the Giants and Oakland A's. However, this event at the stadium was not one that changed, altered or influenced any aspect of San Francisco or Nation. Indeed, the quake had a much greater effect on buildings, structures, objects and people in other areas of San Francisco and Northern California than did the delay of a sporting event. While ESPN broadcast the quake at the stadium — through microwave feed, thereby changing the role of sport broadcasting[53] — more significant earthquake events occurred, including the deaths of 62 people in Northern California (including 42 deaths due to the collapse of the Cypress Freeway in Oakland), collapse of part of the Bay Bridge, injuries (3,757 people) and homelessness (3,000-12,000 people). [54] (Note: see below for discussion of Criterion G and the property's associations with important people that have achieved significance into a period less than fifty years.)

Candlestick Park appears to be eligible for the National Register under Criterion A for its association with the expansion of Major League baseball to the West Coast in the late 1950s/early 1960s.

<u>Criterion B (Associative Value - Person)</u>:
Properties may be eligible for the National Register if they are associated with the lives of persons significant in our past. According to National Register Bulletin 15, persons "significant in our past" refers to individuals whose activities are demonstrably important within a local, State, or national historic context. Properties eligible under this criterion are usually those associated with a person's productive life, reflecting the time period when he or she achieved

[50] Andrew Hope, California Department of Transportation, DPR 523 A & B, January 2008.
[51] National Park Service Bulletin 15 (accessed 3.26.2010) http://www.nps.gov/nr/publications/bulletins/nrb15/nrb15_7.htm#crit%20con%20g
[52] National Park Service Bulletin 15.
[53] http://search.espn.go.com/1989-world-series/ (accessed 22 March 2010).
[54] http://www.vibrationdata.com/earthquakes/lomaprieta.htm (accessed 22 March 2010).

significance. The best representatives usually are properties associated with the person's adult or productive life.[55]

The following is a direct quote from the historic resource evaluation completed by Caltrans in 2008. The California OHP concurred with this finding in 2008. Circa: Historic Property Development also concurs with the finding.

> Candlestick Park does not meet National Register Criterion B for association with any of the Giants former field managers or executive office personnel. With the exception of team owner Horace Stoneham's role in bringing Major League baseball to the West Coast, none of these people played significant roles in baseball history during their time in San Francisco. The movement of the Giants and Dodgers to the West Coast in 1958 is discussed above under Criterion A.
>
> The Giants had several outstanding players who spent a large part of their careers in San Francisco during the Candlestick Park years. Those players now in the baseball Hall of Fame include Orlando Cepeda, Juan Marichal, Willie Mays, Willie McCovey, and Gaylord Perry. Of these, Mays stands above the rest as one of the game's greatest players. His small circle of peers would include only the best players of all time, such as Ty Cobb, Babe Ruth, Joe DiMaggio, Ted Williams, and Hank Aaron. When he retired after the 1973 season, Mays was third on the career home run list with 660, trailing only Babe Ruth (714) and Hank Aaron (713). Mays is currently fourth on the list, having been passed by Barry Bonds. Mays' accomplishments during his Candlestick Park years include leading the National League in hits in 1960, runs scored in 1961, and home runs in 1962, 1964, and 1965. He received the Most Valuable Player award in 1965, and nine Gold Glove awards for fielding excellence, from 1960 through 1968.
>
> Candlestick Park meets National Register Criterion B for association with the career of Willie Mays. Starting with the New York Giants in 1951, Mays moved with the team to San Francisco and stayed until 1972, when he was traded to the New York Mets early in the season. He finished his playing career with the Mets, retiring after the 1973 season. Of his 22 seasons in the major leagues, Mays spent 14 full seasons and a small portion of a 15th in San Francisco, with Candlestick Park as his home field during all but two of these. Approximately 60 percent of his career home games were played at Candlestick Park, compared to approximately 25 percent at the Polo Grounds in New York, ten percent at Seals Stadium, and five percent at Shea Stadium in New York with the Mets. As the Polo Grounds and Seals Stadium are no longer extant, and Mays' tenure with the Mets was brief, Candlestick Park is the property most closely associated with his career and accomplishments in baseball. Mays' career at Candlestick Park began with the opening of the stadium in 1960, slightly less than 50 years ago, and continued to 1972, only 36 years ago. However, he is the one player in San Francisco Giants history whose achievements could be considered to be of exceptional significance in the history of baseball. In addition, enough time has passed to accurately evaluate the significance of Mays' career, and his stature among the greatest players of all time will not diminish in the future, even as later players surpass his accomplishments.

As discussed above, a property may be considered eligible for the National Register under Criteria Consideration G if the property achieved significance within the past fifty years and is of *exceptional importance*. The National Register discourages the nomination of such properties associated to a person still living unless sufficient scholarship and evidence of historical

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[55] Matt Weintraub, "Giant Footprints: Building The New Ballpark Landscape In San Francisco" (M.A. Thesis, San Francisco State University, 2004)

perspective exist and whose active life in their field of endeavor is over. Further, Criteria Consideration G must be considered for a property that "continues to achieve significance into a period less than fifty years". [56] According to the National Park Service,

> …the more recently a property has achieved significance, generally, the more difficult it is to demonstrate exceptional importance. The case for exceptional importance is bolstered when there is a substantial amount of professional, documented materials on the resource and the resource type. A property listed in the National Register 10 or 15 years after it has achieved significance requires clear, widespread recognition of its value to demonstrate exceptional importance."[57]

Mays' career at Candlestick Park began with the opening of the stadium in 1960, 50 years ago at the time of this evaluation, and continued to 1972, 38 years ago. Other notable players associated with Candlestick Park have more recent associations with the property. As such, the evaluation below is discussed in terms of both Criterion B and Criteria Consideration G.

Mays is considered one of the greatest all-around players in the history of baseball and his achievements can "be considered to be of exceptional significance in the history of baseball." A simple library search for Mays identifies a substantial number of printed publications dedicated to Mays' life and career in baseball. Various biographies and historical studies exist that discuss the player's unique life story, as well as his place within the history of the sport and the larger social history of the nation during the span of his active career. As almost 40 years have passed since the end of Mays' baseball career at Candlestick and a number of documentary studies have been completed about his career in professional sports, Circa concurs with the above finding that Candlestick Park appears eligible for the National Register for association with Willie Mays under Criterion B/G. While Candlestick Park was found to meet National Register Criterion B/G for association with the baseball career of Willie Mays, its association to other sport figures within the past fifty years did not meet exceptional importance. This includes other notable players that are associated with Candlestick Park such as Barry Bonds, Joe Montana, and Jerry Rice.

Barry Bonds, left fielder in the National Baseball League, played for the San Francisco Giants from 1986 to 2007. He holds the record for the most career home runs, 756, and was voted Most Valuable Player seven times, the Hank Aaron Award three times, and Major League Player of the Year three times.[58] Bonds will become eligible for considerable for induction into the Baseball Hall of Fame in 2013.[59] Bonds played seven years at Candlestick (1993 -1999) and eight years at AT&T Park (2000-2007).

Joe Montana, quarterback in the National Football League, played for the San Francisco 49ers from 1979 to 1992. He led the 49ers to four Super Bowl wins (Super Bowls XVI, XIX, XXIII, and XXIV) and was named Super Bowl MVP three times. When he retired, he ranked fourth in career passing yardage (40,551 yards), attempts (5,391), and passing touchdowns (273). His 3,409 completions ranked third all-time, and his career passer rating of 92.3 was second all-time. He holds numerous records and awards including being name All-NFL three times, All-NFC

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[56] National Park Service, National Register Bulletin 22: Guidelines for Evaluating and Nominating Properties that Have Achieved Significance within the Past Fifty Years, Carol D. Shull, ed., 1990. Online at http://www.nps.gov/nr/publications/bulletins/nrb22/nrb22_V.htm (accessed 3.26.2010). See also National Register Bulletin 15.

[57] National Register Bulletin 22.

[58] Baseball Reference.Com web site (accessed 14 March 2010) www.baseball-reference.com/players/b/bondsba01. shtml?redir.

[59] National Baseball Hall of Fame web site (accessed 14 March 2010) www.community.baseballhall.org/Page.aspx? pid=414.

five times, and voted to the Pro Bowl eight times. He was inducted into the Football Hall of Fame Class in 2000.[60] No Super Bowl games were ever played at Candlestick Park.[61]

Jerry Rice, wide receiver in the National Football League, played for the San Francisco 49ers from 1985-2000. When he retired, he was the most prolific wide receiver in NFL history with records for receptions (1,549); receiving yards (22,895 yards); most 1,000-yard receiving seasons (14); total touchdowns (208); and combined net yards (23,546). Rice holds many NFL playoff and Super Bowl records. He played in eight conference championships and four Super Bowls. He earned three Super Bowl rings with the 49ers and was named the Most Valuable Player of San Francisco's Super Bowl XXIII. He was inducted into the Football Hall of Fame in 2010.[62]

For Bonds, Montana, and Rice, all outstanding athletes in their own right, the case for *exceptional importance* under Criterion Consideration G cannot be made. All of their achievements have been made in the very recent past, and Bonds earned most of his awards when the team was based at AT&T Park. Joe Montana's active career ended eighteen years ago, Jerry Rice's ten years ago, and Barry Bonds' three years ago. Sufficient historical perspective does not exist to determine that Candlestick Park is exceptionally important for its association with these players.

Candlestick Park appears to be eligible for the National Register under Criterion B/Criteria Consideration G for association with the baseball career of Willie Mays.

<u>Criterion C (Design/Construction)</u>:
This criterion applies to properties significant for their physical design or construction, including such elements as architecture, landscape architecture, engineering, and artwork. To be eligible under Criterion C, a property must meet at least one of the following requirements: Embody distinctive characteristics of a type, period, or method of construction.

- Represent the work of a master.
- Possess high artistic value.
- Represent a significant and distinguishable entity whose components may lack individual distinction.

The following direct quotes are from the historic resource evaluation completed by Caltrans in 2008. The California OHP concurred with this finding in 2008. Circa: Historic Property Development also concurs with the finding.

> The stadium's designer, John S. Bolles, was a prominent Bay Area architect who began his independent practice in the mid-1950s. His varied practice included a number of corporate and industrial facilities, such as the Gallo Winery in Modesto, the General Motors assembly plant in Fremont, and the IBM complex in San Jose. [Jones & Stokes: Appendix B, p. 7.] However, as many of his designs (including Candlestick Park) are not yet 50 years old, it is premature to consider Bolles a "master" architect under National Register criterion C.
>
> Sports stadiums are a rare property type, with most metropolitan areas having only one or two, in addition to college and university stadiums. Consequently, they are difficult

[60] Pro Football Hall of Fame web site (accessed 14 March 2010), www.profootballhof.com/hof/member.aspx? player_id=154.
[61] Super Bowl History (accessed 3.26.2010) http://www.superbowlhistory.net/superbowl/index.php.
[62] Football Hall of Fame web site (accessed 14 March 2010), www.profootballhof.com/hof/member.aspx?PlayerId=290.

to evaluate in a strictly local context. An evaluation of Candlestick Park under National Register criterion C therefore requires an understanding of its place in the evolution of baseball stadium design nationwide. There are presently 30 major league baseball stadiums (29 in the United States and one in Toronto) as well as several former stadiums that are still used for football or other events or are now vacant. None of the stadiums currently in use are listed on the National Register of Historic Places. However, two former stadiums have been listed: Municipal Stadium in Cleveland (built in 1931 and demolished in 1996) and Tiger Stadium in Detroit (built in 1912, [demolished 2008-09]). Of the three pre-World War II stadiums currently in use, Fenway Park in Boston (1912) and Wrigley Field in Chicago (1914) may be eligible for National Register listing, while Yankee Stadium in New York (1923) lacks integrity due to extensive renovations carried out in the 1970s.

A period of new stadium construction began with the Toronto Skydome of 1989 and accelerated with the opening of Oriole Park at Camden Yards in Baltimore in 1992. Oriole Park's neo-traditional design was extremely influential, leading to the construction of similar baseball stadiums in more than a dozen cities, including San Francisco. As a result, there are presently only nine current and three former major league baseball stadiums in the United States that are more than thirty years old, and only four of these are more than 50 years old.

The stadiums dating to the first half of the twentieth century were constructed of concrete and steel, and often consisted of a series of expansions undertaken over the course of several decades. They all had steel columns supporting their upper grandstands and roofs, creating obstructed-view seats below. These stadiums were generally located in older urban neighborhoods, accessible by streetcars. Only three new major league baseball stadiums were constructed in the 1950s. The earliest was Memorial Stadium in Baltimore, which opened in 1950 for the minor league Orioles and the professional football Colts. The upper deck was added in 1954, when the Major League St. Louis Browns relocated to Baltimore and became the Orioles. County Stadium in Milwaukee was built in 1953, when the Boston Braves relocated to that city. Finally, Metropolitan Stadium was constructed in suburban Minneapolis in1956, for the minor league Millers. It was expanded for the 1961 season when the Major League Washington Senators relocated to the Twin Cities and became the Minnesota Twins. The stadiums in Milwaukee and Minneapolis were similar in construction and appearance to the prewar stadiums, while Memorial Stadium in Baltimore had a distinctly modem appearance, with a somewhat sculptural use of concrete to support the upper deck.

Candlestick Park opened for use by the Giants in 1960. It exhibited some innovations in design, including a more extensive use of concrete than in most previous stadiums. The upper deck was pulled well back from the front of the lower deck, allowing columns to be placed near the rear of the lower-deck stands and greatly reducing the number of obstructed-view seats. The outer support for the upper deck consists of diagonal bracing, with each inverted "V" shape supporting a concrete rib that continues upward to support the curved roof that covers a portion of the upper deck. This was an even more distinctly modem, sculptural use of concrete than was seen at Baltimore a few years earlier.

Following the construction of Candlestick Park, a new stadium was completed in the City of Washington [D.C.] that housed the football Redskins beginning with the 1961 season and the expansion Senators of the American League beginning with the 1962 baseball season. Dodger Stadium in Los Angeles opened in 1962, and was followed by several new stadiums in the later 1960s, including Shea Stadium (New York Mets, 1964), the Astrodome (Houston Astros, 1965), Fulton County Stadium (Atlanta Braves, 1966), Busch Stadium (St. Louis Cardinals, 1966), and the Oakland Coliseum (Athletics, 1968). These new stadiums were typically located in outlying areas of their cities or in the suburbs, and were surrounded by extensive parking lots, in contrast to the urban settings of older stadiums. Designed for both baseball and football, these new stadiums were mostly circular or elliptical in plan. In the case of Shea Stadium and the Oakland Coliseum, they were built as a portion of a circle that could later be expanded to form a complete ring. These modern-era stadiums were all built with the upper tiers of seating pulled back farther from the playing field than the lower level, with concrete cantilevers allowing the complete elimination of interior columns. The Astrodome has the additional distinction of being the first stadium for baseball or football to be completely covered.

Candlestick Park does not meet National Register criterion C for its design qualities. In the evolution of baseball stadium design, Candlestick Park can more accurately be considered the last of the old-style ballparks rather than the first of the modern type, or a transitional design between the historic and modern types. The first entirely modern baseball stadiums were District of Columbia Stadium (renamed Robert F. Kennedy Memorial Stadium) and Dodger Stadium in Los Angeles. Although modern in appearance, Candlestick Park's innovations were limited and tentative. A heating system was installed as part of the original construction. This would have made Candlestick the first unenclosed but heated stadium, but the system never worked properly and was soon abandoned. More importantly, all of the modern stadiums are devoid of interior columns, eliminating the obstructed-view seats that are a problem for all of the older stadiums. Candlestick Park has interior columns, although they are located to reduce the number of obstructed view seats compared to earlier stadiums.

Candlestick Park accommodated both baseball and football even before its expansion for the San Francisco 49ers in the early 1970s. The Oakland Raiders, at that time part of the new American Football League, played their final three home games of 1960 and all of their 1961 home games at the stadium. However, the stadium is not significant in this regard, as dual-purpose stadiums were built both before and after Candlestick Park. In the years before professional football became the major sport that it is today, many football teams played in their cities' baseball stadiums. Most of those stadiums were not specifically designed for football, but could accommodate a football field and were often the only venue that provided a large seating capacity. Similarly, Candlestick Park could accommodate football but was designed and used primarily for baseball until the expansion of the early 1970s. At least two of the stadiums that predate Candlestick Park, Municipal Stadium in Cleveland and Memorial Stadium in Baltimore, were specifically designed for both sports. These two stadiums have the oval shape that is characteristic of football stadiums, with a somewhat widened oval to accommodate a baseball diamond.

Following the construction of Candlestick Park, the circular stadiums of the later 1960s and 1970s were all designed for both sports. In conclusion, Candlestick Park does not meet National Register Criterion C.

A property is eligible for listing under Criterion C if it embodies the distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic value; or, represents a significant and distinguishable entity whose components may lack individual distinction. As discussed above, the original baseball turned dual use stadium was not the first of its type or method of construction; it was neither the first concrete stadium nor a prototype for the multi-purpose stadiums that were built shortly after Candlestick Park was constructed.

With regard to consideration of the stadium as the work of a master, John S. Bolles was a prolific Bay Area architect whose San Francisco work includes the 1959 Ping Yuen Annex housing project, Embarcadero Park, and the Anna E. Waden Library in San Francisco. While he was a well-known architect within the Bay Area, sufficient time has not passed to sufficiently evaluate Bolles' status as a "master" architect. According to National Register Bulletin 15, a "master is a figure of generally recognized greatness in a field, a known craftsman of consummate skill, or an anonymous craftsman whose work is distinguishable from others by its characteristic style and quality." For a property to be eligible under this criterion it "must express a particular phase in the development of the master's career, an aspect of his or her work, or a particular idea or theme in his or her craft. A property is not eligible as the work of a master, however, simply because it was designed by a prominent architect."[63] Bolles' commissions were diverse over his nearly 40-year career and included commercial, industrial, site planning, interior design commissions and major residential projects, most of which incorporated modern art and sculpture. Some of his major clients included IBM, Macy's, General Motors, and Gallo and Paul Masson wineries.[64] The architect's active career ended only about 30 years ago and the historical value of Candlestick Park within the larger body of his work cannot be adequately assessed due to a lack of historical perspective. Despite the fact that the artist considered his original design for Candlestick Park more sculptural than architectural, the building does not possess high artistic value. Further, the building has been significantly altered from the original design and configuration. Therefore, Candlestick Park stadium is not considered the work of a master.

Candlestick Park does not appear to be eligible for the National Register under Criterion C for design/architecture.

<u>Criterion D (Information Value):</u>
Criterion D most commonly applies to properties that contain or are *likely* to contain information bearing on an important archeological research question.

Candlestick Park is situated on an area that is comprised largely of fill. The Candlestick Point – Hunters Point Shipyard Phase III EIR archaeological research found that archaeological resources expected to be found on the Candlestick Point site could have important research value and would, therefore, be legally significant under CEQA. Examples of research themes that have been proposed to which expected archaeological resources could contribute significant data include the spatial organization and historical development of Chinese fishing camps and prehistoric shell mounds. Any potential archeological resources that are covered by existing development will remain covered and unavailable unless the site is redeveloped. Adverse effects of construction-related activities to archaeological resources at Candlestick Point, including demolition of the stadium, would be less-than-significant through implementation of the Candlestick Point – Hunters Point Shipyard Phase III Archaeological Research Design and Treatment Plan.

Candlestick Park does not appear to be eligible for the National Register under Criterion D for Information Value.

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[63] National Register Bulletin 15.

[64] David Perry, "Bolles, John Savage," Encyclopedia of San Francisco, A Project of the SF Museum and Historical Society. Online at: http://www.sfhistoryencyclopedia.com/articles/b/bollesJohn.html (accessed 29 March 2010).

California Register of Historical Resources (CRHR)
The California Register of Historical Resources and the National Register of Historic Places significance criteria are essentially the same. The California Register criteria are consistent with the National Register, however they "...have been modified for state use in order to include a range of historical resources which *better reflect the history of California* [emphasis added]." (California Code of Regulations (CCR) §4852)[65] It is recognized that a property may not retain enough integrity to meet the NRHP but they may still be eligible for listing in the California Register. The following criteria evaluation is based on Candlestick Park's significance as it relates primarily to California history. Resources that are significant, meet the age guidelines, and possess integrity will generally be considered eligible for listing in the CRHR.

<u>Criterion 1 (Events):</u>
Associated with events that have made a significant contribution to broad patterns of local or regional history, or cultural heritage of California or the United States.

As discussed in more detail under Criterion A above, Candlestick Park appears to meet Criterion 1 for its association with the expansion of Major League baseball to the West Coast in the late 1950s. Completed two years before Dodger Stadium in Los Angeles, Candlestick Park was the first stadium built for Major League baseball on the West Coast. Candlestick Park does not appear to be eligible for listing on the California Register for its association with events such as the 1989 earthquake during the World Series, "the Catch", the 1966 Beatles concert or a visit by Pope John Paul II in 1987. As stated by Andrew Hope, while "these events are important to those who witnessed them, they do not qualify [the property for] listing...Over time, any major sports stadium will accumulate its share of memorable contests, championship victories, records set and broken, and feats of athleticism."[66] Though notable, these events did not have an enduring impact on the State or region. Further, these events all happened less than fifty-years ago and do not rise to a level of significance that would make the subject property eligible for listing on the California Register.

Candlestick Park appears eligible for listing on the California Register of Historical Resources under Criterion 1 for association with the expansion of Major League baseball to the West Coast in the 1950s/1960s.

<u>Criterion 2 (People)</u>
Associated with the lives of persons important to the local, California or national history

As described in more detail above under Criterion B, Candlestick Park appears eligible for association with Willie Mays' baseball career. Mays' career at Candlestick Park began with the opening of the stadium in 1960, 50 years ago at the time of this evaluation, and continued to 1972, 38 years ago. Other notable players associated with Candlestick Park have more recent associations with the property.

Mays is considered one of the greatest all-around players in the history of baseball and his achievements can be considered to be of exceptional significance in the history of baseball. While Candlestick Park appears to meet California Register Criterion 2 for association with the baseball career of Willie Mays, sufficient time has not passed to understand the historical importance of other notable players that are associated with Candlestick Park such as Barry Bonds, Jerry Rice and Joe Montana.

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[65] California Office of Historic Preservation, 2006, p.2. California Register and National Register: A Comparison. Technical Assistance Series No. 6. California Department of Parks and Recreation, Sacramento. Assistance Series No. 6. California Department of Parks and Recreation, Sacramento.
[66] Andrew Hope, California Department of Transportation, DPR 523 A & B, January 2008.

Barry Bonds, left fielder in the National Baseball League, played for the San Francisco Giants from 1986 to 2007. He holds the record for the most career home runs, 756, and was voted Most Valuable Player seven times, the Hank Aaron Award three times, and Major League Player of the Year three times.[67] Bonds will become eligible for considerable for induction into the Baseball Hall of Fame in 2013.[68] Bonds played seven years at Candlestick (1993 -1999) and eight years at AT&T Park (2000-2007).

Joe Montana, quarterback in the National Football League, played for the San Francisco 49ers from 1979 to 1992. He led the 49ers to four Super Bowl wins (Super Bowls XVI, XIX, XXIII, and XXIV) and was named Super Bowl MVP three times. When he retired, he ranked fourth in career passing yardage (40,551 yards), attempts (5,391), and passing touchdowns (273). His 3,409 completions ranked third all-time, and his career passer rating of 92.3 was second all-time. He holds numerous records and awards including being name All-NFL three times, All-NFC five times, and voted to the Pro Bowl eight times. He was inducted into the Football Hall of Fame in 2000.[69] No Super Bowl games were ever played at Candlestick Park.[70]

Jerry Rice, wide receiver in the National Football League, played for the San Francisco 49ers from 1985-2000. When he retired, he was the most prolific wide receiver in NFL history with records for receptions (1,549); receiving yards (22,895 yards); most 1,000-yard receiving seasons (14); total touchdowns (208); and combined net yards (23,546). Rice holds many NFL playoff and Super Bowl records. He played in eight conference championships and four Super Bowls. He earned three Super Bowl rings with the 49ers and was named the Most Valuable Player of San Francisco's Super Bowl XXIII. He was inducted into the Football Hall of Fame in 2010.[71]

For Bonds, Montana and Rice, all outstanding athletes in their own right, the case for CRHR listing under this criterion cannot be made because sufficient time has not passed to obtain a scholarly perspective on the importance of their achievements within their respective sports. All of their achievements have been made in the very recent past. Joe Montana's active career ended only eighteen years ago, Jerry Rice's ten years ago, and Barry Bonds three years ago. Sufficient historical perspective does not exist to determine that Candlestick Park is significant to the history of California for its association with these players.

Candlestick Park appears to be eligible for the California Register under Criterion 2 for association with the baseball career of Willie Mays.

<u>Criterion 3 (Design/Construction)</u>
Embodies the distinctive characteristics of a design-type, period, region, or method of construction, or represents the work of a master, or possesses high artistic value.

As discussed in greater detail under Criterion C above, Candlestick Park does not meet California Register Criterion 3 for its distinctive design/construction characteristics of design-type, period, region, or method of construction. Hope states that "Candlestick Park opened for use by the Giants in 1960. It exhibited some innovations in design, including a more extensive

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[67] Baseball Reference.Com web site (accessed 14 March 2010) www.baseball-reference.com/players/b/bondsba01. shtml?redir.
[68] National Baseball Hall of Fame web site (accessed 14 March 2010) www.community.baseballhall.org/Page.aspx? pid=414.
[69] Pro Football Hall of Fame web site (accessed 14 March 2010), www.profootballhof.com/hof/member.aspx? player_id=154.
[70] Super Bowl History (accessed 3.26.2010) http://www.superbowlhistory.net/superbowl/index.php.
[71] Football Hall of Fame web site (accessed 14 March 2010), www.profootballhof.com/hof/member.aspx? PlayerId=290.

use of concrete than in most previous stadiums. In the evolution of baseball stadium design, Candlestick Park can more accurately be considered the last of the old-style ballparks rather than the first of the modern type, or a transitional design between the historic and modern types... Although modern in appearance, Candlestick Park's innovations were limited and tentative..."[72] The original baseball stadium turned dual use stadium was not the first of its type or method of construction. The stadium has been extensively altered since the early 1970s, especially with the expansion and enclosure of the stadium seating, and removal of the baseball diamond and conversion to a football field. The formerly open outfield area was enclosed by the extension of the upper deck around the entire perimeter of the playing field. The expansion more than doubled the amount of upper-deck seating, and added both fixed and moveable lower-deck seating in the outfield areas. This resulted in the need for new ramps and stairs that significantly altered the stadium's exterior appearance.

John S. Bolles was a prolific Bay Area architect whose San Francisco work includes the 1959 Ping Yuen Annex housing project, Embarcadero Park, and the Anna E. Waden Library in San Francisco. While he was a well-known architect within the Bay Area, sufficient time has not passed to sufficiently evaluate Bolles' status as a "master" architect. According to National Register Bulletin 15, a "master is a figure of generally recognized greatness in a field, a known craftsman of consummate skill, or an anonymous craftsman whose work is distinguishable from others by its characteristic style and quality." For a property to be eligible under this criterion it "must express a particular phase in the development of the master's career, an aspect of his or her work, or a particular idea or theme in his or her craft. A property is not eligible as the work of a master, however, simply because it was designed by a prominent architect."[73]

Bolles' commissions were diverse over his nearly 40-year career and included commercial, industrial, site planning, interior design commissions and major residential projects, most of which incorporated modern art and sculpture. Some of his major clients included IBM, Macy's, General Motors, McGraw-Hill and Gallo and Paul Masson wineries.[74] The architect's active career ended only about 30 years ago and a number of his designs are not yet 50 years old. Because of this lack of historical perspective, it is premature to consider Bolles a "master" architect since the historical value of Candlestick Park within the larger body of his work cannot be adequately assessed. Despite the fact that the artist considered his original design for Candlestick Park more sculptural than architectural, the building does not possess high artistic value. Further, the building has been significantly altered from the original design and configuration.

Candlestick Park does not appear to be eligible for the California Register under Criterion 3 for design/architecture.

<u>Criterion 4 (Information Potential):</u>
Yields important information about prehistory or history of the local area, California or the nation.

Candlestick Park is situated on an area that is comprised largely of fill. The Candlestick Point – Hunters Point Shipyard Phase III EIR archaeological research found that archaeological resources expected to be found on the Candlestick Point site could have important research value and would, therefore, be legally significant under CEQA. Examples of research themes

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72 Hope, 11 of 13.
73 National Register Bulletin 15.
74 David Perry, "Bolles, John Savage," Encyclopedia of San Francisco, A Project of the SF Museum and Historical Society. Online at: http://www.sfhistoryencyclopedia.com/articles/b/bollesJohn.html (accessed 29 March 2010).

that have been proposed to which expected archaeological resources could contribute significant data include the spatial organization and historical development of Chinese fishing camps and prehistoric shell mounds. Any potential archeological resources that are covered by existing development will remain covered and unavailable unless the site is redeveloped. Adverse effects of construction-related activities to archaeological resources at Candlestick Point, including demolition of the stadium, would be less-than-significant through implementation of the Candlestick Point – Hunters Point Shipyard Phase III Archaeological Research Design and Treatment Plan.

Candlestick Park does not appear to be eligible for the California Register under Criterion 4 for information potential.

City of San Francisco Standards for Evaluation
City and County of San Francisco criteria for evaluation of historic resources is based on Planning Code Section 1004(a)(1): having a special character or special historical, architectural or aesthetic interest or value.

"The Code does not contain specific criteria on how to survey, identify, evaluate and document cultural resources. Consequently, the Landmarks Board recognized the need to adopt a uniform system to evaluate cultural resources once they are identified. To that end, in June 2000, the Landmarks Board adopted by Resolution 527, the Secretary of Interior's Standards, and the California State Office of Historic Preservation Recordation Manual (DPR 523 series) for use in Landmark and Historic District Designation Reports and nominations, and Structures of Merit nominations under Article 10 of the Planning Code."[75]

While the City of San Francisco Landmarks Preservation Advisory Board adopted the National Register criteria for evaluation as policy for evaluation, they did not adopt considerations or establish any bar by which significance is measured.

Criterion A (Events):
As discussed in more detail under National Register Criterion A above, Candlestick Park appears to meet Criterion A for its association with the expansion of Major League baseball to the West Coast in the late 1950s. Completed two years before Dodger Stadium in Los Angeles, Candlestick Park was the first stadium built for Major League baseball on the West Coast. Candlestick Park does not appear to be eligible for listing on the California Register for its association with events such as the 1989 earthquake during the World Series, "the Catch", the 1966 Beatles concert or a visit by Pope John Paul II in 1987. As stated by Andrew Hope, while "these events are important to those who witnessed them, they do not qualify [the property for] listing...Over time, any major sports stadium will accumulate its share of memorable contests, championship victories, records set and broken, and feats of athleticism."[76] Though notable, these events alone did not have an enduring impact on the City of San Francisco. Further, these events all happened less than fifty-years ago and do not rise to a level of significance that would make the subject property eligible for local listing under this criterion.

Candlestick Park appears to be eligible for local listing under Criterion A for association with the expansion of Major League Baseball to the West Coast in the late 1950s/early 1960s.

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[75] San Francisco Preservation Bulletin No. 5: Landmark and Historic District Designation Procedures (page 6). SF Planning Department website: http://www.sfgov.org/site/planning_index.asp?id=24996.
[76] Andrew Hope, California Department of Transportation, DPR 523 A & B, January 2008.

Criterion B (People)
Associated with the lives of persons important to the local, California or national history

As described in more detail above under National Register Criterion B, Candlestick Park appears eligible for association with Willie Mays' baseball career. Mays' career at Candlestick Park began with the opening of the stadium in 1960, 50 years ago at the time of this evaluation, and continued to 1972, 38 years ago. Other notable players associated with Candlestick Park have more recent associations with the property.

Mays is considered one of the greatest all-around players in the history of baseball and his achievements can be considered to be of exceptional significance in the history of baseball. While Candlestick Park appears to meet local criteria for association with the baseball career of Willie Mays, sufficient time has not passed to understand the historical importance of other notable players that are associated with Candlestick Park such as Barry Bonds, Jerry Rice and Joe Montana.

For Bonds, Montana and Rice, all outstanding athletes in their own right, the case for local listing under this criterion cannot be made because sufficient time has not passed to obtain a scholarly perspective on the importance of their achievements within their respective sports. All of their achievements have been made in the very recent past. Joe Montana's active career ended only eighteen years ago, Jerry Rice's ten years ago, and Barry Bonds' three. Sufficient historical perspective does not exist to determine that Candlestick Park is significant to the history of San Francisco for its association with these players.

Candlestick Park appears to be eligible for local listing under Criterion B for association with the baseball career of Willie Mays.

Criterion C (Design/Construction)
Embodies the distinctive characteristics of a design-type, period, region, or method of construction, or represents the work of a master, or possesses high artistic value.

As discussed in greater detail under Criterion C above, Candlestick Park does not meet Criterion C for its distinctive design/construction characteristics of design-type, period, region, or method of construction. Hope states that "Candlestick Park opened for use by the Giants in 1960. It exhibited some innovations in design, including a more extensive use of concrete than in most previous stadiums. In the evolution of baseball stadium design, Candlestick Park can more accurately be considered the last of the old-style ballparks rather than the first of the modern type, or a transitional design between the historic and modern types... Although modern in appearance, Candlestick Park's innovations were limited and tentative..."[77] The original baseball stadium turned dual use stadium was not the first of its type or method of construction. The stadium has been extensively altered since the early 1970s, especially with the expansion and enclosure of the stadium seating, and removal of the baseball diamond and conversion to a football field. The formerly open outfield area was enclosed by the extension of the upper deck around the entire perimeter of the playing field. The expansion more than doubled the amount of upper-deck seating, and added both fixed and moveable lower-deck seating in the outfield areas. This resulted in the need for new ramps and stairs that significantly altered the stadium's exterior appearance.

John S. Bolles was a prolific Bay Area architect whose San Francisco work includes the 1959 Ping Yuen Annex housing project, Embarcadero Park, and the Anna E. Waden Library in San

[77] Hope, 11 of 13.

Francisco. While he was a well-known architect in San Francisco during his tenure, sufficient time has not passed to sufficiently evaluate Bolles' status as a "master" architect. According to National Register Bulletin 15, a "master is a figure of generally recognized greatness in a field, a known craftsman of consummate skill, or an anonymous craftsman whose work is distinguishable from others by its characteristic style and quality." For a property to be eligible under this criterion it "must express a particular phase in the development of the master's career, an aspect of his or her work, or a particular idea or theme in his or her craft. A property is not eligible as the work of a master, however, simply because it was designed by a prominent architect."[78]

Bolles' commissions, located throughout the Bay Area, were diverse over his nearly 40-year career and included commercial, industrial, site planning, interior design commissions and major residential projects, most of which incorporated modern art and sculpture. Some of his major clients included IBM, Macy's, General Motors, and Gallo and Paul Masson wineries.[79] The architect's active career ended only about 30 years ago and a number of his designs are not yet 50 years old. Because of this lack of historical perspective, it is premature to consider Bolles a "master" architect since the historical value of Candlestick Park within the larger body of his work cannot be adequately assessed. Despite the fact that the artist considered his original design for Candlestick Park more sculptural than architectural, the building does not possess high artistic value. Further, the building has been significantly altered from the original design and configuration.

Candlestick Park does not appear to be eligible for local listing under Criterion C for design/architecture.

<u>Criterion D (Information Potential)</u>
Yields important information about prehistory or history of the local area, California or the nation.

Candlestick Park is situated on an area that is comprised largely of fill. The Candlestick Point – Hunters Point Shipyard Phase III EIR archaeological research found that archaeological resources expected to be found on the Candlestick Point site could have important research value and would, therefore, be legally significant under CEQA. Examples of research themes that have been proposed to which expected archaeological resources could contribute significant data include the spatial organization and historical development of Chinese fishing camps and prehistoric shell mounds. Any potential archeological resources that are covered by existing development will remain covered and unavailable unless the site is redeveloped. Adverse effects of construction-related activities to archaeological resources at Candlestick Point, including demolition of the stadium, would be less-than-significant through implementation of the Candlestick Point – Hunters Point Shipyard Phase III Archaeological Research Design and Treatment Plan.

Candlestick Park does not appear to be eligible for local listing under Criterion D for information potential.

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[78] National Register Bulletin 15.
[79] David Perry, "Bolles, John Savage," Encyclopedia of San Francisco, A Project of the SF Museum and Historical Society. Online at: http://www.sfhistoryencyclopedia.com/articles/b/bollesJohn.html (accessed 29 March 2010).

INTEGRITY

To retain integrity a property must have most of the seven aspects of integrity as defined by the National Register. Integrity must also be assessed with reference to the particular criteria under which significance is established. Caltrans, the State Office of Historic Preservation, and Jones & Stokes have all previously evaluated the property and found that Candlestick Park exhibits a significantly diminished level of integrity due to 35+ years of on-going alterations. These alterations, both major and minor, have resulted in a cumulative decrease of the property's material and design integrity.

Candlestick Park operates as an athletic facility, therefore, the activities and operations related to this function go beyond that of the fan's game-day experience in the stands. Food and beverage concessions, souvenir counters and comfort facilities add to the fans experience. VIP/hospitality suites allow for another level of the fan's experience for those who prefer a more private spectatorship. Crowd control is managed with multiple ticket booths and entry gates, and through circulation routes consisting of stairs, ramps, escalator and elevators, and a system of parking lots and access roads. The playing area consists of the playing field (in-field/out-field/field diamond/batter's box/pitcher's mound/dugout/bases for baseball, and field of play/sidelines/endlines/yard markers/endzones/goal posts/marker numbers for football), and surrounding the field are the seats, press boxes, scoreboards, and lights. Behind the scenes operations provide areas for broadcasting, interviews and video and audio taping, and operation and security offices. Not to be forgotten are the players support areas: locker rooms, weight rooms and lounge areas. These stadium operations characteristics were all considered in the analysis of integrity.

As discussed in previous sections above, Candlestick Park has been substantially altered since the early 1970s. These alterations, both major and minor, greatly diminished the park's integrity of design, setting, materials, workmanship, feeling, and association. While the initial expansion was carried out in a manner generally consistent with the original design, it significantly altered the stadium's original form and appearance.

Location
The property remains in the original location where it was constructed and therefore retains integrity of location.

Design
The stadium has been extensively altered over the course of thirty years since the early 1970s, especially with the enclosure of the stadium seating and removal of the baseball diamond for football use. "The formerly open outfield area was enclosed by the extension of the upper deck around the entire perimeter of the playing field. This closed off views to the north and northeast from within the stadium for both players and fans. The expansion more than doubled the amount of upper-deck seating, and added both fixed and moveable lower-deck seating in the outfield areas. In addition, extension of the upper deck and the resulting need for new ramps and stairs significantly altered the stadium's exterior appearance."[80] Nearly all of the support and operational aspects of the stadium have been significantly altered, removed and/or replaced.

A comparison of Figures 7 and 9 clearly illustrates the extensive changes to the stadium's exterior and playing field area. Appendix A, Figures 7-19, shows historic photos and examples of new additions/alterations. The enclosure of the outfield closed off views of the surrounding area for the players and fans. As a result, the stadium's original U-shaped form and is now

[80] Andrew Hope, *Evaluation of Candlestick Park, 11.*

irregular in plan and unrecognizable as a baseball field. Due to the extensive alterations over time, Candlestick Park is not a clear representation of its association with baseball (Criterion A/1); indeed, the only remnant of baseball use is the home team dugout with racks for bats and helmets (see Appendix A, Figure 20).

The property does not retain integrity of design.

Setting
The stadium is located on an 81-acre site and is surrounded by a paved parking lot with a chain link fence. Landscaping is minimal and consists primarily of clusters of trees around both the north and south (main) gates; a succession of trees defines the outside border of the main access road immediately surrounding the stadium. The setting has been altered due to the modification of the stadium envelope. The once U-shaped form is now an irregular oval, and nearly double its original size and height. The addition and alteration of existing gates around the building's perimeter have also altered the building's approach and appearance from the period of significance.

The property retains some integrity of the surrounding setting.

Materials
The stadium retains the original reinforced concrete and steel shell, but this original structure has been enlarged and altered over the course of 30-years. The majority of the character defining elements that characterize a baseball stadium (diamond field layout with bases, pitcher's mound, catcher's box, home plate, infield, outfield and foul lines; score board; original seating and press boxes; hospitality suites; concession stands; entrance/exist pavilions with turnstiles, ticket booths, stairwells, and elevators, etc.) have been removed or significantly altered since the 1970s. Extension of the upper deck required the addition of ramps, stairs and significantly altered the stadium exterior appearance, obscuring much of the original reinforced concrete.

The property does not retain integrity of materials.

Workmanship
Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory. It is the evidence of artisans' labor and skill in constructing or altering a building, structure, object, or site. While Bolles considered Candlestick Park more sculptural than architectural, the building does not possess high artistic value or exhibit any particular craft or workmanship therefore this aspect does not apply.

The property does not retain integrity of workmanship.

Feeling
Candlestick Park was designed and constructed as a baseball stadium; its redesign to accommodate football was to maximize investment and is not a prototype of dual use. The enclosure of the stadium seating around the original outfield, reconfiguring of the seating and alteration of the diamond configuration eliminated the feeling of a baseball field. While it reflects the feeling of a stadium it does not reflect that of a *baseball* stadium and the property have been found significant for its association with the expansion of Major League Baseball to the West Coast and with baseball legend Willie Mays.

The property does not retain integrity of feeling.

Association
Candlestick Park's historic association was once that of the first major league baseball park on the West Coast. Its change to a dual purpose (baseball/football) and ultimate conversion for primary use as a football stadium has removed the park's baseball association.

The property's association with the introduction of Major League Baseball on the West Coast would not extend to the 1970s. By that time, there were Major League Baseball teams in Anaheim, Oakland, and San Diego, in addition to San Francisco and Los Angeles. The property's association with the career of Willie Mays would extend only to the early part of 1972, before Mays was traded to the New York Mets. Mays played only 19 games with the Giants in 1972 (out of a 162-game season), while playing 69 games with the Mets. Almost 99 percent of the home games that Mays played during his Candlestick Park years were in the pre-expansion stadium, with its open outfield and upper deck seating only in the infield areas.[81]

The property does not retain integrity of association.

SUMMARY

Candlestick Park was evaluated in May 2007 for eligibility for listing on the National Register of Historic Places (NRHP) under Criteria Consideration G, since the building was less than fifty years of age at that time. Jones & Stokes found that Candlestick Park "did not appear to meet the threshold of NRHP exceptional significance for buildings less than 50 years old."[82] At that time the stadium was not evaluated for its eligibility for listing on the California Register of Historical Resources or as a San Francisco Landmark.

In April 2008 Andrew Hope, Principal Architectural Historian for the Caltrans District 4 office in Sacramento, completed a second evaluation of Candlestick Park at the request of the California Office of Historic Preservation and only addressed the park's eligibility to meet the National Register level of significance. The California Office of Historic Preservation concurred that the stadium did not retain enough physical integrity to be considered a historic resource.

Circa: Historic Property Development finds these reports to be consistent and thorough. On the basis of those reports and the additional information gathered and evaluated in this HRE, Circa concludes that the property known as Candlestick Park Sports Stadium (Block 5000, Lot 001) does not retain enough integrity to adequately communicate its historical significance as representative of the expansion of Major League Baseball to the West Coast or association with the baseball career of Willie Mays. Since properties must both exhibit historical significance and retain integrity, Candlestick Park does not qualify as a historical resource at the National, State or local levels.

This concludes the evaluation for Candlestick Park. Please see the appendices attached.

[81] Ibid 12.
[82] Jones & Stokes, *Bayview Transportation Improvements Project (BTIP) – Evaluation Exemption for Monster Park*, Memo from Kathryn Hayley to Meg Scantlebury (15 May 2007), 9.

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APPENDIX A: Photographs

Appendix A: Photographs

Historic Photographs

Figure 1. Candlestick Park in its original configuration for the 1961 All-Star Game, July 12, 1961. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 2. Candlestick Park fans watching a game c.1960. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 3. Original wood seats, 1963. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 4. Original scoreboard, 1960. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 5. Candlestick Park c.1975. Photo used with permission from the San Francisco History Center, San Francisco Public Library.

Figure 6. 1964 Postcard view

Existing Conditions Photographs

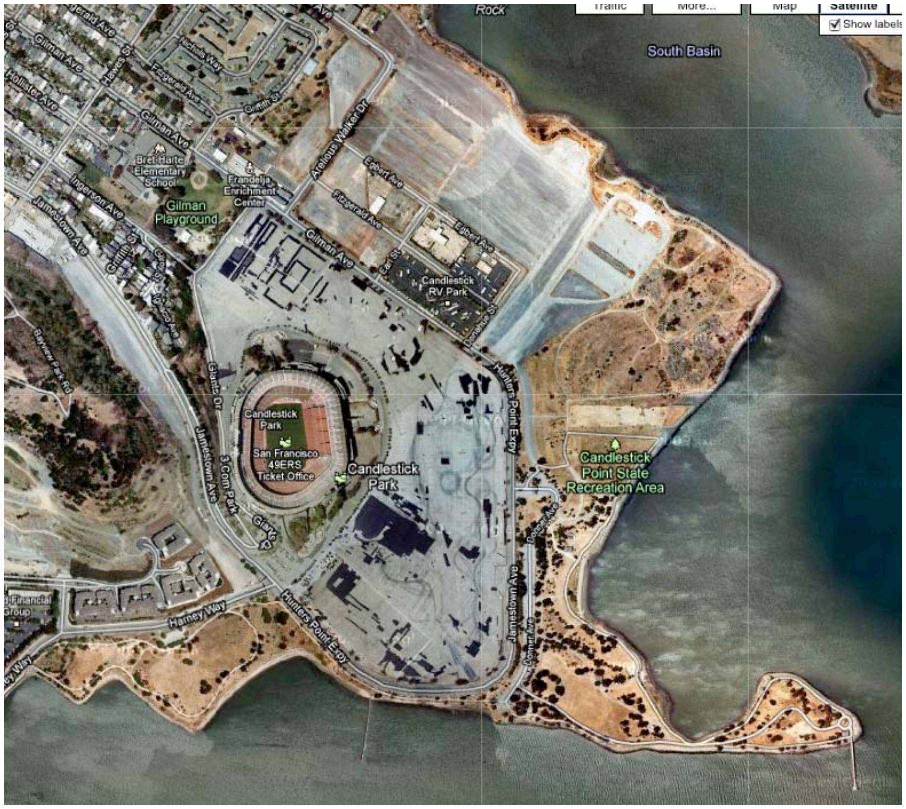

Figure 7. Candlestick Point aerial. (Google Maps), 2010.

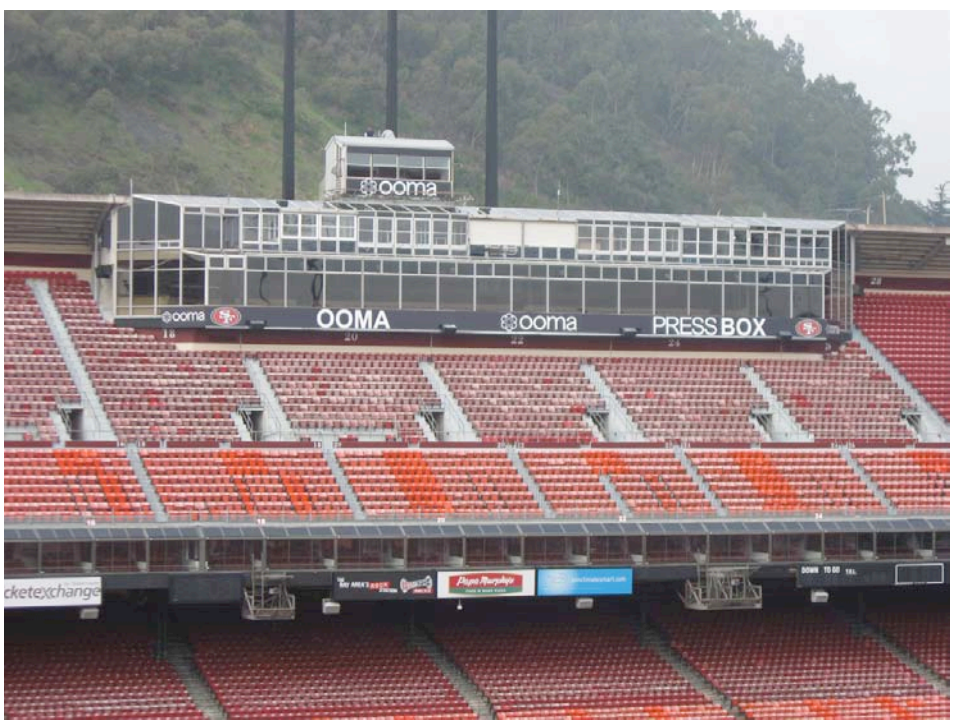

Figure 8. Football Press Box (built in the 1970s, addition in late 1980s (Mike Gay),note enclosed box suites below. (Photo by Circa, 30 January 2010).

Figure 9. Enclosed box suites, built in 1980s (Mike Gay) – interior view. (Photo by Circa, 30 January 2010).

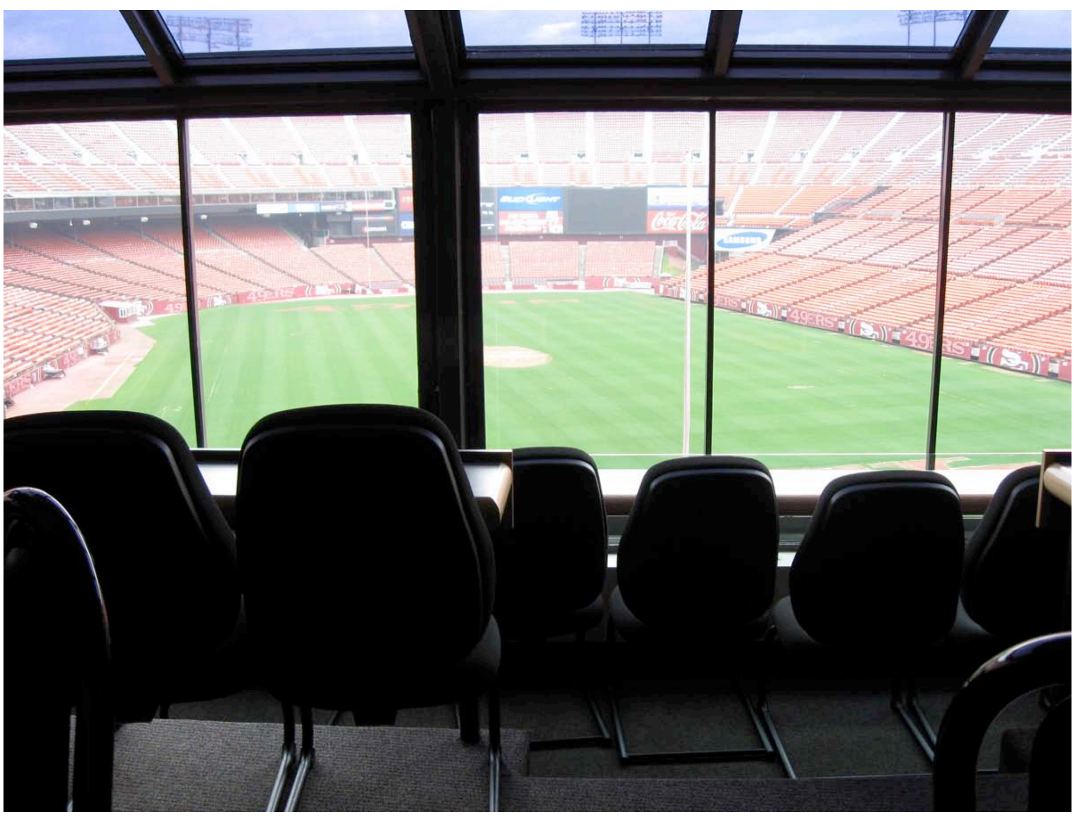

Figure 10. View from suites (Photo by Circa, 30 January 2010).

Figure 11. Gate A from upper concourse – note ghosting on floor where earlier turnstiles/ gate features have been replaced. (Photo by Circa, 30 January 2010).

Figure 12. Concourse and modern restaurant storefronts. (Photo by Circa, 30 January 2010).

Figure 13. Original concourse (right) and later (c.1970) ramp (left), note differences in concrete. (Photo by Circa, 30 January 2010).

Figure 14. Lower concourse, note modern staircase and concession stands. (Photo by Circa, 30 January 2010).

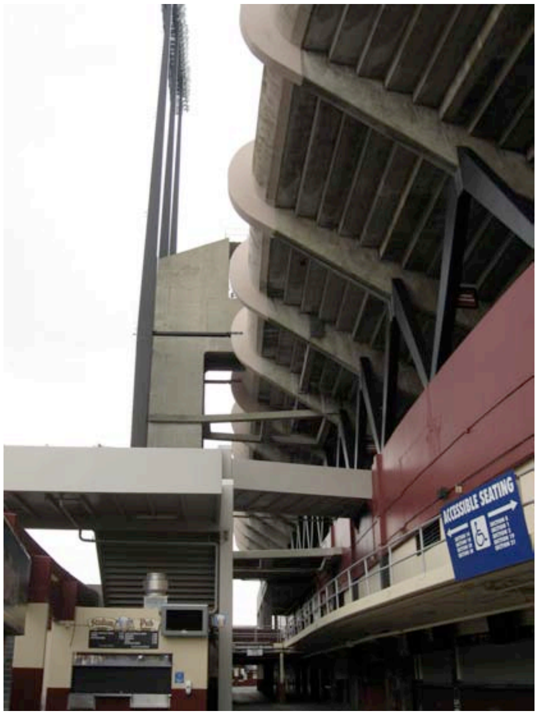

Figure 15. Concrete buttress (in front of light tower) added c.1970 (Mike Gay). (Photo by Circa, 30 January 2010).

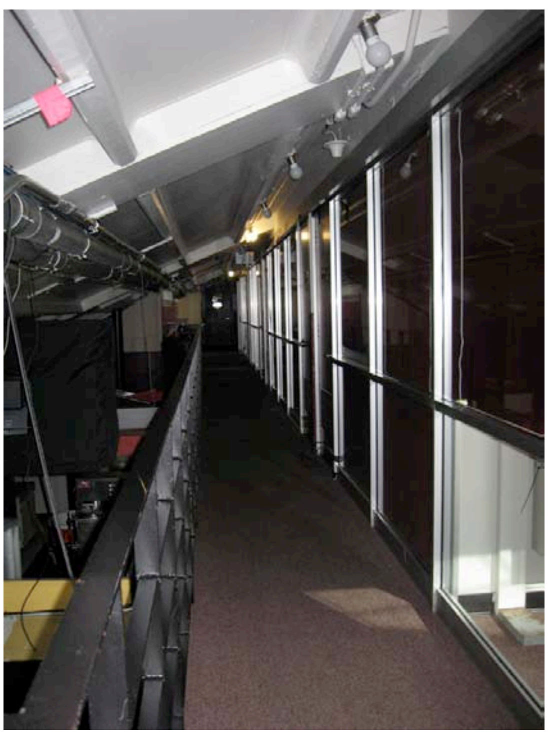
Figure 16. Football press box interior corridor (Photo by Circa, 30 January 2010).

Figure 17. Visitor's locker room. (Photo by Circa, 30 January 2010).

Figure 18. 49ers locker room (Photo by Circa, 30 January 2010).

Figure 19. 49ers locker detail (Photo by Circa, 30 January 2010).

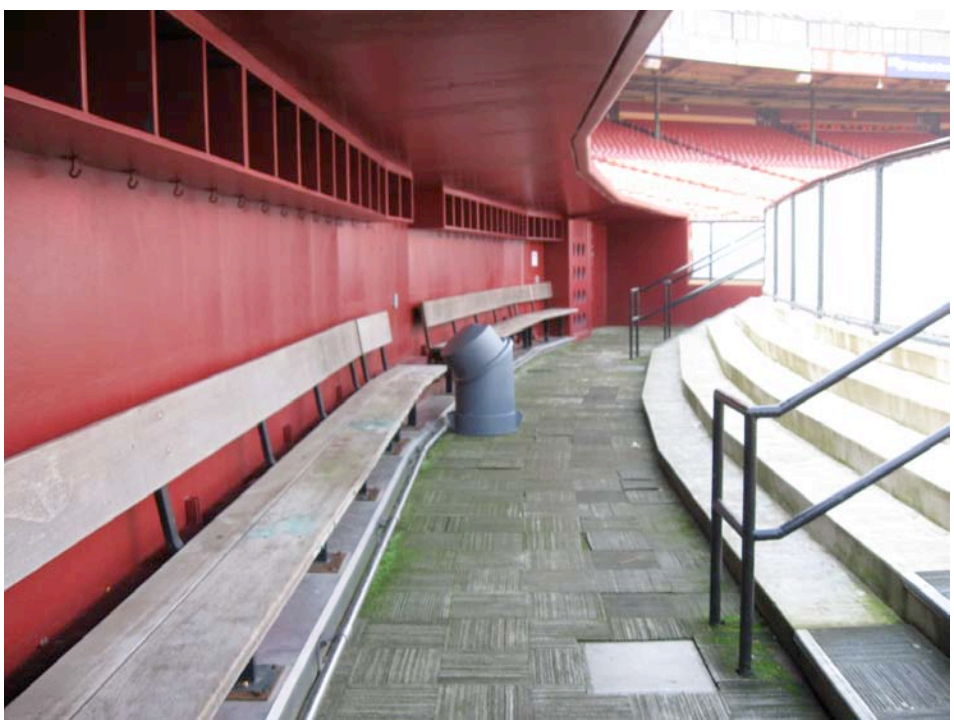

Figure 20. Former home team baseball dugout, note cubbies for helmets (above seats) and bats (far end). (Photo by Circa, 30 January 2010).

Figure 21. Gate A entry turnstiles. (Photo by Circa, 30 January 2010).

APPENDIX B: Construction Chronology Matrix

Candlestick Park - Construction Chronology Matrix

Year	Alterations	Events
1953		By 1953, SF contractor Charles Harney owns a total of 67 acres in Candlestick point area
1954		Mayor George Christopher promises to build 40,000-seat stadium if major league baseball team moves to area; SF voters approve $5 million bond for stadium construction (Jones & Stokes)
1957		April - Mayor Christopher flies to NY to talk NY Giants owner Horace Stoneham into bringing the Giants to SF. May - Mayor George Christopher initiates surveys of possible sites to construct more specialized baseball facilities; City selects CP property owned by Harney as site for stadium and purchases land for $2.7 million; Harney hired as contractor for stadium construction
1958	Construction begins in September of this year; construction cost $15 million (Jones & Stokes)	John S. Bolles designs stadium.
1960	Install Stadium Club facilities (restaurant), (December 20 building permit), cost $190,000. Construct precast reinforced concrete traffic control tower on promenade level; cut doorway opening in exterior wall and construct boardwalk approach to tower (13 July building permit), cost $25,500	April 12 - Opening Day; first stadium built for a major league baseball team on west coast (dodger Stadium completed in 1962)
1961	Construction of "visual background fence behind the centerfield fence in Candlestick Park" (March 7 building permit, cost $36,200)	
1962		Charles Harney dies
1966		Aug 29 - Beatles' last live commercial concert. Bolles begins plans to expand and enclose the stadium for both football and baseball use

1967	Installation of bleachers for football (October 18 building permit), cost $10,000	
1968	Install additional seating (November 7 building permit), cost $19,000	
1969 - 1971	Stadium expanded to seat 62,000 during football games and 59,000 during baseball games (Parks website). Alterations: Astroturf installed in place of natural grass; 30,000 new red & orange plastic seats replace original wood; new main Gate A - eight new ticket booths and special gates for ticket holders; 2 new escalators at Gate A and at Gate E; Gate F, a new entrance, is constructed in right field section of park; moveable stands installed; rubberized track surrounding field installed; new scoreboard in left centerfield; restrooms rehabbed; press box enlarged and rehabbed; new press box in upper deck for football; new lights/extra light tower added. (SF Progress article); Foundation work (Nov 14 Building permit with John S. Bolles Assoc. as architect of record), cost $331,000.	Bolles' plan for new addition approved by SF Bureau of building Inspection
1971	Construct 28'6" x 107' electric scoreboard and new advertising panels at north side of stadium (24 November building permit), cost $130,000. Construct 4' x 109' scoreboard south side of stadium (24 November building permit), cost $14,000	SF 49ers (NFL) move in

1973	Excavation, paving and synthetic surfacing of outfield warning track (March 19 Building permit), cost $70,000. Install new restaurant, John Bolles Assoc. architects of record on building permits/drawings (April 23 building permit), cost $78,000. Note: unknown if restaurant still exists - no location map on scattered drawings available. Highly likely this restaurant has been remodeled/reconfigured since 1973.	
1977	Construct new food stand, lower level - concrete block walls, all new systems, rolling door over counter (February 16 building permit), cost $35,000; Rooms 400 & 401 on promenade remodeled; room 402 remodeled by the 49ers for office space; 406 remodeled with new metal roll up door for use as cushion storage (February 23 building permit), cost $40,000	
1979		Survey by Giants shows that 72 percent of fans said they would go to more games if stadium had a dome
1981	Misc. interior office improvements for SF Giants: new interior partitions, suspended ceiling, new lighting, new finishes (March 24 building permit), cost $36,000	
1982	Installation of eleven (11) exit gates at building exterior (September 8 building permit), cost $75,000	Giants Owner Robert Lurie proposes construction of a new stadium or putting a dome on Candlestick; Mayor Dianne Feinsteinforms Stadium Task Force to explore options for new stadium or dome for Candlestick

1983		SF Bureau of Architecture Department of Public Works and Interactive Resources, Inc., Structural Engineers issue a *Report on the Deterioration of Structural and Architectural Components at Candlestick Park* - report explores water penetration issues and resulting deterioration at Candlestick
1984	Steel columns installed under existing concrete wind baffle girders - part of seismic retrofit (March 29 building permit), cost $14,000	
1985	Various seismic improvements completed as per Feinstein's directives (Mike Gay)	Feinstein steps forward in favor of upgrading stadium facilities for $5 million
1986	Earliest suites installed - have been constantly upgraded since that time (Mike Gay)	SF 49ers threaten to leave Candlestick - team demands luxury suites for attendees, upgraded facilities (Mike Gay)
1987	Addition to football press box (Mike Gay)	
1989		October 17: World Series - SF Giants and Oakland A's/Loma Prieta Earthquake
1991	Fifty-five (55) suite renovations; sixteen (16) vomitory enclosures; modify eight (8) toilet rooms; ADA upgrades at ramp 1-8; conference facility to replace woodworking shop; convert existing Janitor's and storage closets to construct four new shops at Ramp 6 (January 31 building permit), cost $1,640,500.	

1992	Twenty-six (26) suites renovated; football press box windows renovated; luxury suites corridor renovation; concourse widening; Twenty-six (26) suites renovated; football press box windows renovated; luxury suites corridor renovation; baseball press box renovation; remove existing concrete exit stairs on main level and install new concrete exit stairs; baseball press box renovation; remove existing concrete exit stairs on main level; install new concrete exit stairs (January 21 building permit), cost $748,800	
1993	Modifications to Gates 'A' through 'D'; main level concourse widening; seat additions at main level; media compound site improvements; construct Plazas 'A', 'F' and 'E'; new Plaza restrooms & stairs at 'C' Gate; close twenty-two (22) vomitories at upper level (January 28 building permit), cost $2,400,000	Giants begin lobbying for new ball park
1994	Seat alterations; new C Gate stairs; new elevator and ADA improvements (January 1994 building permit) cost $2,689,000. Remodel approx. 2,200 s.f. of office space for Volume Services, located in lower level of CP (building plan set dated Sept. 24, 1995), Nilmeyer & Nilmeyer, architects	
1995	Modify 40 concession stands for handicap access (December 27 building permit), cost $116,100; remodel existing storage room for use as exercise room (July 13 building permit), cost $35,000)	

1996	Modification of stadium seating for disabled access - Sections 5 through 23, lower decks and Sections 1 through 30, upper decks (January 29 Building permit), cost $325,000	Candlestick renamed 3Com park
1997	Modify and install new seats in Sections 3, 5, 7, 8, 9, 14, 18, 19, 21, 28, 32, 34 - work included new accessible seats and handrails (February 13 building permit), cost $375,000	
1998		construction of new Giants ballpark in downtown SF begins
1999	Modify and install new seats in Sections 8, 16, 20, 31, 35, 39, 47 - work included new accessible seats, handrails and path of travel (January 1 building permit), cost $500,000	Sept 30 - last Giants game
2000	Stadium converted to football only facility	
2004		Stadium renamed Monster Park after Monster cable Products, Inc.
2009	construct hospitality seating at dugout ($20, 000)	
ONGOING ALTERATIONS: field turf changes have been ongoing since the 1980s. Regular systems and signage upgrades, as well as changes to food/beverage vendor facilities; remodeling of box seats; expansion, alteration and replacement of stadium seating; and lighting and scoreboard changes have been continual since stadium was constructed. Suites, skyboxes, office spaces and restrooms regularly upgraded, reconfigured and remodeled.		

Appendix J4 CIRCA, Rarity of HPS Military/Industrial Buildings, April 2010

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PBS& J
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16 April 2010
Re: Rarity of HPS Military/Industrial Buildings

I. INTRODUCTION

On 16 December 2009, the City of San Francisco's Historic Preservation Commission (HPC) met to discuss the findings of the cultural resources element of the Draft Environmental Impact Report for the proposed Candlestick Park/Hunters Point Shipyard Phase II project. The Draft EIR analysis is based on the Circa: Historic Property Development's *Bayview Waterfront Project Historic Resources Evaluation: Volume II, Historic Resource Survey and Technical Report,* October 2009 (the Technical Report). The Technical Report evaluated the buildings and structures at HPS. Some structures at HPS have been previously identified as significant historic resources as part of the National Register of Historic Places (NRHP)-eligible Hunters Point Commercial Dry Dock Historic District ("identified historic district"). The Technical Report also identified the California Register of Historical Resource (CRHR)-eligible Hunters Point Commercial Drydock and Naval Shipyard Historic District. As stated in the Technical Report the proposed Hunters Point Commercial Drydock and Naval Shipyard Historic District represents the broad history of HPS. The potential Hunters Point Commercial Dry Dock and Naval Shipyard Historic District is comprised of a collection of buildings, structures, and objects associated with the area's transition from early commercial drydock operation through its period of radiological research. The district encompasses a range of buildings from each of the three primary periods of significance for HPS: early drydocks, Navy use in World War II, and radiological research in the World War II and post-war periods. One issue on which the HPC and other EIR commentators requested clarification was the possibility of a larger district. The HPC also raised a question regarding buildings at Hunters Point Shipyard (HPS) that were once considered common but had the potential to now be considered rare due to the extent of recent military base closures and their redevelopment.

As discussed in the Technical Report (p. 11-16), extensive research was conducted at multiple locations to complete *Bayview Waterfront Plan Historic Resources Evaluation, Volume I: Historic Context Statement* and *Bayview Waterfront Project Historic Resources Evaluation: Volume II, Historic Resource Survey and Technical Report* for the Bayview Waterfront Project (BWP) Environmental Impact Report (EIR). However, the Technical Report scope did not include site visits to other Bay Area military establishments for an in-depth review of existing buildings. To address the HPC's question about the "rarity" of the military/industrial buildings at Hunters Point Shipyard, Circa conducted additional research and site visits to further inform the findings. This memorandum discusses methodology in the following section, and addresses rarity and integrity ("larger district issue") findings in Section III.

Summary of Conclusions

As concluded in the Technical Report, Hunters Point Shipyard is significant to World War II (WWII) military history in the Bay Area, although most remaining buildings are related to ship repair functions as a support facility to the Mare Island Shipyard, Vallejo. Mare Island, and other Bay Area bases and shipyards were historically more significantly associated with the shipbuilding effort and earlier involved in the WWII campaign than HPS, such as those Alameda and Richmond.

Circa found that the most significant theme at HPS, and the one most unique to this site within the Bay Area, is the HPS's role as the National Radiological Defense Laboratory (NRDL) headquarters and radiological research facility (p. 95-96). Unfortunately, most of the buildings associated with the NRDL have been demolished. Beyond these buildings, the most significant remaining building with a direct association to the NRDL is RADLAB (Building 815). That building is located outside the Candlestick Park/Hunters Point Shipyard Phase II project site and will not be affected by Project development.

The boundaries of the proposed extended Hunters Point Commercial Dry Dock and Naval Shipyard California Register Historic District were identified in the Technical Report as encompassing a district that is contiguous, with buildings, structures and objects that are representative of all phases of historic development at Hunters Point Shipyard (through the period of significance) and retains a high level of integrity. While this is true of the proposed district, the same cannot be said of the remaining portions of HPS given the extent of loss of integrity and lack of rarity compared to buildings and districts at other intact military installations in the Bay Area.

II. METHODOLOGY

Rarity

To address the rarity issue, Circa proceeded to compare facilities at Bay Area military installations, using information from the National Park Service and the Base Realignment and Closure Commission (BRAC) website. According to the National Park Service's *World War II in the San Francisco Bay Area* website and the BRAC website, the San Francisco Bay Area's major contribution to WWII was shipbuilding. This was accomplished by a cooperative effort initially of "over 30 shipyards, large and small, and scores of machine shops, and metal and wood fabricators [that] joined together to create the world's largest combined shipbuilding complex...sprawled across hundreds of square miles"[1]. Initial research on several Bay Area bases showed that they are all at various levels of redevelopment, primarily with established

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[1] National Park Service, *World War II Shipbuilding in the San Francisco Bay Area*, www.nps.gov/nr/travel/wwIIbayarea/shipbuilding.

redevelopment plans; many of these bases have been found eligible for the National Register or are listed National Register historic districts.

PBS&J staff made initial contact with selected municipalities or other agencies involved with re-use or redevelopment of Bay Area military establishments (both WWII Navy and Army installations). PBS&J conducted research on former bases that had approved redevelopment plans. Circa then reviewed relevant information on these military installation and compiled brief status summaries for each (see Findings section below for summaries). The establishments reviewed include the following:

- **Alameda Naval Air Station** (WWII Association)
- **Mare Island Naval Shipyard** (WWII and Shipbuilding)
- **Moffett Field Naval Air Station / Naval Air Station, Sunnyvale** (WWII Association)
- **Oakland/Alameda Annex** (WWII Association)
- **Department of Defense (DoD) Housing Facility, Novato** (WWII Association)
- **Presidio of San Francisco** (WWII Association)
- **Fort Cronkhite (Presidio)** (WWII Association)
- **Richmond Shipyards** (WWII and Shipbuilding)
- **Oakland Army Base** (WWII Association)
- **Treasure Island Naval Station** (WWII Association)

See below for links to applicable base plans.

After initial PBS&J contacts and research, Circa visited selected former WWII military installations that had the most potential to retain similar building types to those at HPS. These buildings were then were documented for comparative purposes. The general building types documented fell into three general categories: 1) warehousing, supply and industrial support, 2) shops/ship repair and outfitting (large machine/assembly shops, wood-clad shops and metal-clad shops), and 3) administrative, residential and personnel support services. Because of the standardization typical of WWII-era military architecture, buildings within these categories share many of the same functional and design characteristics. The characteristics are commonly found not just in WWII-era buildings on Naval sites but on Army bases, supply depots and other military installations of that period. These general categories exemplify the predominant building types extant at HPS outside of the proposed historic district boundary.

At HPS buildings categorized under the warehousing, supply and industrial support heading are generally located in the south shipyard area of HPS. Storage buildings are somewhat varied in design and nearly all were built along standard Bureau of Yards and Docks designs, modified on occasion to fit specific requirements. The predominant warehouse type is a rectangular plan, warehouse building with redwood shiplap siding, wood-sash windows or wood louver vents, and a monitor roof. This standard plan was used alone or in groupings of two or more.

Buildings categorized under the shops, ship repair and outfitting heading are represented at HPS in three general forms: large machine/assembly shops, wood clad shops and metal-clad shops. Like the warehouses, nearly all were built along standard Bureau of Yards and Docks designs and modified to fit specific functional requirements. The shops are generally rectangular plan buildings, some quite substantial in footprint as well as height. Most of the buildings are wood or steel framed and were originally clad in wood shiplap siding or corrugated steel panels. These shops range in size from smaller gable-roofed buildings with large vehicular entry doors and limited window openings, to one- and two-story full height shop buildings with shallow gabled roof monitors and shed-roofed side wings. The large machine/assembly shops are fewer in number and are either reinforced concrete or steel framed curtain wall shop buildings that are clad in a combination of corrugated steel or transite (cementitious) siding and corrugated safety glass.

Buildings categorized under the administrative, residential and personnel support services heading are typically one- to two-story buildings with wood shiplap siding, horizontal massing and flat or low-pitched gable roofs. These buildings are usually rectangular in plan or irregular plan buildings built in an additive fashion with boxlike additions projecting from a central building mass. This was common as the standardized plans developed by the Army and Navy were adapted by the architectural and engineering firms on site to meet specific circumstances at each military base.

Circa selected sites to visit determined by 1) proximity, 2) reasonably similar historic context and 3) the above-mentioned building typologies. The site visits were conducted at Mare Island Navel Shipyard, Richmond Shipyards, Alameda Naval Air Station and Oakland Army Base on February 19, 2010. A comparison matrix of extant similar building types found at these bases is included in Appendix A. This matrix demonstrates that a number of similar building types exist among the four sites, and that those located outside of the potential district boundaries at HPS are not the only or last remaining buildings of their type in the Bay Area. Because a building-by-building comparison of HPS buildings to those at other installations would be an extensive effort beyond the scope of this study, the general building typologies described above (and used in the matrix headings of Appendix A) identify general architectural features and functional typologies for comparative purposes. The survey matrix shows the results of the site visits to the above listed bases only, and does not include similar extant building types from other known Bay Area military installations. However, the comparative survey provides substantial information to support the conclusion.

Larger District

As noted above, the HPC and other EIR commentators raised the question of the potential of a larger district beyond the proposed extended Hunters Point Commercial Dry Dock and Naval Shipyard California Register Historic District (that also includes National Register eligible buildings) identified in the Technical Report. The following discusses the question of whether a larger CRHR-eligible historic district should be included.

As stated above, PBS&J staff made initial contact with selected Bay Area military establishments and conducted research on former bases that had approved redevelopment plans. This research found that Alameda Naval Air Station, Mare Island Navel Shipyard, Moffett Field Naval Air Station, Presidio of San Francisco, Fort Cronkhite, Department of Defense (DoD) Housing Facility (Novato) and the Richmond Shipyards all have historic districts that are either listed as a National Register Historic District (NRHD) or eligible as such. While the historic district evaluations were not reviewed, it is assumed that the district evaluations are competent and contain sound conclusions. Of the selected sites visited noted above Mare Island Navel Shipyard, Richmond Shipyards, and Alameda Naval Air Station have historic districts. Circa found Mare Island to have a superior, more comprehensive, and much larger collection of similar building types from the WWII period. All of the individual buildings retain a higher level of physical integrity and are within a significant concentration and continuity of physical development and context to constitute a historic district as compared to those at Hunters Point Shipyard.

A review of HPS maps and photographs from past time periods, as well as written documentation, demonstrates that substantial demolition occurred at HPS since 1974. Of the roughly 530 buildings/structures existent at the height of operation, over 400 have been demolished.[2] The 130 buildings remaining as of 2008 represent less than 25 percent of what was there originally. Circa compared the HPS documents to the established historic districts at military installations noted above. Only those remaining in the proposed extended Hunters Point Commercial Dry Dock and Naval Shipyard California Register Historic District best represent the HPS during the period of significance. The resulting data was applied against the National Register definition of and criteria for "historic districts". This topic is discussed below under Findings.

III. FINDINGS

Rarity Issue
Circa reviewed preliminary research on closed bases as summarized below.

The findings of the preliminary information survey are summarized using information from relevant redevelopment/reuse agencies and data from the BRAC website.

- **Name: Alameda Naval Air Station**
  Summary: Commissioned in 1940 and supported the Navy's defense until its closure in 1997. It contains a National Register eligible WWII Historic District. The Reuse Plan was adopted in 1996, http://www.alameda-point.com/AP.html

- **Name: Mare Island Naval Shipyard**
  Summary: Commissioned in 1854 for shipbuilding operations and was the first naval station on the Pacific Coast. The shipyard was closed in 1996. It contains a National Register Historic District with buildings built from 1854 until the end of WWII. The Specific Plan was adopted in 1999, amended 2008, http://www.ci.vallejo.ca.us/GovSite/default.asp?serviceID1=549

- **Name: Moffett Field Naval Air Station / Naval Air Station, Sunnyvale**
- **Summary:** Commissioned in 1933 to support a "lighter-than-air" program but was soon turned over for flight training and was used to support Navy aeronautical activities. The

[2] See NAVSEA, Hunters Point Shipyard. Final Historical Radiological Assessment: History of the use of General Radioactive Materials, 1939-2003. San Francisco, 2004. *Table 3-3: Current and Former Facilities at HPS by Building Number*.

air station was closed for Navy use in 1994 but has continued in research for NASA Ames Research Center. It contains the Shenandoah Historic District. The Redevelopment/Historic District Development Plan was adopted in 2002, http://www.researchpark.arc.nasa.gov/Public/publicDocs.html

- **Name: Oakland/Alameda Annex**
- **Summary:** Commissioned in 1941 for use as Army airport depot and later used by the Navy (1946) as a main supply center supporting the operation of fleets. The center was closed in 1998. As of the writing of this report no redevelopment plan was received however the BRAC office states that the "intended reuse includes residential and commercial/industrial components"[3]

- **Name: Department of Defense (DoD) Housing Facility, Novato**
- **Summary:** Commissioned in the early 1940s by the Air Force until 1974 when the Navy took over the housing and community services and the Army took over the runway and related structures. The center was closed in 1997. According to the Redevelopment Office " The 600 acre former military base is one of the most successful base reuse projects in the country. Over a billion and a half dollars in private investment in 10 years. Over 2,000 new homes ... one of the largest wetlands restoration projects in the history of the country; numerous recreational facilities, open space and trails and a museum; & affordable artist studios in an art center. The hangars have been redeveloped and renovated for office and technology space. A few sites and buildings remain vacant or underutilized."[4] As of the writing of this report no redevelopment plan was received however according to the City of Novato a plan was adopted in 1999.

- **Name: Presidio of San Francisco**
- **Summary:** Established by Spain in 1776 the Presidio became a Mexican outpost in 1822 and then taken over by the U.S Army in 1847. It is the oldest military installation in the west. The US Army closed the Presidio as a military base in 1994, and transferred it to the National Park Service. In 1996, the Presidio Trust Act gave jurisdiction of the 1,168-acre inland area of the Presidio to the Presidio Trust; the NPS continues to manage the shoreline. Congress created the Presidio Trust to manage the Presidio, with a focus on preservation and leasing of its buildings. The Presidio is a National Historic Landmark of which over 450 buildings are on the National Register. Since 1996, the Presidio Trust has managed and rehabilitated about 2/3 of the over 800 buildings at the Presidio. The Redevelopment/Management Plan was adopted in 2002, http://www.presidio.gov/trust/documents/environmentalplans/ptmp.htm

- **Name: Fort Cronkhite**
- **Summary:** The National Park Service considers Fort Cronkhite (along with Forts Baker and Barry) to be excellent examples of early coastal defense structures from 1918 until after 1945. Fort Cronkhite was closed in 1974, just after the property was listed in the

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[3] Base Realignment and Closure (BRAC), *Former Fleet and Industrial Supply Center Oakland/Alameda Annex*, www.bracpmo.navy.mil/basepage.aspx?baseid...alameda_annex

[4] Email communication Ron Gerber**,** Redevelopment Administrator, Community Development Department Planning Division, email: rgerber@cityofnovato.org

National Register of Historic Places as the Forts Baker-Barry-Cronkhite Historic District. It was then transferred to the National Park Service. The Golden Gate National Recreation Area (GGNRA) General Management Plan was adopted in 1980 http://www.nps.gov/goga/parkmgmt/completed-plans-and-projects.htm

- **Name: Richmond Shipyards**
- **Summary:** No shipyards existed in Richmond prior to WWII. The four Kaiser shipyards (some in partnership with the established Todd Shipyards) grew seemingly overnight between 1941-1942 to meet wartime demand. These private facilities closed in 1945. The Richmond Shipyard # 3 is part of the *Rosie the Riveter/World War II Home Front National Historical Park*, and is listed on the National Register. Its General Management Plan was released in January of 2009. The plan explores three different alternatives for developing and managing the new national park in Richmond, California, http://www.nps.gov/rori/parkmgmt/planning.htm

- **Name: Oakland Army Base**
- **Summary:** Commissioned in 1941 to augment the cargo facilities at Fort Mason in San Francisco. The facilities were closed in 1999. Much of former base is being used by lessees of the Port of Oakland and Oakland Redevelopment Agency to generate income for future development. The Oakland Army Base (Army Base) Redevelopment Area Plan was adopted in 2002, http://www.business2oakland.com/main/oaklandarmybase.htm

- **Name: Treasure Island Naval Station**
- **Summary:** The man-made island was constructed in 1936 for the purpose of hosting (along with Yerba Buena Island) the Golden Gate International Exposition Worlds Fair (1939-1940). The Navy acquired the island in 1942 for a primary use as a military personnel-processing center. The island was closed for Navy use in 1997 and is currently being maintained by Treasure Island Development Authority through a cooperative agreement with the Navy. A Development Plan and Term Sheet developed in 2006 and serves as the basis for the Redevelopment Plan. The final project approvals are expected in early 2011.

This preliminary review of existing military installations also helped to inform the sites chosen for the field survey. Selection of sites to visit was determined by 1) proximity, 2) reasonably similar historic context (WWII defense/ship repair/military architecture/radiological research) and 3) the above-mentioned building typologies.

In comparing the remaining buildings at Hunters Point Shipyard with similar buildings at the identified military installations, survey findings show that the buildings outside of the identified CRHR-eligible Hunters Point Commercial Dry Dock and Naval Shipyard Historic District are not the last remaining or best examples of their types. In most cases, the HPS buildings are inferior to similar buildings at other bases in regard to physical integrity and condition. Most, if not all, of the similar buildings at the other bases retain their original cladding materials – undamaged or obscured by secondary siding materials - and original wood windows, among other character defining features. Furthermore, Alameda Naval Air Station and Mare Island

Naval Shipyard both exhibit a high degree of overall integrity, retaining and reusing a number of administrative, residential, industrial and storage type buildings similar to those at HPS.

As can be seen in the chart in Appendix A, Mare Island has a superior, and more comprehensive, collection of similar shop, storehouse and residential and related building types from the WWII period, all with a higher level of physical integrity than those at Hunters Point Shipyard (see panorama view of shop/storage buildings at Mare Island below.

Figure 1. Mare island shop/storage buildings in historic district (photo by Circa, February 2010).

Various iterations of the warehousing, supply and industrial support buildings can be seen on other bases, as can similar wood and metal clad shop buildings. Similar examples of large machine/assembly shops are also seen at Mare Island, in the protected industrial historic district area. Better examples of WWII residential and related buildings, including barracks, can also be found at The Presidio, Fort Baker, or Fort Cronkhite.

Review of adopted redevelopment plans for the former bases and site visits show that many of these similar buildings types are being retained and are planned for reuse. Many have been successfully reused for years and are important contributors to the economic health of the reused military sites. A number of these sites have been found eligible for the National Register or are listed as National Register historic districts. Alameda Naval Air Station, Mare Island Navel Shipyard, Moffett Field Naval Air Station, Presidio of San Francisco, Fort Cronkhite, Department of Defense (DoD) Housing Facility and the Richmond Shipyards all have historic districts that contain WWII buildings currently being reused or planned for reuse. A number of the implemented redevelopment plans have preserved, rehabilitated and/or reused scores of buildings that are a model for economic success while retaining a high level of historic significance and integrity.

The remaining buildings outside of the identified CRHR-eligible Hunters Point Commercial Dry Dock and Naval Shipyard Historic District are not the last remaining or best examples of their types. The majority of the remaining buildings at the HPS are inferior to like-buildings at other Bay Area bases. In addition, similar buildings at the other bases retain their original materials and character-defining features at a higher level of integrity, and convey the historic context within their period of significance. All of the seven National Register (or NR eligible) historic districts historic are retaining, rehabilitating and reusing buildings similar to those at HPS.

LARGER DISTRICT ISSUE

The Technical Report found that the extant buildings located outside of the proposed Hunters Point Commercial Dry Dock and Shipyard Historic District do not qualify as contributors to a larger historic district because:

1) Better examples of these types of buildings are found within the proposed district, within the Bay Area, and on military bases through the United States;
2) Inclusion of these buildings within the proposed historic district would not expand or augment the historic context or architectural value of the proposed historic district;
3) The site does not retain enough integrity as a whole to justify an expansion of the proposed district.

As a whole, the physical integrity of Hunters Point Shipyard has been compromised as a result of ongoing demolition at the site since base closure. This loss of historic fabric includes the demolition of all buildings on Parcel A (except Building 101); the removal of numerous buildings and structures on Parcels B, C, and E; and the demolition of a significant number of buildings, structures and objects - including recent removal of sections of the roadway system, rail spurs, signage and light standards - on Parcel D. All dry dock cranes, with the exception of the bridge crane at the regunning pier, have also been removed from the site.[5] See below for recent photos showing roadway removal, and Appendix B for figures illustrating the extent of the site during wartime.

Figure 2. View south on Cochrane Street, looking toward west elevation of Building 351A (Photo by Mike Mentink, June 2008).

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[5] Many of the remaining buildings have been leased for other uses since base closure. These later uses may have resulted in further degradation of the interior integrity of the buildings, though the extent to which interior alterations have altered original configurations unknown. Circa's survey work was limited to exterior review only.

CIRCA Historic Property Development

Figure 3. View toward north elevation of building 411 (Photo by Mike Mentink, June 2008).

As discussed above, demolition has been a common factor at HPS since it was decommissioned as a Naval base in 1974. Of the roughly 530 buildings/structures that existed at the height of production at HPS, about 400 have been demolished. The 130 buildings remaining in 2008-9 represent less than 25 percent of the original built environment.

The 130 buildings remain outside the identified historic district 116 are categorized in Appendix C by the three building types, and identified by building number and original use. The remaining fourteen buildings that do not fall into these general categories are considered minor buildings (i.e. windowless substations or small pump houses) or have low integrity. They would not be considered primary contributors to a historic district.

- Building 122 (Substation "V" and Compressor Plant)
- Building 135 (Substation "G")
- Building 206 (Substation "A")
- Building 229 (Substation "L")
- Building 236 (Salt Water Pump House)
- Building 238 (Unknown)
- Building 300 (Substation "N")
- Building 306/306A (Substation "I")
- Building 308 (Salt Water Pump House)
- Building 412 (R.R. Scales)
- Building 521 (Power Plant - South Area)
- Building 523 (Fire Protection Pump Station)
- Building 707 (Animal hospital building; NRDL annex N; Animal colony; waste processing)
- Building 708 (NRDL Bio-med Facility/animal research; Animal psychology study colony)

Below is a summary listing of the buildings that have been lost since HPS was in full operation:[6]

Parcel A:

- A residential district containing about 50 residential buildings, some built in the early decades of the 20th century and others constructed by the Navy when it acquired the shipyard; these residential buildings were used as for married personnel quarters between 1939-1974 when HPS was an active Navy base. This collection of residential buildings included the following:

    - Buildings A-O – 17 Officers' Quarters
    - Buildings E, R and S-Z - Residences
    - Buildings R-3 to R-119 – 26 civilian residential quarters
    - Building 19 – Apartment house
    - 13 Homoja Homes (Quonset huts)
    - Associated greenhouses, garages, a water tank and gardener's tool houses

- Building 100 - Main Electrical Substation for Navy power
- Building 102 – Personnel building, Office of Naval Research, Security Administration and Post Office
- Building 106 – Watch tower, gatehouse
- Building 151 –Bus Shelter
- Building 158 - Sentry House and Main Gate
- Building 322 – Guard and Pass Office
- Building 805 – Guard Shelter/Personnel Shelter
- Building 816 – High Voltage Particle accelerator and Van De Graff Accelerator (RADLAB related)
- Building 818 – Water treatment plant
- Building 901 – Officers' Mess Building, Officers' Club and rental housing
- Building 908 – Garages, 5 cars
- Building 915 – Bank Building
- Building 916 – Chief Petty Officer's Club and Package Liquor Store
- Building 917 – Grocery Store
- Building 921 – Bachelor Officers Quarters
- Building S-807 – Small arms magazine

Parcel B:

- 23 Apartment Buildings – area shown as Soloman Village, adjacent to submarine repair area and across from residential district (Parcels A & B)

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[6] NAVSEA, Hunters Point Shipyard. Final Historical Radiological Assessment: History of the Use of General Radioactive Materials, 1939-2003 (San Francisco, 2004) *Table 3-3: Current and Former Facilities at HPS by Building Number* and Appendix C: Historical Drawings and Photographs. Also, JRP Historical Consulting Services, *Historic Context and Inventory and Evaluation of Buildings and Structures: Hunters Point Shipyard*. Prepared for Engineering Field Activity West, Naval Facilities Engineering Command (September 1997), DPR forms; and 'Building List as of 30 June 1973: Hunters Point Naval Shipyard, San Francisco, California" by the Public Works Engineering Division (held at the San Francisco History Room, San Francisco Public Library).

- Building 27 - Clocking Station
- Building 105 – Watch tower/Gatehouse
- Building 108 – Temporary Marine Barracks and Electronics
- Building 114 – Submarine Barracks, Design Branch, Technical Library and Administrative Building
- Building 118 – Submarine Bachelor's Officers' Quarters and Administration
- Building 119 – Medical Stores and Temporary Training School and Infirmary
- Buildings 127, 144 – Latrines
- Building 131 – Substation "U"
- Building 141 – Dock Shipwrights' Shop
- Building 142 - Air Raid Shelter "A", Personnel Shelter
- Building 143 – Joiner/Carpenter Shop (DD3)
- Building 145 – Saltwater Pumphouse
- Buildings 150, 152 – Bus/Personnel Shelters
- Building 155 – Area Time Office #2
- Buildings 161, 162 – Maintenance service center and paint storage

Parcel C

- Buildings 34, 72 – Clocking Stations
- Building 111 – Lubricating Oil Pump house
- Building 112 – Diesel Oil Pump house
- Building 126 – Submarine Pier Office
- Building 201 – Tugmaster's Office and Administration Building
- Building 210 – Dispensary
- Building 232 – Bus shelter
- Building 234 – Ship Superintendent Office and Administration Building, latrine
- Building 235 – Shop 38 Central Tool Room Annex and General Warehouse
- Building 257 – Galvanizing Plant
- Building 270 – Paint Shop/Ship Repair Shop
- Various substations and storage facilities

Parcel D

- Building 305 – Storage
- Building 311 – Latrine, Ship Superintendent's Office and Administration building
- Building 313 – National Radiological Defense Laboratory (NRDL)
- Building 313A – RADIAC Instrument Development, Instrumentation Lab, Lab Offices
- Building 322 – NRDL Instrumentation Branch Offices
- Building 364 – Animal Irradiation Facility, Research Animal Facility
- Buildings 374-377 – Instrumentation and Control facilities
- Building 408 – Furnace Shelter
- Building 434 – Supply Storehouse
- Building 501 – Ships' Barracks and Teen Club
- Building 502 - Ships' Barracks
- Building 503 – Navy Exchange, Launderette, Ships Subsistence and Laundry
- Building 504 – Laundry office

- Building 519 –Chapel
- Building 522 – Bus shelter

Parcel E

- Building 506 – Housing, Navy Exchange and ROICC Offices; Low Power neutron Generator, Nuclear and Physical Chemistry Branch (NRDL)
- Building 507 – Public Works Office
- Building 508 – Locker Club, Barracks, Temporary Barracks, Employee Relations; NRDL Annex J
- Building 509 – Enlisted Personnel and Disbursing Office, Library
- Building 510/510A – naval investigation Service/Naval Ordinance Laboratory
- Building 511/511- Pacific Reserve Fleet Headquarters/Administrative building; material shelter and hobby shop
- Building 512 – Elementary School
- Building 513 – Ships Barracks
- Building 514 - Ships Barracks
- Building 515 - Ships Barracks
- Building 516 - Ships Barracks
- Building 517 – Marine Storage, NRDL Bio-med Lab, General Research Labs
- Building 518 – Motion Picture Theater
- Building 520 – Dental Clinic
- Building 524 – Pacific Reserve Fleet Supply Building and General Warehouse
- Building 803 – Commissary
- Buildings E-1 to E-120 - Homoja village - 120 Homoja huts (Quonset huts)
- Buildings M-1 to M-17 - 17 Homoja huts
- Buildings O-1 to O-38 - 38 Homoja huts
- Various warehouses and storage facilities

Given the historic contexts of early commercial docking facilities, state-of-the-art ship repair and activities associated with a major national research institution (NRDL), Circa considered the potential that HPS could contain a larger historic district. However, due to the lack of physical integrity (of the individual remaining buildings and the larger site as a functional whole) resulting from the factors listed below, it was concluded that only very few buildings retained enough integrity to warrant further evaluation as historic resources or consideration as contributors to a larger historic district. These factors include:

- extensive demolition of important buildings and structures;
- maintenance deferral/deterioration/neglect;
- extensive use of secondary (asbestos) siding on many of the buildings and/or removal or replacement of original features;
- removal of character-defining features of the site and the altered relationship between some of the buildings and structures.

For purposes of evaluating *physical* integrity of individual buildings at HPS, the following definitions for each level of integrity were developed. The seven aspects of integrity as identified by the National Park Service are location, design, setting, materials, workmanship, feeling, and association. These are discussed in the following section. This integrity evaluation scale was developed for use in the field to categorize buildings without having any information as to the property's associative significance (association with significant events/people). As such, discussion of the Association aspect of integrity is not included in the scale below. Integrity of location is also not discussed in the scale below as it is assumed, based on the lack of documentation to prove otherwise, that none of the HPS buildings were relocated. This scale deals with the more tangible qualities of physical integrity retention – those materials and features that are still extant and appropriate to the period. The Integrity Matrix in Appendix D identifies physical integrity as defined below only, for each of the remaining buildings.

High: Buildings that exhibit an excellent degree of integrity of design, materials, feeling, workmanship and setting. Such buildings retain, to a high degree, original materials and features including exterior siding and window materials, architectural detailing and stylistic features. Their general setting and physical context is intact. These buildings may have modest alterations, additions and/or are in good to excellent physical condition (that has not had an impact on the structural condition) that have had little impact on the overall historic integrity of the property.

Moderate: Buildings that exhibit a moderate degree of integrity of design, materials, feeling, workmanship and setting. Such buildings retain approximately 50 percent or more of the building's original materials, form and features including one or more of the following: exterior siding and window materials, architectural detailing and stylistic features. Their general setting and physical context is somewhat intact. These properties may have alterations or additions but the general form, massing and original stylistic features of the building – the basic elements that allow it to communicate its historic character - remain intact, and are in fair to good physical condition (that has not had an impact on the structural condition).

Low: Buildings that exhibit a low or negligible degree of integrity of design, materials, feeling workmanship and setting. Buildings with low integrity are those with two or more of the following: removal and replacement of original windows with modern sash (vinyl or aluminum, usually), a majority of siding replacement, significant alterations to the setting/physical context and/or notably incompatible or out of scale additions, and/or are in poor to fair physical condition that has had an impact on the structural condition. Buildings that rank low are not considered to retain a degree of physical integrity that would warrant listing as an individual resource or as part of a district.

When assessing a potential historic resource, one must evaluate and clearly state the significance of that resource to American history, architecture, archaeology, engineering, or culture. A resource may qualify as a historic resource if it meets one or more of the applicable (National, state, or local) criteria for significance *and* possesses historic integrity. Historic properties must retain sufficient historic integrity to convey their significance. According to the Office of Historic Preservation's Technical Assistance Series Bulletin #6:

> Integrity is the authenticity of an historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance.

> Historical resources eligible for listing in the California Register must meet one of the criteria of significance described above and retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. It is possible that historical resources may not retain sufficient integrity to meet the criteria for listing in the National Register, but they may still be eligible for listing in the California Register.[7]

The National Register recognizes seven aspects or qualities that define historic integrity:

- Location: The place where the historic property was constructed or the place where the historic event occurred.
- Design: The combination of elements that create the form, plan, space, structure, and style of a property.
- Setting: The physical environment of a historic property.
- Materials: The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.
- Workmanship: The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.
- Feeling: A property's expression of the aesthetic or historic sense of a particular period of time.
- Association: The direct link between an important historic event or person and a historic property.

To retain historic integrity, a resource should possess several of the above-mentioned aspects. The retention of specific aspects of integrity is essential for a resource to convey its significance. Comparisons with similar properties should also be considered when evaluating integrity as it may be important in deciding what physical features are essential to reflect the significance of a historic context.

To assess a building's ability to contribute to a historic district, the above-listed attributes must be applied. Applying the identified historic contexts of early commercial docking facilities, state-of-the-art ship repair and activities associated with a major national research institution (NRDL), the 130 remaining buildings (more than 45 years old) located outside the identified Hunters Point Commercial Dry Dock and Shipyard Historic District were reviewed for their ability to be contributors to an extension of the proposed Historic District or as a separate historic district(s):

Location: Based on the lack of documentation to prove otherwise, it is assumed that none of the HPS buildings were relocated; therefore, they retain integrity for Location.

Design: The design of the remaining buildings outside the proposed historic district are primarily derived or adapted from standard plans from the Bureau of Yards & Docks. Better examples of these types of buildings are found within the proposed district, within the Bay Area, and on military bases through the United States. Because of alterations of individual buildings and

[7] Office of Historic Preservation, Department of Parks and Recreation. California Register and National Register: A Comparison. Technical Assistance Series No. 6.

extensive base wide demolition, the remaining HPS buildings display a significantly diminished degree of physical integrity and condition.

Setting: The physical integrity of the HPS site has been compromised as a result of ongoing demolition, including the demolition of all buildings but one on Parcel A; the removal of numerous buildings and structures on Parcels B, C, and E; and the demolition of a significant number of buildings, structures, and objects (sections of the roadway system, rail spurs, signage and light standards) on Parcel D. The remaining HPS buildings display a significantly diminished degree of integrity of Setting.

Materials: The materials of the remaining buildings outside the proposed Historic District are generally intact; however most of the buildings have secondary cladding materials and window alterations/replacement. Original machinery and other character defining features have been removed. In addition, most suffer from various degrees of deterioration and neglect, and many are in poor condition; they display a significantly diminished degree of integrity of Materials.

Workmanship: The remaining HPS buildings were built from standard plans from the Bureau of Yards & Docks and do not exhibit any particular evidence of "craft". They are inferior to similar buildings at other bases, and therefore they do not display integrity of Workmanship.

Feeling: Of the roughly 530 buildings and structures that existed at the height of operation at HPS, over 400 have been demolished. Due to the extensive demolition of at the site many of the 130 remaining buildings have lost their relationship to one another. In addition, sections of the roadway system, rail spurs, signage, light standards, and dock cranes have been removed, a cumulative impact that has further decreased the integrity of feeling at this former WWII Naval facility. Mare Island has a superior and more comprehensive collection of WWII-era buildings, all with a higher level of physical integrity and sense of place. The areas outside the identified historic district display a significantly diminished degree of integrity of Feeling.

Association: While the remaining buildings are linked to WWII military history, most remaining buildings are related to ongoing the HPS ship repair function as an annex to the shipyard at Mare Island. Other bases and shipyards were more directly associated with shipbuilding and earlier involvement with the WWII campaign and retain a higher level of physical integrity. Further, the site has not been used by the Navy since base closure in 1974 and has lost integrity of association.

In addition to its role in ship repair, HPS was uniquely associated with Cold-War-era radiological research and served as the NRDL headquarters. However, most of the buildings outside the identified historic district associated with the NRDL have been demolished and therefore do not retain integrity of Association with that context.

Therefore, the buildings extant at the HPS as of 2008-9 outside the identified historic district, and the larger shipyard site as a whole, do not retain a level of historic integrity to fully communicate their historic significance that would justify a larger historic district. HPS fails to meet the integrity criteria when compared to other military installations in the Bay Area that have similar buildings used for similar uses and that display higher levels of integrity that strongly convey their historic significance. Information based on records and plans, and site visits provide a substantial basis for concluding that the buildings at HPS are not rare such that they would be considered individual historic resources or contributors to a larger historic district.

It should also be noted that in the comparison of military installations it became apparent that while these bases supported integrated WWII activities during the period of significance, bases were also very self-sufficient in nature with their own chapels, movie theaters, recreational playing fields, housing, and personnel support facilities - as well as the industrial-related buildings. Due to extensive demolition, this pattern is no longer reflected in the built environment at HPS. Since the extant buildings located outside the identified historic district boundaries display (both individually and as a whole) a significantly diminished level of integrity, inclusion of the remaining buildings outside of the Historic District would diminish the integrity of the identified historic district as a whole.

Though HPS is significant to WWII military history in the Bay Area, most remaining buildings are related to ship-repair functions, as an annex to the shipyard at Mare Island. In addition to Mare Island, other bases and shipyards such as Alameda and Richmond, were more significantly associated with the shipbuilding effort and involved earlier in the WWII campaign than HPS.

Furthermore, in our professional opinion, the most significant theme at HPS, and the one most unique to this installation within the Bay Area, is the site's role as the NRDL headquarters and radiological research facility. As part of recent environmental remediation efforts, most of the buildings associated with the NRDL have been demolished. However, Dry Docks 2 and 3, Building 224 (bomb shelter, NRDL Annex K), and Building 253 (Optical, Ordinance and Electronics Shop), located in the identified potential historic district, were used in various functions by the NRDL. Beyond these buildings, the most significant remaining building with a clear association to the NRDL is Building 815 that is outside the project site.

The boundaries of the proposed historic district were identified as encompassing a district that is contiguous, with buildings, structures and objects that are representative of all phases of historic development at Hunters Point Shipyard (through the period of significance) and retains a high level of integrity. While this is true of the proposed district, the same cannot be said of the remaining portions of the shipyard given the widespread loss of integrity and lack of rarity compared to other intact military installations in the Bay Area.

Should there be any questions please contact me 415-362-7711.

Sincerely,

Sheila McElroy
Principal, Circa: Historic Property Development

APPENDIX A

Appendix A: Building Comparison Matrix

Building Category/Type	HUNTERS POINT SHIPYARD	MARE ISLAND	OAKLAND ARMY BASE	ALAMEDA NAVAL BASE
WAREHOUSING, SUPPLY AND INDUSTRIAL SUPPORT				
	 Building 400 (1943) - Supply storehouse	 Building 527	 Supply Storehouse 1 (1940s)	 Building 91 and neighbor (1940s)
	 Building 404 (1943) - Supply storehouse	 Unnumbered storage buildings (1940s)	 Supply Storehouse 2 (1940s)	
	 Building 810 (1943) - Paint and Oil Storage	 Unnumbered storage building (1940s)		
		 Building 571 (1940s-1950s)		

SHOPS, SHIP REPAIR & OUTFITTING	
Large Machine/Assembly Shops	


Building 411 (1947) - Shipfitters, Welders & Boilermakers Shop; Ship Repair Shop


Building 382 (1941) - Sub Assembly Shop


Building 231 (1942-1945) - Inside Machine shop; Ship Repair Shop
Located within proposedexpanded historic district


Building 386/388/390 (1920/1922/1922) - Forge Shop/Structural Shop/Shipfitting Shop


Building 351 (1945/1960 addition) - NRDL Annex E (late 1940s through early 1950s); Electronics Shop


Building 680 (1940) - Machine & Optical Shop/Masonry Industrial Shop


Building 503 (c.1940) - unidentified

Appendix A: Building Comparison Matrix

Wood-Clad Shops


Building 251 (1942) - Storage & Issue Building; Electricians' Shop


Unnumbered shop building (1940s)


Building 230 (1943) - Shop Service building; Machine Shop

Building 639 - wood-clad gabled shop building (1940s)

Metal-Clad Shops


Building 123 (1943) - Battery Overhaul & Storage

Building 213 (1917) - Storage/Metal Clad Industrial, Ordinance Storage or Warehouse


Unnumbered shop building (c.1950s?)


Building 274 (1950) - Sheetmetal Annex


Building 115 (1901) - Electric Shop


Building 366 (1952) - Boat Shop/plastic shop

ADMIN, RESIDENTIAL & PERSONNEL SUPPORT SERVICES


Building 228 (1944) - Central Cafeteria


Building 505 (1943) - Navy Exchange Building and Gymnasium


Building 115/116 (1943-44) - Submarine Applied Training School; Submarine Subsistence


Building 500 (1943) - Barracks; Ship Officers Bachelors Quarters


Building 117 (1943) - Submarine Barracks


Building 737 (1944) - WAVES Officer's Subsistence/Barracks


Building 733 (1944) - WAVES Officer's Quarters/Barracks


Building 137 (c.1940s) - personnel services type

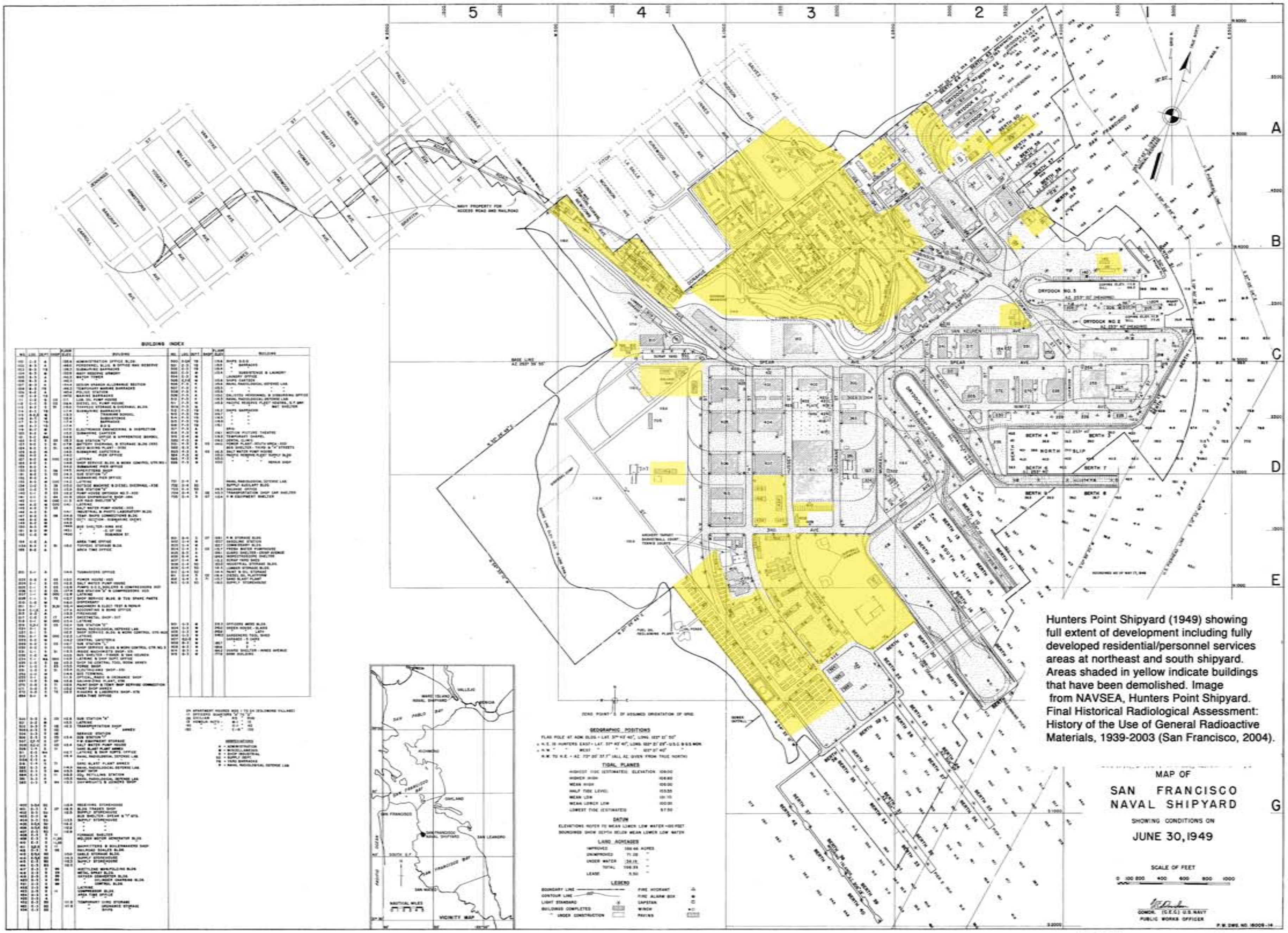

Unnumbered U-plan building (c.1940s) - barracks/personnel services type


Building 78 (c.1940s) - barracks

APPENDIX B

Appendix B: Photographs and Maps

Hunters Point Shipyard (ca. 1945) showing full extent of development. Image from NAVSEA, Hunters Point Shipyard. Final Historical Radiological Assessment: History of the Use of General Radioactive Materials, 1939-2003 (San Francisco, 2004).



Hunters Point Shipyard (1949) showing full extent of development including fully developed residential/personnel services areas at northeast and south shipyard. Areas shaded in yellow indicate buildings that have been demolished. Image from NAVSEA, Hunters Point Shipyard. Final Historical Radiological Assessment: History of the Use of General Radioactive Materials, 1939-2003 (San Francisco, 2004).

ENCL (1)

APPENDIX C

Appendix C: Buildings Listed by General Category

Warehousing, supply & industrial support		Shops, ship repair and outfitting		Administrative, Residential & Personnel support services	
Building 400	Supply storehouse	**Building 113**	Torpedo Storage & Overhaul/Tug Maintenance; non-destructive testing (X-ray) - NRDL related	**Building 101**	Administration Building, Civilian Cafeteria
Building 402	Supply storehouse	**Building 123**	Battery Overhaul & Storage; Substation "T"	**Building 103**	Submarine Barracks; Personnel Decontamination Center for OPERATION CROSSROADS
Building 404	Supply storehouse	**Building 128**	Substation "U"; Work Control Center #1; Shop Services; Ship Repair Shop	**Building 104**	U.S. Naval Reserve Training Center, Naval Reserve Armory; Submarine Barracks
Building 405	Supply storehouse	**Building 130**	Pipefitter's Shop; Shipbuilding & repair shop	**Building 109**	Lincoln restaurant; HPSY Police Station
Building 406	Supply storehouse	**Building 134**	Outside Machine Shop; Diesel Overhaul; Quality Assurance Offices	**Building 110**	Marine Barracks & Mess
Building 407	Supply storehouse	**Building 146**	Industrial Photo & Laboratory Building; Electronics Repair & Storage	**Building 116**	Submarine Applied Training School; Submarine Subsistence
Building 413	Supply storehouse; Cable storage building	**Building 156**	Rubber Shop; Pipefitters Shop Annex	**Building 117**	Submarine Barracks
Building 414	Supply storehouse; Mold loft (1945); radium storage area	**Building 217**	Sheetmetal Shop & Ship Repair Shop	**Building 120**	Canteen, Enlisted Men's Club
Building 415/416	Supply storehouse	**Building 225**	Shop Service building; Work Control Center #2	**Building 121**	Submarine Offices; Apprentice School; Submarine Repair Shop; Administration Building; Civilian Training center
Building 435	Equipment Storage; General Warehouse	**Building 230**	Shop Service building; Machine Shop	**Building 125**	"Submarine Cafeteria"
Building 436	Paint & lumber storage	**Building 241**	Boilermakers & Blacksmiths' Shop; Forge Shop; Ship Repair Shop	**Building 129**	Administration Building, Substation "U-2"; Submarine Pier Office (Pier B)

Appendix C: Buildings Listed by General Category

Building 437	Pipe Storage; General Warehouse	**Building 251**	Storage & Issue Building; Electricians' Shop (through 1950); Central Tool Room; Sheetmetal shop	**Building 132**	Submarine Pier Office; Substation "U-1"; Tug crew barracks (Pier C)
Building 704	Equipment holding shed; Radioactive Material Storage Area; Transportation Shop car shelter	**Building 258**	Pipefitter's Shop	**Building 154**	Area Time Office #1; Administration Building
Building 808	Industrial Storage building	**Building 271**	Paint Shop Annex; Equipment Storage; Sandblast Facility; Paint Lab	**Building 159**	Latrine
Building 809	Lumber Storage/Supply Storehouse	**Building 272**	Riggers & Laborers Shop	**Building 226**	Latrine
Building 810	Paint & Oil Storage	**Building 275**	Sheetmetal Annex	**Building 228**	Central Cafeteria/Civilian cafeteria
Building 813	Supply storehouse & office; general Warehouse	**Building 302**	Transportation Shop; Automotive Vehicle Maintenance Facility	**Building 252**	Bus Terminal; Golden Anchor Coffee Shop
Building 819/823	819: Sewage Dump Station A (1957); 823: Storage Building (1976)	**Building 303**	Transportation Shop Annex	**Building 274**	Decontamination Training Building; Office Space
		Building 323	Boat Shop; Shore Activities/Electronics	**Building 301**	Latrine
		Building 351/351A	NRDL Annex E (late 1940s through early 1950s); Electronics Shop; Chemical Technical Development Branch; General Research Labs	**Building 367**	Work Control Center #3; Administration building, field office
		Building 363	Shipwrights & Joiners Shop; Woodworkers shop	**Building 370**	Latrine
		Building 366	Boat Shop/plastic shop; NRDL Electronics Work Area; Radiography shop; Chemical Research Lab	**Building 378**	Latrine
		Building 368	Shop Service Building #1- Ship Repair Shop and Pipefitting Shop	**Building 424**	Area Time Office #4; Administration Building

Appendix C: Buildings Listed by General Category

		Building 369	Shop Service Building #2- Ship Repair Shop and Pipefitting Shop	**Building 500**	Barracks; Ship Officers Bachelors Quarters; Ships Canteen, Laundry;NRDL Admin. Offices
		Building 371	Transportation Shop Annex; automotive shop building	**Building 505**	Navy Exchange Building and Gymnasium; Bowling alley; canteen
		Building 411	Shipfitters, Welders & Boilermakers Shop; Ship Repair Shop; Civilian Cafeteria; Radiography	**Building 710**	Latrine
		Building 417	Acetylene Manifolding Building		
		Building 419	Oxygen Converter		
		Building 420	Oxygen Cylinder Charging		
		Building 530	Auto Hobby Shop		

APPENDIX D

Appendix D - Integrity Matrix

Building #	Name/Use	Built	Parcel	Integrity	Condition
Building 101	Administration Building, Civilian Cafeteria	1943	A	H	Good
Building 103	Submarine Barracks; Personnel Decontamination Center for OPERATION CROSSROADS	1943	B	M - asbestos shingle cladding over original redwood siding	Fait to good
Building 104	U.S. Naval Reserve Training Center, Naval Reserve Armory; Submarine Barracks	1943	B	M - asbestos shingle cladding over original redwood siding	Fair to good
Building 109	Lincoln restaurant; HPSY Police Station	1934	B	L - window infill/modifications, missing architectural details	Fair to poor condition
Building 110	Marine Barracks & Mess	1943	A	H	Good

Hunters Point Shipyard - Integrity Matrix

Building 113	Torpedo Storage & Overhaul/Tug Maintenance; non-destructive testing (X-ray) - NRDL related	1943	B	L - asbestos shingle cladding over original redwood siding (partial); window removal	Poor condition - building severely deteriorated
Building 115	"US Naval Reserve Drill Hall"; Submarine Training School	1944	B	M - asbestos shingle cladding over original redwood siding	Fair condition
Building 116	Submarine Applied Training School; Submarine Subsistence	1943	B	M - asbestos shingle cladding over original redwood siding	Fair condition
Building 117	Submarine Barracks	1943	B	M - asbestos shingle cladding over original redwood siding	Fair condition
Building 120	Canteen, Enlisted Men's Club	1943	B	L - wood shingle cladding over original redwood siding	Fair to poor condition

Hunters Point Shipyard - Integrity Matrix

Building 121	Submarine Offices; Apprentice School; Submarine Repair Shop; Administration Building; Civilian Training center	1944	B	L - asbestos shingle cladding over original redwood siding (partial); window modifications	Very poor condition
Building 122	Substation "V" and Compressor Plant	1944	B	M - addition	fair condition
Building 123	Battery Overhaul & Storage; Substation "T"	1943	B	H	fair condition
Building 125	"Submarine Cafeteria"	1944	B	H	fair condition
Building 128	Substation "U"; Work Control Center #1; Shop Services; Ship Repair Shop	1944	B	L - infilled bays; most windows missing	poor condition - building severely deteriorated

Hunters Point Shipyard - Integrity Matrix

Building 129	Administration Building, Substation "U-2"; Submarine Pier Office (Pier B)	1943	B	L - windows/doors missing	Pier B disentegrating; building in v. poor condition
Building 130	Pipefitter's Shop; Shipbuilding & repair shop	1944	B	L	most windows in monitor broken, building in v. poor condition
Building 132	Submarine Pier Office; Substation "U-1"; Tug crew barracks (Pier C)	1943	B	L - windows/doors missing	Pier C disentegrating; building in v. poor condition
Building 134	Outside Machine Shop; Diesel Overhaul; Quality Assurance Offices	1945	B	H	Good
Building 135	Substation "G"	1943	B	M - addition	Good
Building 146	Industrial Photo & Laboratory Building; Electronics Repair & Storage	1945	B	H	Fair condition

Hunters Point Shipyard - Integrity Matrix

Building 154	Area Time Office #1; Administration Building	1953	C	L - secondary siding, windows missing	Poor condition, building deteriorating
Building 156	Rubber Shop; Pipefitters Shop Annex	1953	B	M - addition	Fair condition
Building 159	Latrine	1956	B	M	Fair condition
Building 203	Powerplant-Substation "H"; oil fired heating plant; CROSSROADS ship fuel Burn	1943	C	H	Good
Building 206	Substation "A" & Compressors	1943	C	M - portion of building below water, deteriorated	Fair to poor condition
Building 215	Firestation #1 / Hunters Point Fire Department	1942	C	H	Good
Building 217	Sheetmetal Shop & Ship Repair Shop	1943	C	M - asbestos shingle over redwood	Fair condition

Hunters Point Shipyard - Integrity Matrix

Building 225	Shop Service building; Work Control Center #2	1943	C	L - windows broken/missing	Poor condition - building severely deteriorated
Building 226	Latrine	1943	C	M	Fair condition
Building 228	Central Cafeteria/Civilian cafeteria	1944	C	L - most windows/doors missing	Poor condition - building severely deteriorated
Building 229	Substation "L"	1943	C	L - addition; door missing	Poor condition
Building 230	Shop Service building; Machine Shop	1943	C	L - windows broken/missing	Poor condition - building severely deteriorated
Building 236	Salt Water Pump House	c.1943	C	H	G
Building 238	Unknown	c.1943	C	L - most windows/doors missing	Poor condition - building severely deteriorated

Hunters Point Shipyard - Integrity Matrix

Building 241	Boilermakers & Blacksmiths' Shop; Forge Shop; Ship Repair Shop	1945	C	L - secondary siding, windows missing	Poor condition - building severely deteriorated; interior machinery not extant
Building 251	Storage & Issue Building; Electricians' Shop (through 1950); Central Tool Room; Sheetmetal shop	1942	C	L - secondary siding, windows missing	Poor condition
Building 252	Bus Terminal; Golden Anchor Coffee Shop	1944	C	M - window modifications, secondary siding?	Fair condition
Building 258	Pipefitter's Shop	1948	C	L - full stucco cladding, multi-story addition w/ tower element	Fair condition
Building 271	Paint Shop Annex; Equipment Storage; Sandblast Facility; Paint Lab	1947	C	H	Fair condition
Building 272	Riggers & Laborers Shop	1942	C	M - asbestos shingle cladding over original redwood siding (partial); window removal	Fair to poor condition

Hunters Point Shipyard - Integrity Matrix

Building 274	Decontamination Training Building; Office Space	1950	D	M - window modifications	Fair condition
Building 275	Sheetmetal Annex	1953	C	M	Fair to poor condition
Building 280	Covered Sheet Metal Work Area	c.1945	C	L - wall missing	Poor condition - building deteriorated
Building 300	Substation "N"	1943	C	H	Good; concrete building, no windows.
Building 301	Latrine	1943	C	H	Fair condition
Building 302	Transportation Shop; Automotive Vehicle Maintenance Facility	1943	D	M - asbestos shingle cladding over original redwood siding (partial); windows missing, some door replacemnt	Fair condition
Building 303	Transportation Shop Annex	1944	D	L - secondary siding, windows/doors removed	Fair to poor condition
Building 304	Service/Gas Station	1943	D	L - secondary siding, doors removed	Poor condition - building severely deteriorated

Hunters Point Shipyard - Integrity Matrix

Building 306/306A	Substation "I"	1943	D	L - secondary siding, windows/doors missing; large addition	Poor condition - building severely deteriorated
Building 307	Electronic Storage; Public Works Equip. Storage; Electronic Assembly	1944	D	H	Good
Building 308	Salt Water Pump House; Fire Protection Pumping Station	1943	D	M - addition	Fair to good
Building 323	Boat Shop; Shore Activities/Electronics	1946	D	L - secondary siding, windows removed/replaced	Poor condition - building deteriorated
Building 324	CO2 Refilling Station	1946	D	L - window modifications	Poor condition - building deteriorated

Hunters Point Shipyard - Integrity Matrix

Building 351/351A	NRDL Annex E (late 1940s through early 1950s); Electronics Shop; Chemical Technical Development Branch; General Research Labs	1945/1960	D	M - addition	Fair to poor condition
Building 363	Shipwrights & Joiners Shop; Woodworkers shop	1943	D	M - secondary siding	Fair condition
Building 366	Boat Shop/plastic shop; NRDL Electronics Work Area; Radiography shop; Chemical Research Lab	1952	D	M - window modifications/removal	Fair condition
Building 367	Work Control Center #3; Administration building, field office	1953	C	H-M	Good
Building 368	Shop Service Building #1- Ship Repair Shop and Pipefitting Shop	1953	C	H	Good

Hunters Point Shipyard - Integrity Matrix

Building 369	Shop Service Building #2- Ship Repair Shop and Pipefitting Shop	1953	D	H	Good
Building 370	Latrine	1953	D	H	Good
Building 371	Transportation Shop Annex; automotive shop building	1953	D	M - siding modification?	Fair to good
Building 377	Work Shop & Poseidon Systems Test Engineering	1962	D	H	modern type
Building 378	Latrine	1963	D	M - secondary siding	Fair to good
Building 379	Instrumentation/Control - Poseidon Engineering	1962	D	M - siding modification?	Fair to good
Building 380	Work Shop & Poseidon Systems Test Engineering	1962	D	M - siding modification?	Fair to good
Building 400	Supply storehouse	1943	E	H	Good

Hunters Point Shipyard - Integrity Matrix

Building 401	Building trades shop/general warehouse; Public Works Shop	1943	D	M - asbestos siding over original redwood	Fair condition
Building 402	Supply storehouse	1943	D	H	Fair condition
Building 404	Supply storehouse	1943	D	H	Fair condition
Building 405	Supply storehouse	1943	E	H	Fair condition
Building 406	Supply storehouse	1943	E	H	Fair condition
Building 407	Supply storehouse	1943	D	H	Fair condition
Building 409/409A	Welder Motor Generator Building	1947	D	L - doors missing, all equipment removed	poor condition
Building 410	Welder Motor Generator Building	1947	D	L - portions of siding mission, all equipment removed	poor condition

Hunters Point Shipyard - Integrity Matrix

Building 411	Shipfitters, Welders & Boilermakers Shop; Ship Repair Shop; Civilian Cafeteria; Radiography	1947	D	M	Fair to good;cranes and other equipment removed
Building 412	R.R. Scales	1943	D	H	
Building 413	Supply storehouse; Cable storage building	1944	D	H	Fair condition
Building 414	Supply storehouse; Mold loft (1945); radium storage area	1944	E	M	Fair condition

Hunters Point Shipyard - Integrity Matrix

Building 415/416	Supply storehouse	1946-7	D	H	Fair condition
Building 417	Acetylene Manifolding Building	1947	D	L - full T-111 siding	Fair condition
Building 418	Metal Spray Building	1947	D	L - windows/doors missing; secondary siding	Fair condition
Building 419	Oxygen Converter	1947	D	M	Fair condition
Building 420	Oxygen Cylinder Charging	1947	D	L - front wall/portions of siding missing	Poor
Building 424	Area Time Office #4; Administration Building	1947	D	L - additions	Fair to poor
Building 435	Equipment Storage; General Warehouse	1946	D	L - doors missing, all equipment removed, secondary siding	Fair to poor
Building 436	Paint & lumber storage	1946	D	L - doors missing, all equipment removed, secondary siding	Fair to poor
Building 437	Pipe Storage; General Warehouse	1954	D	L - front wall/doors missing, secondary siding	Fair to poor

Hunters Point Shipyard - Integrity Matrix

Building 500	Barracks; Ship Officers Bachelors Quarters; Ships Canteen, Laundry;NRDL Admin. Offices	1943	D	L - most windows missing, doors & stairwells removed	Poor - building severely deteriorated
Building 505	Navy Exchange Building and Gymnasium; Bowling alley; canteen	1943	D	L - asbestos siding covering original redwood; missing windows	Poor - building severely deteriorated
Building 521	Power Plant - South Area	1948	E	H	Fair
Building 523	Fire Protection Pump Station; Salt Water pump house	1948	D	M - large portion of exterior wall missing	Poor - building deteriorated
Building 525	Pacific Reserve Fleet Supply Building	1948	D	H	Fair condition
Building 526	Pacific Reserve Fleet Repair Shop	1948	D	H	Fair condition
Building 527	Motor generator building on pier 2	1947	E	L - windows missing	Poor condition - building and pier severly deteriorated

Hunters Point Shipyard - Integrity Matrix

Building 530	Auto Hobby Shop	1953	D	M	Fair to good
Building 704	Equipment holding shed; Radioactive Material Storage Area; Transportation Shop car shelter	1946	E	H	Fair condition
Building 707	Animal hospital medical building; NRDL annex N; Animal colony; waste processing	1950	E	M - secondary siding?	Fair condition
Building 708	NRDL Bio-med Facility/animal research; Animal psychology study colony	1953	E	M - orig. doors removed	Fair to good
Building 709	Navy Exchange Gas Station	1952	E	L - glazing/doors removed; equipment stripped	Poor condition - building severely deteriorated
Building 710	Latrine	1948	E	L -windows/doors removed; interior stripped	Poor condition - building severely deteriorated

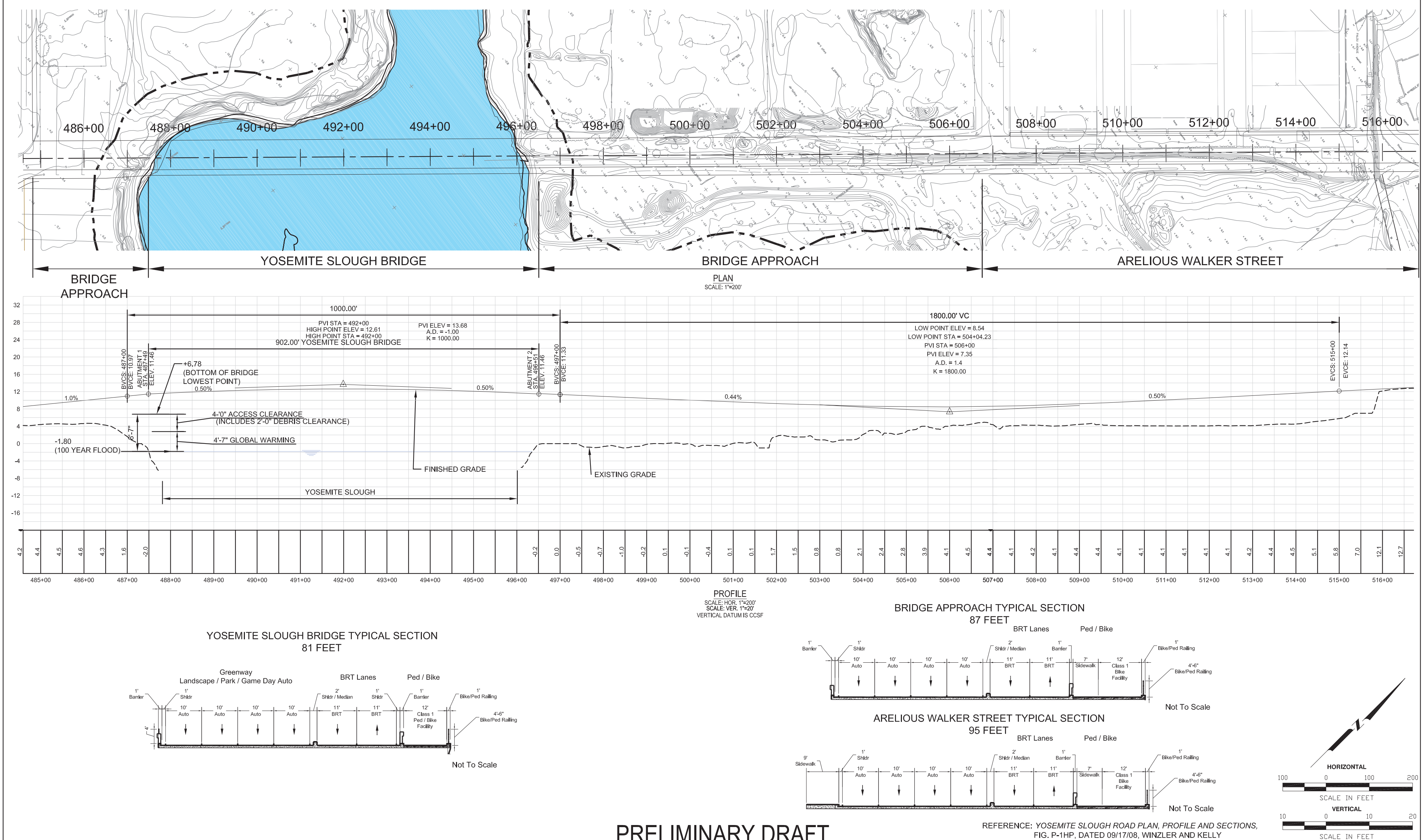
Hunters Point Shipyard - Integrity Matrix

Building 808	Industrial Storage building	1944	A	H	Good
Building 809	Lumber Storage/Supply Storehouse	1943	E	H	Fair to good
Building 810	Paint & Oil Storage	1943	E	M	Fair to good; adjacent building burned
Building 813	Supply storehouse & office; general Warehouse	1947	A	H	Good
Building 819/823	819: Sewage Dump Station A (1957); 823: Storage Building (1976)	1957/1976	D	L - addition	Fair condition
Other Major Structures:					
Drydocks 5, 6, 7	Ship repair - Submarines	1944	B	L - crane equipment and rail spur connections removed	Unknown

Hunters Point Shipyard - Integrity Matrix

450 Ton Crane	altered	1948		L - altered	Unknown

Appendix N2 MACTEC, Yosemite Slough Bridge Drawings—Stadium and Non-Stadium Options



PRELIMINARY DRAFT

REFERENCE: *YOSEMITE SLOUGH ROAD PLAN, PROFILE AND SECTIONS,* FIG. P-1HP, DATED 09/17/08, WINZLER AND KELLY

NO.	DATE	REVISIONS
3	10-19-2009	ADJUST FOR CHANGE IN100 YEAR FLOOD ELEVATION TO -1.80.
2	10-8-2009	ADJUST FOR ALLOWING DEBRIS AND ACCESS CLEARANCE, CHANGE 100 YEAR FLOOD ELEVATION TO -1.70.

DRAWN: JHD PROJECT NO: 4096097772
ENGINEER: SCALE: AS SHOWN
CHECKED: APPROVED:
DATE: 10-27-09 DATE:

MACTEC

HUNTERS POINT / CANDLESTICK POINT
SAN FRANCISCO, CALIFORNIA

YOSEMITE SLOUGH BRIDGE, APPROACH AND ARELIOUS WALKER STREETS PLAN, PROFILE & SECTIONS

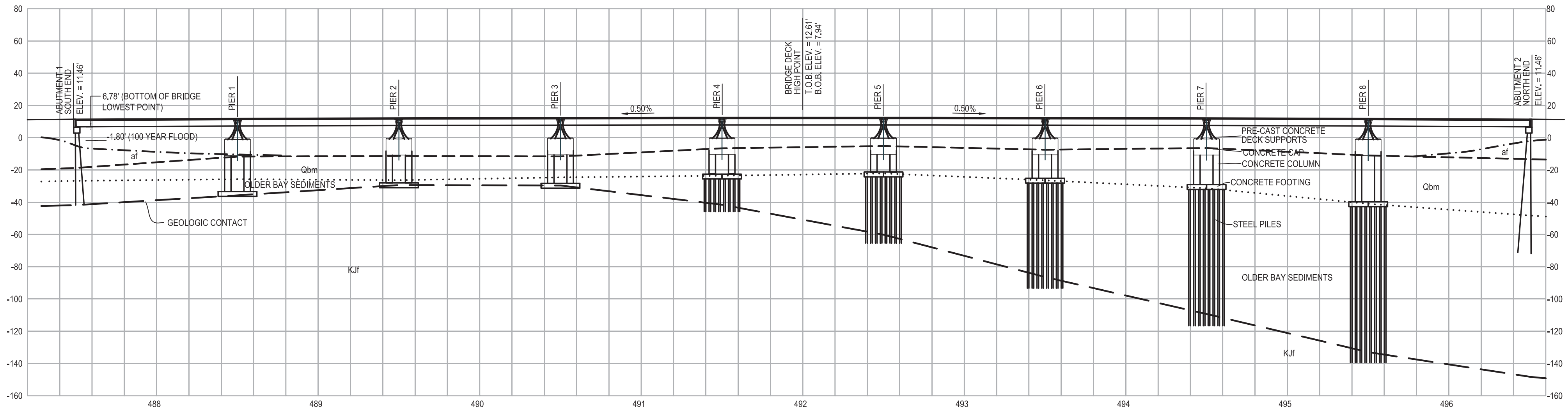
DRAWING: 1
SHEET: 1 OF 7

20091027_YSB_MLC_FIG-1.DWG 300.0

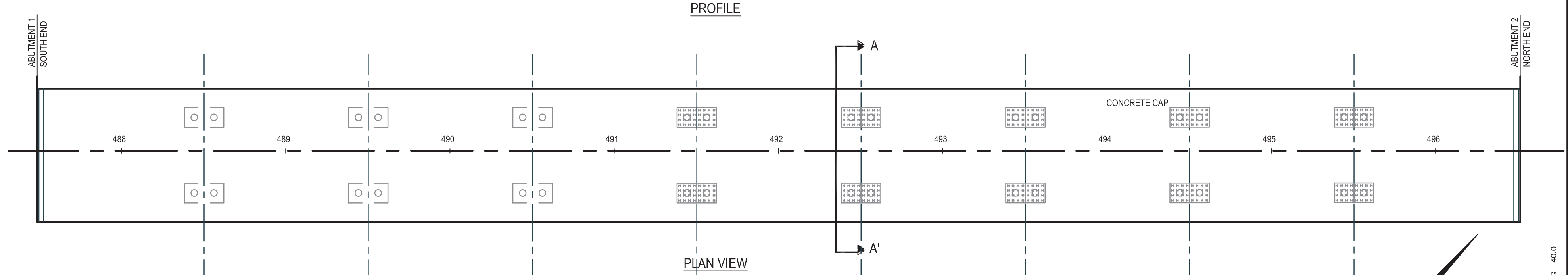
LEGEND

NOTE:
VERTICAL DATUM IS CCSF.

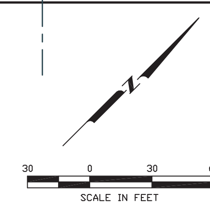
— · — · —	af	ARTIFICIAL FILL CONSISTING OF CLAY, SILT AND SAND WITH CONSTRUCTION DEBRIS SUCH AS CONCRETE AND WOOD DEBRIS
— — — —	Qbm	BAY MUD DEPOSIT CONSISTING OF HIGHLY COMPRESSIBLE SOFT CLAY AND SILT SUSCEPTIBLE TO CONSOLIDATION SETTLEMENT
· · · · · · · ·	OLDER BAY SEDIMENTS	OLD BAY DEPOSIT CONSISTING OF CONSOLIDATED CLAY SILT AND SAND THAT MAY BE SUSCEPTIBLE TO MINOR CONSOLIDATION SETTLEMENT
—— ——	KJf	FRANCISCAN COMPLEX ROCK
	496	STATIONING BASED ON WINZLER AND KELLY FIGURE NUMBER P-1HP DATED 09-17-2008



PROFILE



PLAN VIEW



20091019-YSB-MLC_FIG-2-3.DWG 40.0
20091027.1159

PRELIMINARY DRAFT

NO.	DATE	REVISIONS
3	10-19-2009	ADJUST FOR CHANGE IN 100 YEAR FLOOD ELEVATION TO -1.80.
2	10-8-2009	ADJUST FOR ALLOWING DEBRIS AND ACCESS CLEARANCE, CHANGE 100 YEAR FLOOD ELEVATION TO -1.70.

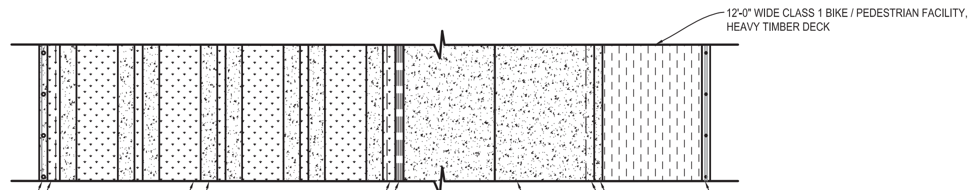
DRAWN:	JHD	PROJECT NO:	4096097772
ENGINEER:		SCALE:	AS SHOWN
CHECKED:		APPROVED:	
DATE:	10-27-09	DATE:	

MACTEC

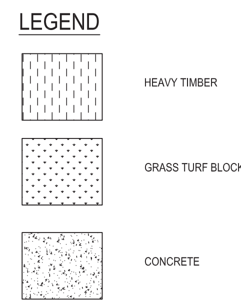
HUNTERS POINT / CANDLESTICK POINT
SAN FRANCISCO, CALIFORNIA

YOSEMITE SLOUGH BRIDGE
PLAN AND PROFILE

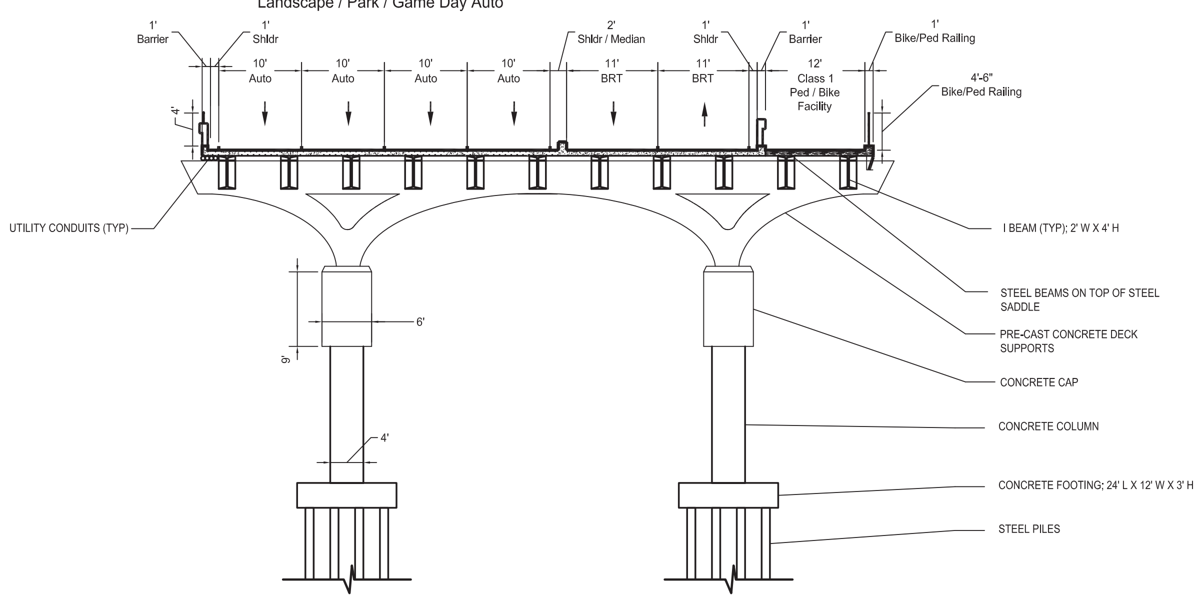
DRAWING: 2
SHEET: 2 OF 7



DETAIL



YOSEMITE SLOUGH BRIDGE
81 FEET



SECTION A-A'

15 0 7.5 15
SCALE IN FEET

20090925–YSB–MLC_FIG–2–3.DWG 40.0
20090617.1056

PRELIMINARY DRAFT

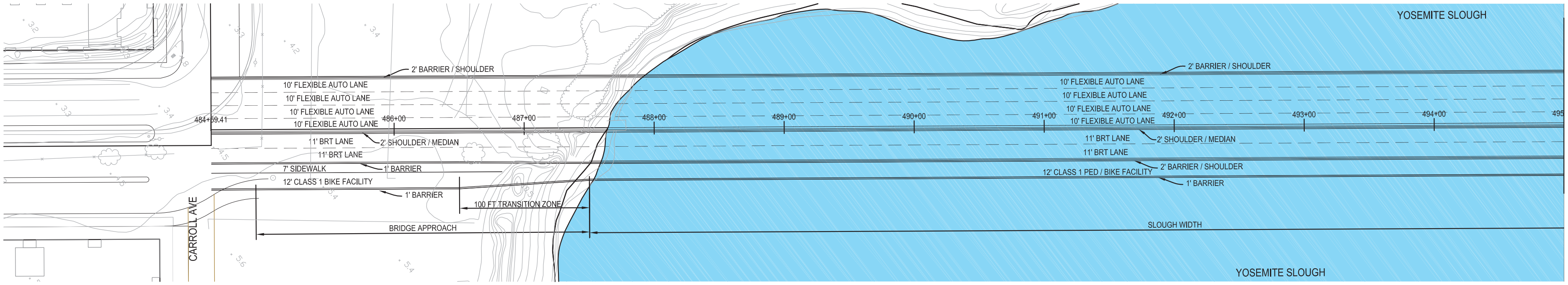
NO.	DATE	REVISIONS	DRAWN: JHD	PROJECT NO: 4096097772
			ENGINEER:	SCALE: AS SHOWN
			CHECKED:	APPROVED:
			DATE: 10-27-09	DATE:

MACTEC

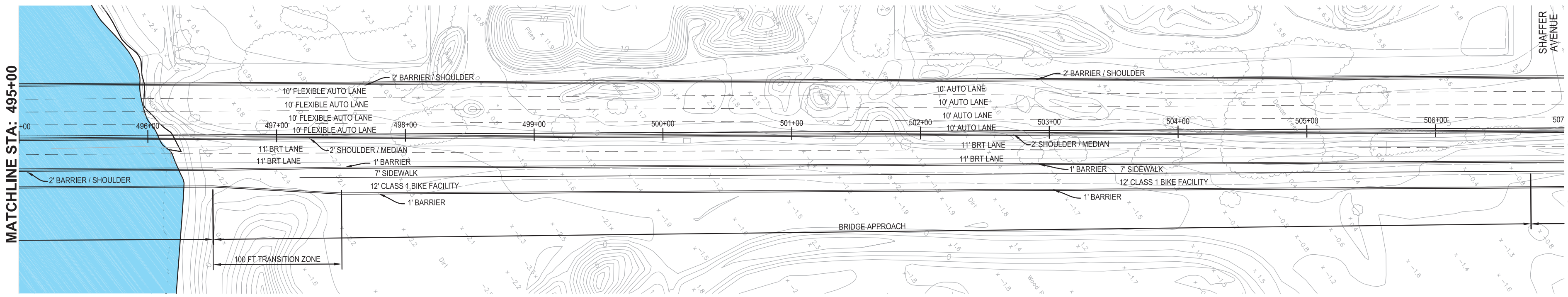
HUNTERS POINT / CANDLESTICK POINT
SAN FRANCISCO, CALIFORNIA

YOSEMITE SLOUGH BRIDGE
SECTION AND DETAIL

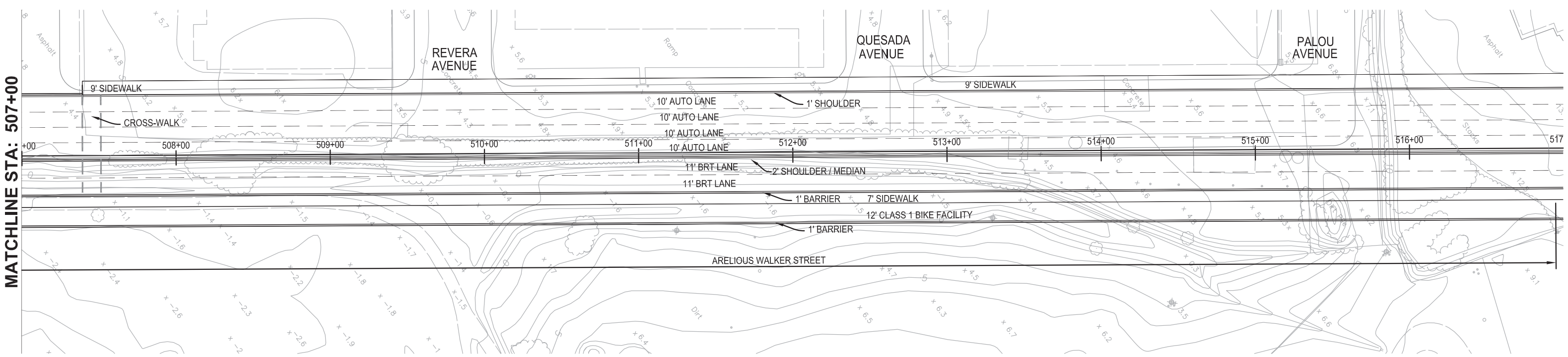
DRAWING: 3
SHEET: 3 OF 7



PLAN VIEW



PLAN VIEW



PLAN VIEW

PRELIMINARY DRAFT

40 0 40 80
SCALE IN FEET

2009l027-YSMT BRDG-MLC_FIG-4.DWG 300.0
20091027.1730

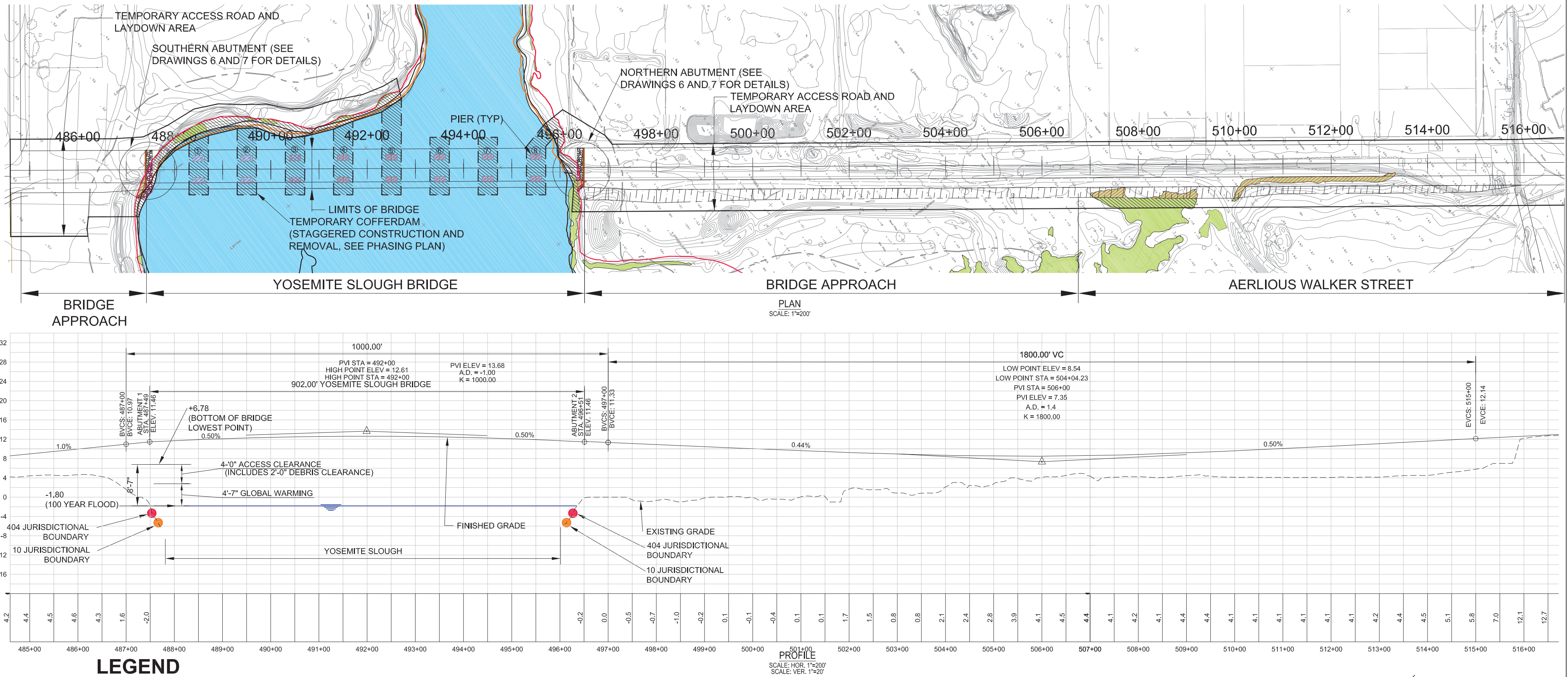
NO.	DATE	REVISIONS	DRAWN: JHD	PROJECT NO: 4096097772
			ENGINEER:	SCALE: AS SHOWN
			CHECKED:	APPROVED:
			DATE: 10-27-09	DATE:

MACTEC

HUNTERS POINT / CANDLESTICK POINT
SAN FRANCISCO, CALIFORNIA

YOSEMITE SLOUGH BRIDGE APPROACH & ARELIOUS WALKER STREET PLAN VIEW

DRAWING: 4
SHEET: 4 OF 7

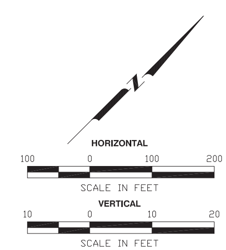


LEGEND

- PERMANENT IMPACT - JURISDICTIONAL WATERS OR WETLAND HABITAT AREAS
- TEMPORARY IMPACT - JURISDICTIONAL WATERS OR WETLAND HABITAT AREAS
- JURISDICTIONAL WETLANDS
- APPROACH AND ARELIOUS WALKER STREET EMBANKMENT
- SECTION 10 JURISDICTIONAL BOUNDARY
- SECTION 404 JURISDICTIONAL BOUNDARY (TIDAL)
- TEMPORARY ACCESS ROAD AND CONTRACTOR LAYDOWN AREA
- 1 TEMPORARY COFFERDAMS AND NUMBER
- BCDC LIMIT (100 FT FROM SHORELINE)

Cofferdam Construction Phasing Plan

Phase	Cofferdam Constructed	Cofferdam Removed
A	1	
B	2	
C	3	1
D	4	2
E	5	3
F	6	4
G	8	5
H	7	
I		6 7 8



PRELIMINARY DRAFT

REFERENCE: *YOSEMITE SLOUGH ROAD PLAN, PROFILE AND SECTIONS,* FIG. P-1HP, DATED 09/17/08, WINZLER AND KELLY

NO.	DATE	REVISIONS
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DRAWN: JHD | PROJECT NO: 4096097772 | ENGINEER: | SCALE: AS SHOWN | CHECKED: | APPROVED: | DATE: 10-27-09 | DATE:

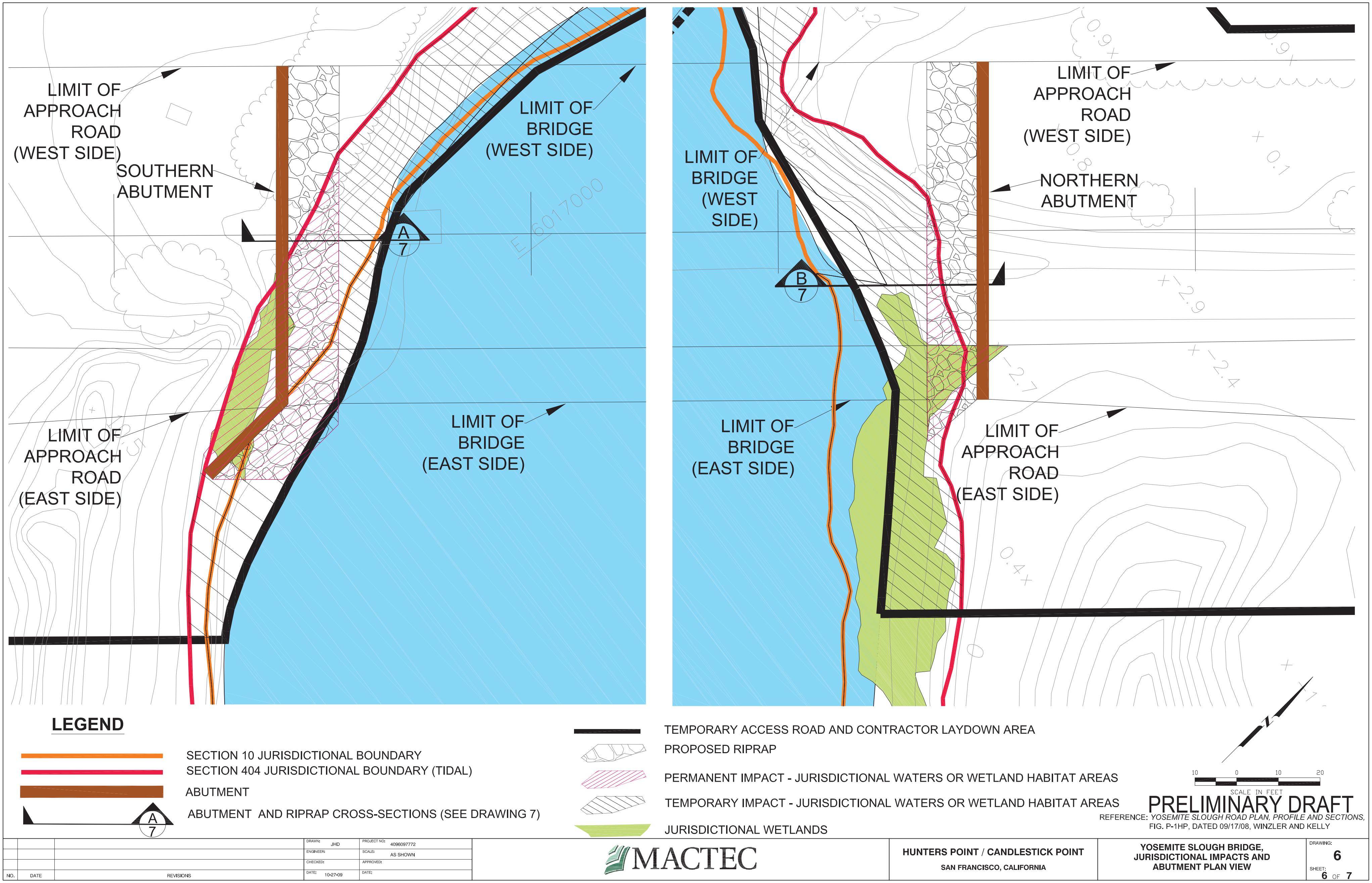
MACTEC

HUNTERS POINT / CANDLESTICK POINT
SAN FRANCISCO, CALIFORNIA

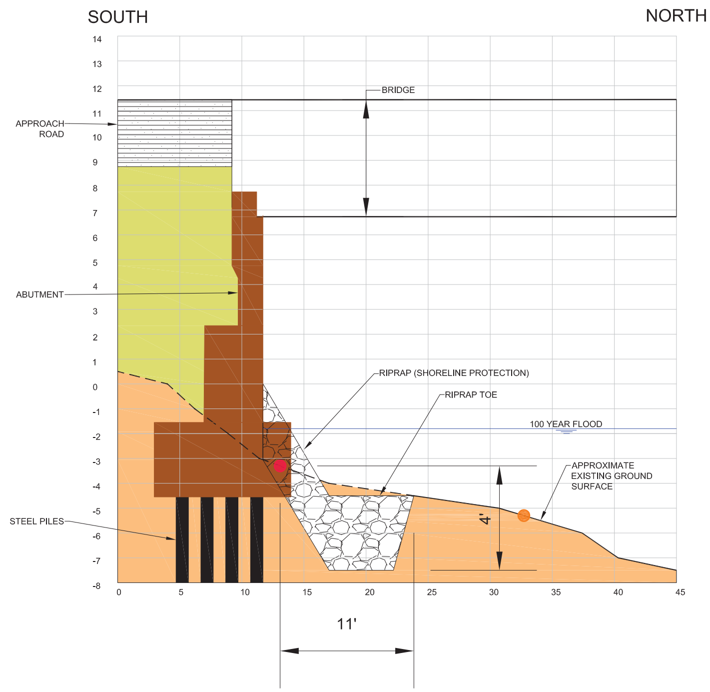
YOSEMITE SLOUGH BRIDGE, JURISDICTIONAL IMPACTS PLAN AND PROFILE

DRAWING: 5
SHEET: 5 OF 7

20091027_YSB_MLC_FIG-5.DWG 300.0
20091027.1738

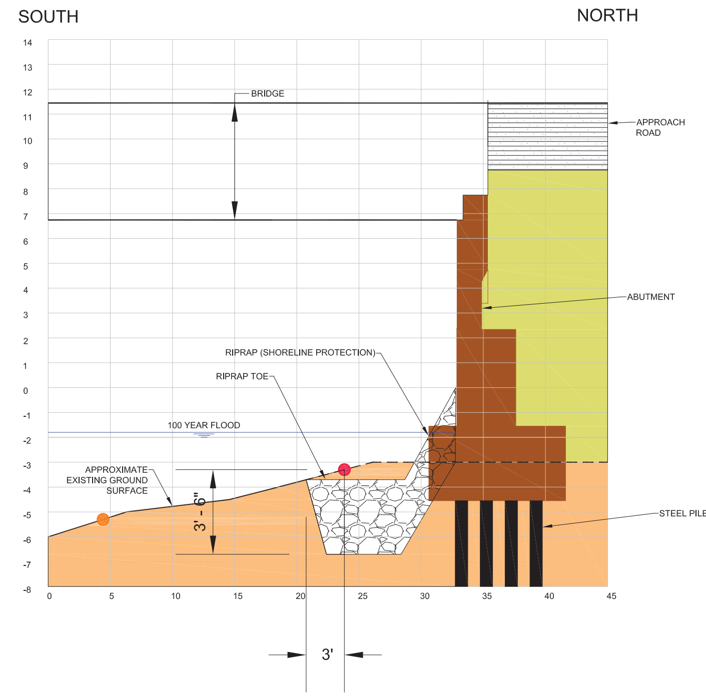


LIMIT OF APPROACH ROAD (WEST SIDE)
SOUTHERN ABUTMENT
LIMIT OF BRIDGE (WEST SIDE)
LIMIT OF APPROACH ROAD (EAST SIDE)
LIMIT OF BRIDGE (EAST SIDE)
A 7
E 6017000
LIMIT OF BRIDGE (WEST SIDE)
B 7
LIMIT OF APPROACH ROAD (WEST SIDE)
NORTHERN ABUTMENT
LIMIT OF BRIDGE (EAST SIDE)
LIMIT OF APPROACH ROAD (EAST SIDE)
LEGEND
SECTION 10 JURISDICTIONAL BOUNDARY
SECTION 404 JURISDICTIONAL BOUNDARY (TIDAL)
ABUTMENT
ABUTMENT AND RIPRAP CROSS-SECTIONS (SEE DRAWING 7)
TEMPORARY ACCESS ROAD AND CONTRACTOR LAYDOWN AREA
PROPOSED RIPRAP
PERMANENT IMPACT - JURISDICTIONAL WATERS OR WETLAND HABITAT AREAS
TEMPORARY IMPACT - JURISDICTIONAL WATERS OR WETLAND HABITAT AREAS
JURISDICTIONAL WETLANDS
N
10 0 10 20
SCALE IN FEET
PRELIMINARY DRAFT
REFERENCE: YOSEMITE SLOUGH ROAD PLAN, PROFILE AND SECTIONS, FIG. P-1HP, DATED 09/17/08, WINZLER AND KELLY
DRAWN: JHD
PROJECT NO: 4096097772
ENGINEER:
SCALE: AS SHOWN
CHECKED:
APPROVED:
DATE: 10-27-09
DATE:
NO. DATE REVISIONS
MACTEC
HUNTERS POINT / CANDLESTICK POINT
SAN FRANCISCO, CALIFORNIA
YOSEMITE SLOUGH BRIDGE, JURISDICTIONAL IMPACTS AND ABUTMENT PLAN VIEW
DRAWING: 6
SHEET: 6 OF 7
20091027-YSB_MLC_FIG-6-7.DWG 300.0



SOUTHERN ABUTMENT (A)

HORIZONTAL SCALE 1" = 10'
VERTICAL SCALE 1" = 5'



NORTHERN ABUTMENT (B)

HORIZONTAL SCALE 1" = 10'
VERTICAL SCALE 1" = 5'

LEGEND

- RIP-RAP
- EXISTING FILL
- NEW FILL
- ABUTMENT
- SECTION 10 JURISDICTIONAL BOUNDARY
- SECTION 404 JURISDICTIONAL BOUNDARY (TIDAL)

PRELIMINARY DRAFT

REFERENCE: *YOSEMITE SLOUGH ROAD PLAN, PROFILE AND SECTIONS,* FIG. P-1HP, DATED 09/17/08, WINZLER AND KELLY

NO.	DATE	REVISIONS
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DRAWN: JHD | PROJECT NO: 4096097772
ENGINEER: | SCALE: AS SHOWN
CHECKED: | APPROVED:
DATE: 10-27-09 | DATE:

MACTEC

HUNTERS POINT / CANDLESTICK POINT
SAN FRANCISCO, CALIFORNIA

YOSEMITE SLOUGH BRIDGE, JURISDICTIONAL IMPACTS AND ABUTMENT SECTION VIEW

DRAWING: 7
SHEET: 7 OF 7

EXHIBIT-YSB_MLC_FIG-6-7.DWG 300.0

Appendix Q2 Arup, Amendment to Water Demand Memorandum #16—Variant 2A (Housing/R&D Variant), April 28, 2010

To	Lennar -	Reference number	131878/RRJ
cc		File reference	
From	Rowan Roderick-Jones/Manish Dalia x 27222 (San Francisco)	Date	April 28, 2010
Subject	**Candlestick Point / Hunters Point Shipyard Phase II** Amendment to Water Demand Memorandum #16—Variant 2A (Housing/R&D Variant)		

1 Purpose

An option to Variant 2 (Housing Variant)—Variant 2A (Housing/R&D Variant)—has been identified that would allow for additional R&D uses on the stadium site, along with housing, in the event the 49ers do not choose to develop a stadium in the HPS Phase II area. This addendum to the Candlestick Point / Hunters Point Shipyard Phase II Water Demand Memorandum Revision #16, October 15, 2009, provides a water demand estimate for Variant 2A, the Housing/R&D Variant.

As compared to the Housing Variant 2, the Housing/R&D Variant (Variant 2A) would relocate 275 residential units from Candlestick Point to HPS Phase II and redistribute 50 residential units within Candlestick Point. The Housing/R&D Variant (Variant 2A) would not develop the uses in the Jamestown District of Candlestick Point that would occur under the Housing Variant (Variant 2).

An additional 500,000 square feet (sf) of R&D land use would be constructed on the stadium site as compared to the Housing Variant (Variant 2), for a total of 3,000,000 sf of R&D uses at the HPS Phase II site. The Draft EIR analyzed a total of 5,000,000 sf of R&D uses under the R&D Variant 1, and 2,500,000 sf under the Housing Variant (Variant 2); therefore, the increased amount of R&D square footage under the Housing/R&D Variant (Variant 2A) (e.g., 3,000,000 sf) would fall within the range of development programs analyzed by the R&D Variant (Variant 1) and the Housing Variant (Variant 2).

The total amount of park acreage with the Housing/R&D Variant (Variant 2A) would be 326.6 acres, which represents a decrease of approximately 10 acres as compared to the Project (which would provide 336.4 acres) and about 22.8 acres less than the Housing Variant (Variant 2) (which would provide 349.4 acres) because of increased development on the stadium site.

2 Approach

To develop reasonable water demand estimates for the CP/HPS development the following steps were taken.

1) The Project Variant was divided into land uses as shown in Table 1.

2) A **Historical Benchmark** demand was estimated for each land use based on a series of assumptions and references. Key references used were:

    a. The Urban Water Management Plan for the City of San Francisco

    b. The SFPUC Wholesale Customer Demand Projections Technical Report (URS, 2004)

c. The City of Los Angeles CEQA Threshold Guide, 2006

d. The EPA, Onsite Wastewater Treatment Systems Manual, 2002

A number of other references were also used and these are provided at the end of this memorandum. Arup collected information from a number of sources and selected a method of estimating demands that we believed to be appropriate and reasonable for the area. Assumptions and references are provided in Section 4.

3) The demands were then distributed between indoor and outdoor end uses which were estimated based on published data in the SFPUC Wholesale Customer Demand Projections Report (URS 2004). End use distributions for the stadium and performance venues were assumed rather than taken directly from the SFPUC's projections. The distribution ratios are provided in Table 8 and Table 9.

4) Next, the Historical Benchmark was adjusted to an **Adjusted to California Codes** scenario using new fixture flow rates from California and Federal Buildings standards as well as the International Plumbing Code.

5) The Adjusted to California Codes demand estimate does not include the requirements of the **San Francisco Green Building Ordinance (SFGBO)**. The SFGBO is based on LEED for New Construction (LEED NC) and requires a 50% reduction in landscape irrigation demands. The SFGBO does not specify what code is to be used as the baseline for irrigation demands. Therefore the current code was assumed to be equivalent to the irrigation amount allowed under the California Water Efficient Landscape Ordinance. This rule was assumed to be applicable to both private and public landscape irrigation. In addition, the SFGBO requires a 30% reduction in potable water demand. The SFGBO does not provide specific language as to which portions of demand are to be included in the 30% reduction. However, the intention of the similar LEED NC credit (Water Efficiency Credit 3) is to reduce building water demand by 30%. The total 30% reduction in building water efficiency may be achieved by any number of means including improved fixture efficiency, mechanical building efficiency, or by providing an alternative water supply. The demand estimates, when adjusted for the SFGBO represent the final demands for the Proposed Project and Project Variants.

   The SFGBO demand was developed by using the California code as a baseline and using a trajectory or possible means of water saving strategies and/or alternative water supplies to achieve the SFGBO. The assumptions and references used to make these adjustments are provided in Table 10.

6) Potential reclaimed water demands as well as sewage generation were determined based on end use distributions.

The results of the study are presented at the beginning of this report. References and Assumptions used for making the demand estimations are provided after the results in Section 3.

Table 1: CP/HPS Land Use Program (Housing/R&D Variant)

		Hunters Point Shipyard	Candlestick Point	Project Total
Land Use				
Residential				
	Density, 15-75 units per acre (units)	1,320	940	2,260
	Density, 50-125 units per acre (units)	2,185	3,855	6,040
	Density, 100-175 units per acre (units)	460	270	730
	Density, 175-285 units per acre (units)	310	1,160	1,470
	Total Project (units)	**4,275**	**6,225**	**10,500**
Retail				
	Regional Retail (sqft))	0	635,000	635,000
	Neighborhood Retail (sqft)	125,000	125,000	250,000
	Total (sqft)	**125,000**	**760,000**	**885,000**
Office (sqft)		0	150,000	150,000
Community Uses (sqft)		50,000	50,000	100,000
Research & Development (sqft)		3,000,000	0	3,000,000
Hotel (sqft)		0	150,000	150,000
Artist's Studios				
	1:1 Studio Renovation & Replacement (sqft)	225,000	0	225,000
	New Artist Center (sqft)	30,000	0	30,000
	Total (sqft)	**255,000**	**0**	**255,000**
Parks & Open Space				
	New City Parks (acres)	150.9	8.1	159
	New Sports Fields & Active Recreation (acres)	70.9	0	70.9
	New Open Space and Restored State Parkland (acres)	0	96.7	96.7
	Total (acres)	**221.8**	**104.8**	**326.6**
Football Stadium (seats)		0	0	0
Performance Venue (seats)		0	10,000	10,000

3 Results

This section provides the results of the water demand assessment. The results are provided by land use as well as by end use (fixture type). The overall results for the proposed project are summarized by Figure 1.

Figure 1 provides the Variant 2A demands for the Historical Benchmark, the Adjusted to California Codes and the San Francisco Green Building Ordinance cases. It also illustrates the Sustainable Case trajectory defined by the step down line. The first five steps in the "Sustainable Case" step-down graph are demand reduction strategies while the later five steps are achieved by utilizing alternative water supplies. Additional demand breakdowns by land use and end use are provided in Table 2 through Table 4. Reclaimed water demands and sanitary flows by end use for the Proposed Project are provided in Table 5 through Table 6.

Figure 1: Water demand results summary (Housing/R&D Variant)

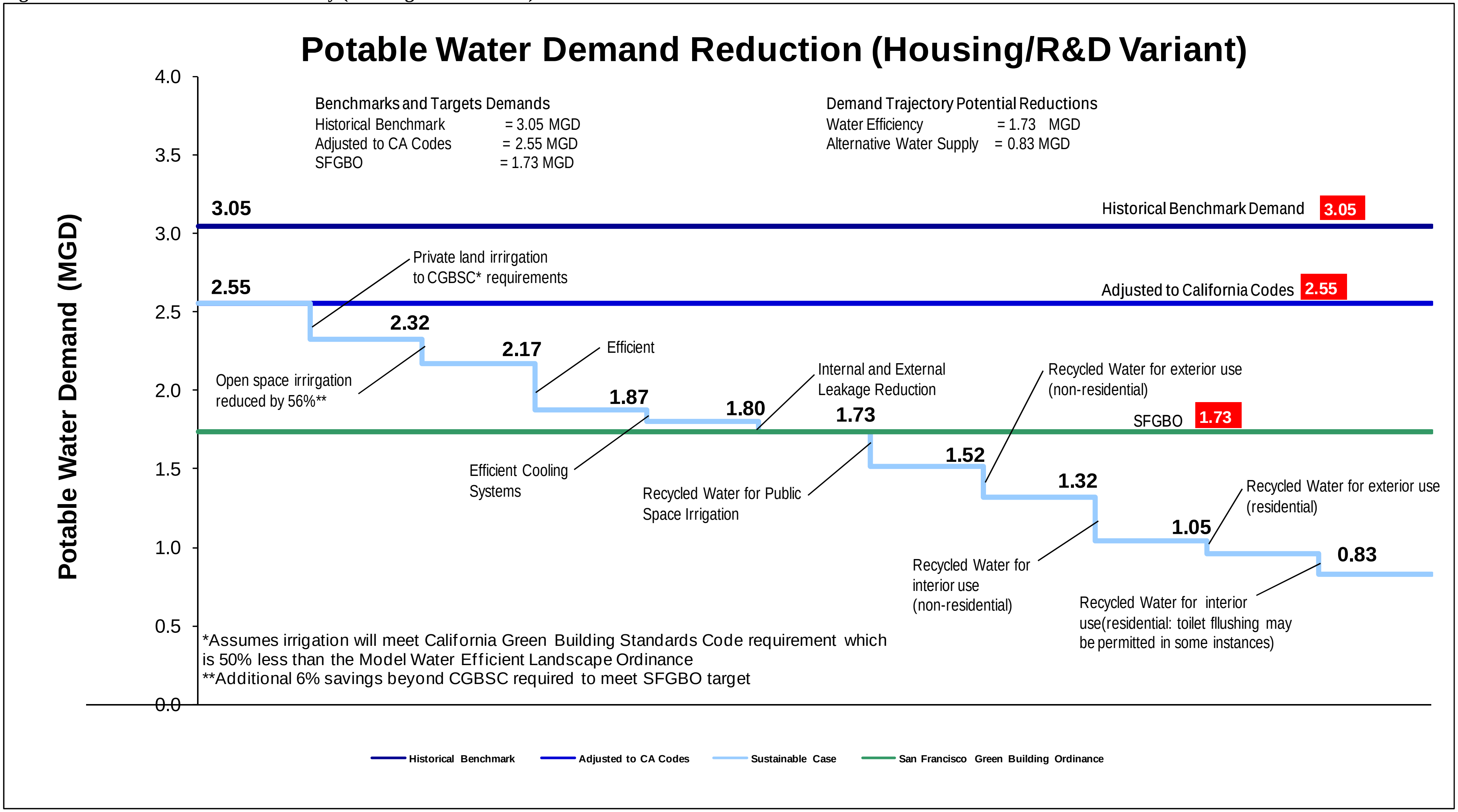

Table 2: Historical Benchmark demand by land use and end use – Housing/R&D Variant

Land Use	Historical Benchmark Demand (MGD)		
	Candlestick Point	Hunters Point	Total Development
Residential	0.90	0.62	1.52
Hotel	0.08	0.00	0.08
Office	0.07	0.01	0.08
Artist Studios	0.00	0.03	0.03
Research and Development	0.00	0.73	0.73
Neighborhood Retail	0.03	0.03	0.06
Regional Retail	0.13	0.00	0.13
Community Uses	0.02	0.02	0.03
Football Stadium	0.00	0.00	0.00
Performance Venue	0.04	0.00	0.04
Total demand excluding Parks and Open Space	**1.25**	**1.42**	**2.68**
Parks and Open Space	0.11	0.25	0.36
Total Demand	**1.36**	**1.67**	**3.04**
End Use	**Candlestick Point**	**Hunters Point**	**Total Development**
Indoor Uses			
Toilets (low density residential)	0.03	0.05	0.08
Toilets (med-high density Residential)	0.19	0.10	0.29
Toilets (all other uses)	0.05	0.11	0.17
Urinals	0.01	0.01	0.02
Laundry (low density residential)	0.02	0.04	0.06
Laundry (medium and high density residential)	0.15	0.08	0.23
Laundry (all other uses)	0.02	0.03	0.05
Shower	0.15	0.12	0.27
Bath	0.01	0.01	0.02
Faucets	0.15	0.14	0.29
Process Water	0.05	0.15	0.20
Dishwashers	0.03	0.04	0.07
Internal Leakage	0.13	0.12	0.26
Other domestic	0.03	0.01	0.04
Subtotal	**1.04**	**1.02**	**2.05**
Outdoor Uses			
Irrigation and landscaping	0.16	0.30	0.46
Pools and Fountains	0.01	0.01	0.02
Wash down of houses and facilities	0.01	0.01	0.02
Car Washing	0.00	0.00	0.01
Cooling	0.02	0.06	0.08
External Leakage	0.01	0.02	0.03
Subtotal	**0.22**	**0.41**	**0.62**
Total excluding Parks and Open Space	**1.25**	**1.42**	**2.68**
Parks and Open Space	0.11	0.25	0.36
Total Demand	**1.36**	**1.67**	**3.04**

*Note: Rounding errors may occur.

Table 3: Adjusted to CA Codes demand by land use and end use- Housing/R&D Variant

Land Use	Adjusted to Codes BAU Demand (MGD) Candlestick Point	Hunters Point	Total Development
Residential	0.69	0.47	1.16
Hotel	0.07	0.00	0.07
Office	0.06	0.01	0.07
Artist Studios	0.00	0.02	0.02
Research and Development	0.00	0.65	0.65
Neighborhood Retail	0.02	0.02	0.05
Regional Retail	0.12	0.00	0.12
Community Uses	0.01	0.01	0.03
Football Stadium	0.00	0.00	0.00
Performance Venue	0.02	0.00	0.02
Total demand excluding Parks and Open Space	**1.00**	**1.18**	**2.18**
Parks and Open Space	0.11	0.25	0.36
Total Demand	**1.11**	**1.43**	**2.54**
End Use	**Candlestick Point**	**Hunters Point**	**Total Development**
Indoor Uses			
Toilets (low density residential)	0.01	0.02	0.03
Toilets (med-high density Residential)	0.08	0.05	0.13
Toilets (all other uses)	0.02	0.05	0.08
Urinals	0.01	0.01	0.01
Laundry (low density residential)	0.02	0.03	0.04
Laundry (medium and high density residential)	0.11	0.06	0.17
Laundry (all other uses)	0.01	0.02	0.03
Shower	0.12	0.09	0.21
Bath	0.01	0.01	0.02
Faucets	0.14	0.12	0.26
Process Water	0.05	0.15	0.20
Dishwashers	0.02	0.03	0.06
Internal Leakage	0.13	0.12	0.26
Other domestic	0.03	0.01	0.04
Subtotal	**0.78**	**0.78**	**1.56**
Outdoor Uses			
Irrigation and landscaping	0.16	0.30	0.46
Pools and Fountains	0.01	0.01	0.02
Wash down of houses and facilities	0.01	0.01	0.02
Car Washing	0.00	0.00	0.01
Cooling	0.02	0.06	0.08
External Leakage	0.01	0.02	0.03
Subtotal	**0.22**	**0.41**	**0.62**
Total excluding Parks and Open Space	**1.00**	**1.19**	**2.18**
Parks and Open Space	0.11	0.25	0.36
Total Demand	**1.11**	**1.45**	**2.54**

*Note: Rounding errors may occur.

Table 4: SFGBO demands by land use and end use – Housing/R&D Variant

Land Use	SFGBO (MGD)		
	Candlestick Point	Hunters Point	Total Development
Residential	0.48	0.35	0.83
Hotel	0.05	0.00	0.05
Office	0.04	0.00	0.04
Artist Studios	0.00	0.01	0.01
Research and Development	0.00	0.43	0.43
Neighborhood Retail	0.02	0.02	0.03
Regional Retail	0.08	0.00	0.08
Community Uses	0.01	0.01	0.02
Football Stadium	0.00	0.00	0.00
Performance Venue	0.01	0.00	0.01
Total demand excluding Parks and Open Space	**0.70**	**0.82**	**1.52**
Parks and Open Space	0.06	0.15	0.22
Total Demand	**0.76**	**0.97**	**1.73**
End Use	**Candlestick Point**	**Hunters Point**	**Total Development**
Indoor Uses			
Toilets (low density residential)	0.01	0.02	0.03
Toilets (med-high density Residential)	0.07	0.04	0.11
Toilets (all other uses)	0.02	0.04	0.06
Urinals	0.00	0.00	0.00
Laundry (low density residential)	0.01	0.02	0.03
Laundry (medium and high density residential)	0.08	0.04	0.12
Laundry (all other uses)	0.01	0.02	0.02
Shower	0.08	0.07	0.15
Bath	0.01	0.01	0.02
Faucets	0.09	0.08	0.19
Process Water	0.04	0.11	0.15
Dishwashers	0.02	0.02	0.04
Internal Leakage	0.10	0.09	0.19
Other domestic	0.02	0.01	0.03
Subtotal	**0.56**	**0.57**	**1.10**
Outdoor Uses			
Irrigation and landscaping	0.08	0.16	0.24
Pools and Fountains	0.01	0.01	0.02
Wash down of houses and facilities	0.01	0.01	0.02
Car Washing	0.00	0.00	0.01
Cooling	0.01	0.05	0.06
External Leakage	0.01	0.02	0.02
Subtotal	**0.13**	**0.25**	**0.37**
Total excluding Parks and Open Space	**0.70**	**0.82**	**1.52**
Parks and Open Space	0.06	0.15	0.22
Total Demand	**0.76**	**0.97**	**1.73**

*Note: Rounding errors may occur.

Potential reclaimed water demands and sanitary flows by end use were estimated for the Proposed Project and Project Variants. These are provided below in Table 5 through Table 6.

Table 5: Reclaimed water demands by end use – Housing/R&D Variant

End Use	Reclaimed Water Demands by End Use (MGD)		
	Historical Benchmark	Adjusted to Codes BAU	SFGBO
Toilets (residential)	0.36	0.17	0.13
Toilets (non-residential))	0.17	0.08	0.06
Urinals	0.02	0.01	0.00
Process Water (non-residential)	0.20	0.20	0.15
Irrigation and landscaping (residential)	0.12	0.12	0.06
Irrigation and Landscaping (non-residential)	0.34	0.34	0.17
Pools and Fountains (residential)	0.01	0.01	0.01
Pools and Fountains (non-residential)	0.01	0.01	0.01
Wash down (residential)	0.01	0.01	0.01
Wash down (non-residential)	0.01	0.01	0.01
Car Washing (residential)	0.01	0.01	0.01
Car Washing (non-residential)	0.00	0.00	0.00
Cooling (non-residential)	0.08	0.08	0.06
Total flow excluding Parks and Open Space	**1.35**	**1.05**	**0.69**
Parks and Open Space	0.37	0.37	0.22
Total Demand	**1.72**	**1.42**	**0.90**

*Note: Rounding errors may occur.

Table 6: Sanitary flows by end use – Housing/R&D Variant

End Use	Sanitary Flows by End Use (MGD)		
	Historical Benchmark	Adjusted to CA Codes	SFGBO
Toilets	0.53	0.24	0.19
Urinals	0.02	0.01	0.00
Laundry	0.34	0.25	0.17
Shower	0.27	0.21	0.15
Bath	0.02	0.02	0.02
Faucets	0.29	0.26	0.19
Process Water	0.20	0.20	0.15
Dishwashers	0.07	0.06	0.04
Other domestic	0.04	0.04	0.03
Cooling (50% flow to sewer)	0.08	0.08	0.06
Total	**1.88**	**1.38**	**1.01**

*Note: Rounding errors may occur.

4 Assumptions and References

This section describes assumptions used to:

1) Estimate historical baseline demands;
2) Distribute the historical baseline demands to specific end uses such as toilets, showers, irrigation etc…;
3) Adjust the historical baseline demands to current California code; and
4) Adjust the to-code demands to a sustainable case wherein efficiency measures such as efficient fixtures are applied. The efficiency measures applied in the Sustainable Case have been tailored to meet the demand reduction requirements of the SFGBO.

Table 7: Assumptions for estimating water demands by land use for the Historical Benchmark case .

Assumptions Summary for Historical Benchmark Demand Estimation						
Land use	**ID#**	**Description**	**Value**	**Unit**	**Reference or Assumption**	**Notes**
Residential						
	1	No. of residents per unit - low density	2.33	residents	Mundie & Associates, 2009	
	2	No. of residents per unit - medium density	2.33	residents	Mundie & Associates, 2009	
	3	No. of residents per unit - high density	2.33	residents	Mundie & Associates, 2009	
	4	Average consumption per capita	62	gallons per day (gp)	SFPUC, 2005	
	5	Average outdoor water use for single family residences	10	%	SFPUC, 2005	Note reference states that average demand is less than 10%
Regional Retail						
	1	Regional Retail jobs creation	350	Square feet (sqft)/job	Economic and Planning Systems, 2009.	
	2	Area of retail space per customer	22	sqft/customer	British Standards Institution. 2006	
	3	Sewage generation per employee	10	gpd	EPA, 2002	Sewage generation is only a fraction of overall consumption
	4	Sewage generation per visitor	2	gpd	EPA, 2002	EPA sites 2 gpd / parking spot. Sewage generation is only a fraction of overall consumption
	5	Average outdoor water use for non-residential customers	43	percent	URS, 2004.	
	6	Ratio of sewage generation to total water consumed on site	57	percent	Assumed based on URS 2004.	Required to convert sewage generation to total water consumption. Conservative in that a small portion of water consumed indoors would not go to sanitary sewer

Neighborhood Retail						
	1	Neighborhood retail jobs creation	270	sqft/job	Economic and Planning Systems, 2009.	
	2	Area of retail space per customer	22	sqft/customer	British Standards Institution. 2006	
	3	Sewage generation per employee	10	gpd	EPA, 2002	Sewage generation is only a fraction of overall consumption
	4	Water generation per visitor	2	gpd	EPA, 2002	EPA sites 2 gpd / parking spot. Sewage generation is only a fraction of overall consumption
	5	Average outdoor water use for non-residential customers	43	percent	URS, 2004.	Sewage generation is only a fraction of overall consumption
	6	Ratio of sewage generation to total water consumed on site	57	percent	Assumed based on URS 2004.	Required to convert sewage generation to total water consumption. Conservative in that a small portion of water consumed indoors would not go to sanitary sewer
Office						
	1	Office job creation	276	sqft/job	Economic and Planning Systems, 2009.	
	2	Residential jobs creation	25	Units/job	Economic and Planning Systems, 2009.	
	3	Water consumption per employee	85	gpd	URS, 2004.	
	4	Average outdoor water use for non-residential customers	43	percent	URS, 2004.	
	5	Ratio of sewage generation to total water consumed on site	57	percent	Assumed based on URS 2004.	Required to convert sewage generation to total water consumption. Conservative in that a small portion of water consumed indoors would not go to sanitary sewer
Community Uses						

	1	Community use job creation	276	sqft/job	Assumed similar to office	Actual Community uses are not finalized therefore community use water demands have been estimated in a similar manner as office land use.
	2	Water consumption per employee	85	gpd	Assumed similar to office	
	3	Average outdoor water use for non-residential customers	43	percent	Assumed similar to office	
	4	Ratio of sewage generation to total water consumed on site	57	percent	Assumed similar to office	Required to convert sewage generation to total water consumption. Conservative in that a small portion of water consumed indoors would not go to sanitary sewer
Research and Development						
	1	R&D jobs creation (office)	267	sqft/job	Economic and Planning Systems, 2009.	
	2	Sewage generation per employee for office R&D space	85	gpd	URS, 2004.	Sewage generation is only a fraction of overall consumption
	3	Average outdoor water use for non-residential customers for all R&D	43	percent	URS, 2004.	Sewage generation is only a fraction of overall consumption
	4	Ratio of sewage generation to total water consumed on site	57	percent	Assumed based on URS 2004.	Assumption is conservative in that some water consumed indoors would not go to sanitary sewer
	5	Type of R&D Spaces	1/3,1/3, and 1/3	Fraction	Email from Lennar	From email correspondence with Lennar it has been assumed that 1/3 of the R&D space will be office, 1/3 will be wet laboratory, and the remaining 1/3 will be light production which is similar to industrial.
	6	Water Usage for Wet Laboratory R&D Space	0.547	gpsfd	2020 UC Berkeley LRDP Draft EIR (http://www.cp.berkeley.edu/LRDP_2020 draft.htm) - Table 4.13-1	Source provided by Winzler & Kelly. The report states that 0.32 is for sustainable lab case with efficient fixtures built in, and calculations were worked backwards to calculate the BAU.
	7	Water usage profile for	Varies	%	URS, 2004	The water usage profile for wet lab

		Wet Lab Space				space has been assumed to be the average of the commercial and industrial usage profile.
	8	Water Usage for Light Projection R&D Space	0.1	gpsfd	City of Los Angeles, L.A. CEQA Threshold Guide, 2006, Exhibit M.2. - 12 Sewage Generation Factors	
Hotel						
	1	Hotel job creation	700	sqft/job	Economic and Planning Systems, 2009	
	2	Average guest room size	600	sqft	Assumed	This includes the space for reception, kitchens and conference facilities
	3	Average guests / room	1.9	guests	Assumed	
	4	Sewage generation per guest	50	gpd	EPA, 2002	Sewage generation is only a fraction of overall consumption
	5	Sewage generation per employee	10	gpd	EPA, 2002	Sewage generation is only a fraction of overall consumption
	6	Average outdoor water use for non-residential customers	43	percent	URS, 2004.	Sewage generation is only a fraction of overall consumption
	7	Ratio of sewage generation to total water consumed on site	57	percent	Assumed based on URS 2004.	Required to convert sewage generation to total water consumption. Conservative in that a small portion of water consumed indoors would not go to sanitary sewer
Artist Studios						
	1	# of artists	252	people	Lennar, 2009	
	2	Consumption per artist	85	gpd	URS, 2004.	
Parks and Open Space						
	1	Total irrigation demand from landscape architect	350,180	gpd	Per landscape irrigation prepared by RHAA 7/31/08	
Football Stadium						
	1	Football games / year	10	Home games	Economic and Planning Systems, 2009.	
	2	Attendance at football games	69000	people	Economic and Planning Systems, 2009.	

	3	Other venues per year	20	Other venues	Economic and Planning Systems, 2009.	
	4	Attendance at other venues	37500	people	Lennar, 2009	
	5	Employees (football day)	3625	people	Stadium Staffing Numbers from SF 49ers, (Lennar, 2009)	Includes 2900 employees and 725 media personnel
	6	Employees (event day)	1,922	people	Pro-rated using football day attendance and employees on football days	
	7	Employee (nonevent days)	48	people	Stadium Staffing Numbers from SF 49ers, (Lennar, 2009)	
	8	No. of players/performers (event day)	200	people	Assumed	100 people per team for players and staff. Assumed same number for other event days
	9	Stadium average daily irrigation	23979	gpd	Marty Laporte, 2009	
	10	Sewage generation per seat and employee on game days	4	gpd	EPA, 2002.	EPA value is for "auditorium" Sewage generation is only a fraction of overall consumption
	11	Ratio of sewage generation to indoor water consumption	95	percent	Assumed based on URS 2004.	Required to convert sewage generation to total water consumption. Conservative in that a small portion of water consumed indoors would not go to sanitary sewer
	12	Water consumption per permanent employee per day	85	gpd	URS, 2004.	
Performance Venue						
	1	Performance venue job creation	40	seats/job	Economic and Planning Systems, 2009.	
	2	Performance events per year	250	events	Economic and Planning Systems, 2009.	
	3	Employees - typical day	7	people	Assumed	Prorated to be similar to stadium
	4	Visitors per performance	10,000	people	Per CP/HPS development program, 2009	

	6	Water consumption per permanent employee per day	85	gpd	URS, 2004.	
	7	Sewage generation per seat and employee on event days	4	gpd	EPA, 2002.	EPA value is for "auditorium". Sewage generation is only a fraction of overall consumption
	12	Ratio of sewage generation to indoor water consumption	95	percent	Assumed based on URS 2004.	Required to convert sewage generation to total water consumption. Conservative in that a small portion of water consumed indoors would not go to sanitary sewer
Sanitary Sewer						
	1	Percent of indoor consumption to sanitary sewer	100%	Percent	Assumed per URS 2004 and conversations with W&K	
	2	Cooling demands assumed to contribute to sanitary sewer. (Non Res)			Assumed per conversations with W&K	Though some losses may occur, 100% of cooling demand is assumed to go to sanitary sewer

Table 8: End use demand distributions by land use (URS 2004)

Table 3-3
End-Use Data - Initial Percentage Assumptions

End Use	Initial Percentages by Customer-Billing Category				
	Single-Family Residential	Multi-Family Residential	Commercial	Industrial	Institutional
Indoor Usage					
Toilets (indoor)	26.7%	26.7%	25%	23%	20%
Urinals (indoor)	NA	NA	0%	7%	0%
Laundry (indoor)	21.7%	21.7%	8%	5%	10%
Showers (indoor)	16.8%	16.8%	5%	5%	16%
Bath (indoor)	1.7%	1.7%	NA	NA	NA
Faucets (indoor)	15.7%	15.7%	10%	15%	19%
Process (indoor)	NA	NA	34%	30%	5%
Dishwashers (indoor)	1.4%	1.4%	8%	5%	15%
Internal Leakage (indoor)	13.7%	13.7%	10%	10%	15%
Other Domestic (indoor)	2.2%	2.2%	NA	NA	NA
Outdoor Usage					
Irrigation and Landscaping (outdoor)	80%	80%	75%	65%	70%
Pools and Fountains (outdoor)	5%	5%	2%	5%	5%
Wash-down of house/facilities (outdoor)	5%	5%	3%	0%	5%
Car Washing (outdoor)	5%	5%	0%	0%	0%
Cooling (outdoor)	0%	0%	15%	25%	15%
External Leakage (outdoor)	5%	5%	5%	5%	5%

NA – Not Applicable

Sources: AWWARF, Konen (1986), Bohling et al. (1992)

Table 9: Assumed end use distributions for the stadium and performance venue

Indoor Usage	%	95%
Outdoor Usage	%	5%
Indoor Uses		
Toilets	%	30%
Urinals	%	30%
Laundry	%	0%
Shower	%	5%
Bath	%	0%
Faucets	%	15%
Process Water	%	10%
Dishwashers	%	0%
Internal Leakage	%	10%
Other domestic	%	0%
Outdoor Uses		
Irrigation and landscaping	%	20%
Pools and Fountains	%	0%
Wash down of houses and facilities	%	20%
Car Washing	%	0%
Cooling	%	50%
External Leakage	%	10%

Table 10: Assumptions used to adjust between water demand scenarios

	Historical Benchmark		Adjusted to CA Code		SFGBO		
	Max Flow or Quantity	Note / Reference	Max Flow or Quantity	Note / Reference	Max Flow or Quantity	Note/Reference	Unit
Plumbing Fixture							
Lavatory faucet, private	2.5		2.2	2007 California Plumbing Code	1.5	EPA WaterSense	gpm at 60 psi
Lavatory faucet, public, (metering)	0.25		0.25	2006 International Plumbing Code	0.2	CA Green Building Standard 2008	gallon per metering cycle
(not metering)	0.6		0.5	IPC	0.5	n.a.	gpm at 60 psi
Shower head	3.125	URS 2004*	2.5	2007 California Plumbing Code	1.75	EPA WaterSense	gpm at 80 psi
Sink faucet	2.5		2.2	Plumbing Code	1.5	EPA WaterSense	gpm at 60 psi
Urinal	2	URS 2004*	1	2007 California Plumbing Code	0.125	EPA Water Sense	gallon per flushing cycle
Water closet	3.5	URS 2004*	1.6	2007 California Plumbing Code	1.28	EPA Water Sense and CA Green Building Standard 2008	gallon per flushing cycle
Other Appliances							
Dishwasher (Residential)	7		6	US Department of Energy 2007	4	Energy Star	gallons/cy capacity
Dishwasher (Commercial)	1.75		1.46	Energy Star	0.92	Energy Star	gallons per rack
Laundry	36.4	URS 2004	26	(US Federal Standard by 2011)	18	n.a. (calc)	gal/load
Laundry	13.2		8.5	CA Green Building Standard 2008	6	EPA Water Sense	gal/load-cf (Water Factor)
Irrigation							
Private Lands		Based on water demand distribution		California Water Efficient Landscape Ordinance (CWELO)	50%	CA Green Building Standard 2008	Fractional reduction compared to CWELO
Public Open Space		Per Landscape Architect Estimates		Per Landscape Architect Estimates - Note that this is less than CWELO	50%	CA Green Building Standard 2008	Fractional reduction compared to CWELO

Table 11: Other assumptions used to adjust the CA code demand to the SFGBO

Improved Cooling Efficiency		
Total fraction demand reductiont due to building envelope improvement measures and improved cooling technologies	0.25	
Reduced Losses		
Fractional demand reduction due to new piping and metering	0.25	

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Appendix T4

ENVIRON, Updated Air Quality Analysis Candlestick Point–Hunters Point Shipyard Phase II Development Plan—Updated Variants 2A and 3 (Tower Variant D), Alternative 2, and Subalternative 4A, April 26, 2010

ENVIRON

April 26, 2010

MEMORANDUM

To: Alison Rondone, PBS&J
Michael Rice, PBS&J
Kimberly Avila, PBS&J

Cc: Therese Brekke, Lennar Urban

From: Michael Keinath, ENVIRON
Elizabeth Miesner, ENVIRON
Shari Libicki, ENVIRON

Subject: Updated Air Quality Analysis
Candlestick Point-Hunter's Point Shipyard Phase II Development Plan – Updated Variants 2A and 3 (Tower Variant D), Alternative 2, and Subalternative 4A

On March 1 and 8, 2010, ENVIRON received information from PBS&J regarding the revised Variant 2A, Variant 3 (Tower Variant D), Alternative 2 and Subalternative 4A for the Candlestick Point-Hunter's Point Shipyard Phase II Development Plan (CP-HPS). This memorandum discusses the impact of the revised variants and alternatives with respect to the ambient air quality (AAQ) human health risk assessments (HHRA) presented as Appendix H of the Draft Environmental Impact Report (DEIR).

Below we list our understanding of the changes to the variants and alternatives as well as a brief discussion of how those impacts may affect our previous analyses:

- Variant 2A update proposes a shift of 275 residential units from Candlestick Point (CP) to Hunter's Point Shipyard (HPS) and an additional 500,000 square feet of Research and Development (R&D) buildings to HPS. Since Variant 2A has changes to the location of the R&D areas, we evaluated this new location with respect to the impact this location would have on new residents located adjacent to the new R&D area. Since the R&D uses also increase in square footage, the traffic associated with this Variant was evaluated by Fehr & Peers. We evaluated the traffic with respect to the traffic $PM_{2.5}$ and cumulative risk analysis presented in the air quality section (Section III.H) of the Final EIR. These new analyses are discussed in the next section.

- Variant 3 (Tower Variant D) changes the size of floor plates and tower locations. Since Variant 3 (Tower Variant D) does not result in any change in number of dwelling units or square footage of non-residential space, there will be no changes to the impacts discussed in the DEIR.

- Alternative 2 is a no bridge scenario which could be applied to the Project or any of the Variants. As the footprint of development, the total amount of development, and the land uses provided with Alternative 2 would be virtually the same as the Project or any of the

Variants, air quality impacts of Alternative 2 would also be the same as the Project or Variants.

- o Subalternative 4A allows for historic preservation of buildings. This alternative does not result in any total square footage change in R&D space, only use of historic buildings for R&D uses with an increase in the height of new R&D buildings to accommodate this use. As the land use plan is the same as the Project, there will be no change from the impacts discussed for the Project or its Variants.

Variant 2A Update

Compared to the Project, Variant 2A proposes an additional 500,000 square feet of R&D at Hunter's Point Shipyard (in an area designated by the HPS Redevelopment Plan as Hunter's Point South), located to the west of residential uses that would be constructed instead of the 49ers Stadium. For the purposes of this analysis of Variant 2A, we refer to this area of 500,000 square feet of R&D as "Stadium R&D," which is the R&D areas south of Crisp Road in the Hunter's Point South region. The HPS Redevelopment Plan states "no Laboratory, Life Sciences, Light Industrial, and/or Green Technology uses containing a facility that emits regulated toxic air contaminants shall be permitted within 350 feet of any residential use south of Crisp Road in Hunters Point South."

Since this additional R&D, the Stadium R&D, is located in an area not previously evaluated in the DEIR, we evaluate it here considering the 350-foot restriction presented in the HPS Redevelopment Plan. Additionally, this R&D increase in square footage causes an increase in traffic associated with this Variant, which we also evaluate to update the traffic $PM_{2.5}$ and cumulative analyses presented in our technical memorandum dated April 20, 2010 and entitled "Cumulative Risk Impact and San Francisco Health Code Article 38 Analyses, Candlestick Point – Hunter's Point Shipyard Phase II Redevelopment Project."

Location of Additional R&D

We evaluated the additional 500,000 square feet of R&D using the methodology described in DEIR Appendix H1, Attachment III: Analysis of Toxic Air Contaminant (TAC) Emissions from Stationary Sources in Research & Development (R&D) Areas (herein referred to as "App. H1-III").

Land use designations, as shown in the Final EIR, were used in this analysis to identify the locations of the Stadium R&D and residential nearby receptors. As discussed in App. H1-III, in order to determine the number of potential TAC emission sources, this additional Stadium R&D area was subdivided into twelve roughly one acre sites (shown in Figure 1, attached), which is consistent with the minimum size of a parcel based on the expected uses at the Project. For this analysis, it was assumed that each site contained one air emission source located at the centroid of each site; however, this evaluation also considered the HPS Redevelopment Plan which states that facilities south of Crisp Road that emit regulated air toxics shall not be permitted within 350 feet of any residential land use in HPS South. Figure 1 shows the locations of the parcels which meet the restriction on TAC sources. Specifics of the source parameters for each source as well as the air dispersion modeling methodology are presented in App. H1-III. Additionally, the specific approaches described in App. H1-III have been developed into mitigation measures AQ-6.1 and AQ-6.2. This analysis assumes these two mitigation measures are adopted.

As shown in Figure 2, with the 350 feet buffer area, areas which exceed the health risk threshold (10 in a million) do not extend beyond the boundary of the R&D area into areas zoned for residential use. Further evaluation may be warranted if land use in the vicinity of the Project is modified or if the placement of the stationary sources do not conform to the assumptions made in this screening-level analysis.

Traffic Modification

The traffic changes for Variant 2A were evaluated with respect to the traffic $PM_{2.5}$ and cumulative risk analysis presented in the air quality section (Section III.H) of the Final EIR.

The traffic data provided by Fehr & Peers shows that, compared to the Project, Variant 2A will generate slightly more traffic on the Hunter's Point Shipyard side of the Project. This is expected since Variant 2A assumes additional R&D and housing unit on HPS, which results in additional weekday traffic. There appear to be approximately 10% increases in traffic on Innes and Evans Avenues. Other streets including Palou, Revere, Thomas, and Van Dyke Avenues each have approximately 5%-10% of traffic increases. However, there is the same or slightly decreased traffic on the Candlestick Point side of the Project. The only exception is Ingerson Avenue, which has an 18% traffic increase.

We evaluated the potential impact of the traffic changes to health risk from cumulative sources. The previous cumulative risk impact analysis shows that the highest cumulative cancer risk at the residential receptors at the Hunter's Point Shipyard is 0.9 in a million for the Project scenario. The 10% traffic increase will lead to a cumulative cancer risk of about 1.0 in a million, which is well below the threshold of 100 in a million. Similarly, for the evaluation of the Project traffic, the highest cumulative $PM_{2.5}$ concentration at the residential receptors at the Hunter's Point Shipyard is approximately 0.022 ug/m^3. The 10% increase will lead to a $PM_{2.5}$ concentration of 0.024 ug/m^3, which is well below the San Francisco Health Code Article 38 threshold of 0.2 µg/m^3. Therefore, housing at HPS would not be required to install filtration, which is consistent with the findings for the Project.

On the Candlestick Point side of the Project, since traffic on Ingerson Avenue is small compared to the traffic on other nearly streets (e.g., Gilman Ave, or Jametown Avenue), the impact of its traffic increase will be counteracted by the traffic decrease from other streets. Overall, there will not be a significant change to health risks or hazards or $PM_{2.5}$ concentrations for Variant 2A.

Therefore, compared to the Project, Variant 2A will have a similar cumulative risk impact.

Attachments:

Figure 1 – Locations of Potential TAC Source
Figure 2 – Locations of Potential Exceedances

ENVIRON

6001 Shellmound St., Suite 700, Emeryville, CA 94608

Locations of Potential TAC Sources
Variant 2A - Housing
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure
1

Drafter: Date: Contract Number: Approved: Revised:

ENVIRON

6001 Shellmound St., Suite 700, Emeryville, CA 94608

Locations of Potential Exceedances
Variant 2A - Housing
Candlestick Point - Hunters Point Shipyard Phase II Development Plan
San Francisco, California

Figure

2

Drafter: Date: Contract Number: Approved: Revised:

Appendix T5 ENVIRON, Updated Greenhouse Gas Emissions Calculation for Candlestick Point–Hunters Point Shipyard Phase II Development Plan—Variants 2A and 3 (Tower Variant D), Alternative 2, and Subalternative 4A, March 12, 2010

ENVIRON

March 12, 2010

MEMORANDUM

To: Alison Rondone, PBS&J
Michael Rice, PBS&J
Kimberly Avila, PBS&J

Cc: Therese Brekke, Lennar Urban

From: Shari Libicki, ENVIRON
Jennifer Schulte, ENVIRON
Kai Zhao, ENVIRON

Subject: Updated Greenhouse Gas Emissions Calculation for Candlestick Point-Hunters Point Shipyard Phase II Development Plan – Variants 2A, 3 (Tower Variant D), Alternative 2, and Subalternative 4A

On March 1 and 8, 2010, ENVIRON received from PBS&J information regarding the revised Variant 2A, Variant 3 (Tower Variant D), Alternative 2 and Subalternative 4A for the Candlestick Point-Hunter's Point Shipyard Phase II Development Plan (CP-HPS). This memorandum discusses the effect of these variants and alternatives with respect to climate change and greenhouse gas (GHG) emissions. Variant 2A proposes a shift of 275 residential units from Candlestick Point (CP) to Hunter's Point Shipyard (HPS) and an additional 500,000 square feet of Research and Development (R&D) buildings to HPS. Since Variant 2A has changes in the number of dwelling units and non-residential square footage, there will be changes to the GHG emissions associated with this Variant. These changes are discussed in the next section. Variant 3 (Tower Variant D) changes the size of floor plates[1] and tower locations. Since Variant 3 (Tower Variant D) does not result in any change in number of dwelling units or square footage of non-residential space, there will be no changes to the GHG emissions associated with this Variant compared to the Project. Alternative 2 is a no bridge scenario which could be applied to the Project or any of the Variants. No changes in the GHG emissions reported for the Project, Variants 1, 2 or 2A are anticipated if there is no bridge[2]. Subalternative 4A allows for historic preservation of buildings. This alternative does not result in any total square footage change in R&D space. Since Subalternative 4A does not result in any change in number of dwelling units or square footage, there will be no changes to the GHG emissions associated with this Alternative compared to the Project, Variants 1, 2 or 2A.

---

[1] ENVIRON understands that the increase in floor plate size does not impact the overall footprint of the towers. This change affects the overall aesthetic of the building, but does not change any characteristics associated with energy use per dwelling unit.

[2] ENVIRON utilized an average trip length estimated by Fehr and Peers based on the Caltrans Household Travel Survey for San Francisco County. ENVIRON assumes that there would be no change in average trip length estimated from this source if no bridge was built. The analysis is unable to capture any changes in trip length that may result from changes to travel paths as a result no bridge.

Emissions Update Variant 2A

The greenhouse gas (GHG) emissions associated with the residential, non-residential, mobile, municipal, area, and waste disposal sources are affected by the revision to Variant 2A and have been updated accordingly using the same emissions calculation methodology presented in the original Climate Change Technical Report prepared on October 15, 2009. This section of this memo lists and explains the changes to the emissions calculation in detail and references the similar tables prepared for Variant 2 in the Climate Change Technical Report. The appropriate tables for Variant 2A are included at the end of this memorandum.

a. Residential Sources

Table 3-12 : CO2 Emissions from Electricity and Natural Gas Usage in Residential Dwelling Units with Renewable Portable Standard

Updates: The number of dwelling units in CP was reduced from 6,244 to 5,969 and the number of dwelling units in HPS was increased from 4,000 to 4,275.

b. Non-Resid ential Sources

Table 3-19 : Electricity Usage and Resulting GHG Emissions for Non-Residential Building Types

Updates: The R&D square footage was increased from 2,500,000 to 3,000,000 square feet to account for the proposed addition of 500,000 square feet.

c. Mobile Sources

Table 3-24 : Greenhouse Gas Emissions from Vehicles for the Year 2020: Variant 2 with Paveley Standards

Table 4-4 : Greenhouse Gas Emissions from Vehicles for the Year 2020: No Action Taken for Variant 2

Updates: The residential and non-residential unadjusted daily one-way trips for CP and HPS were updated based on the revised number of residential dwelling units and R&D square footage as provided by the traffic consultants in an email dated March 3, 2010.

d. Area Sources

Table 3-29: GHG Emissions from Area Sources-Hearth Fuel Combustion: Variant 2

Updates: The quantities of dwelling units for CP and HPS with fireplaces was updated.

e. Municipal Sources

Table 3-30 : GHG Emission Factors for Municipal Sources: Variant 2 with Renewable Portfolio Standard

Table 4-7: GHG Emission Factor for Municipal Sources: No Action Taken Variant 2

Updates: The quantities of water and wastewater for CP and HPS were updated based on the estimated water volume provided to ENVIRON on March 8, 2010 from PBS&J for Variant 2A.

f. Waste Disposal

Table 3-32: GHG Emissions from Waste Disposal: Variant 2

Updates: The number of residential units of CP was reduced from 6,244 to 5,969, and the number of residential units was increased for HPS from 4,000 to 4,275.

g. Construction

The GHG emissions associated with construction activities are determined by the overall numbers of construction hours and total worker, vendor, and material/waste transportation trips and are independent of the construction phase length. As the total number of hours and trips are not expected to change considerably for Variant 2A, the GHG emissions associated with construction activities were not revised.

As presented in the revised Table 3-40, the total annualized GHG emissions of Variant 2A after this revision (i.e. 164,163 tonnes per year) are less than 4% higher than those compared to the Project (i.e. 157,104 tonnes per year). With mitigation, Variant 2A-related operational emissions of 161,596 tonnes per year result in 4.6 tonnes CO_2e per service population per year based on a service population of 35,498 (this accounts for 23,869 net new residents and all 11,629 jobs). This is equal to the Bay Area Air Quality Management District (BAAQMD) draft GHG CEQA thresholds published in December of 2009 of 4.6 metric tonnes per service population.

The operational emissions for Variant 2A were compared to ARB Scoping Plan No Action Taken Scenario which assumes the site would be developed without implementation of conceptual design features and using regulations in place at the time of the Scoping Plan development. Compared to the original technical report, the revised Table 4-10 shows a small change of the percentage improvement of GHG emissions over no action taken compared to the Project (i.e. from 51% to 49%). Variant 2A shows large reductions in GHG emissions due to the mitigation measures that would be implemented. The comparison of Variant 2A GHG emissions to the ARB Scoping Plan No Action Taken scenario is shown in Table 4-10. This shows that due to the improvement in electricity carbon intensity and energy efficiency of the buildings residential GHG emissions would have a 20 percent reduction in emissions and non-residential buildings would have a 17 percent reduction in emissions. Municipal sources are anticipated to be 7 percent lower than the ARB Scoping Plan No Action Taken as a result of reductions in electricity carbon intensity. Mobile source emissions associated with Variant 2A are a result of trip reductions in automobiles and vehicle emission efficiency regulations resulting in 57 percent reductions compared to the ARB Scoping Plan No Action Taken scenario.

Emissions associated with new public transportation added to the development would have a 40 percent reduction due to the use of diesel-hybrid buses. Since transportation is one of the largest emissions categories in both the statewide and local GHG emissions inventory, the amount of reduction is substantial in the overall reductions anticipated for Variant 2A Furthermore, most of the other larger categories also result in substantial reductions in emissions. This indicates that the Housing/R&D Variant would not impede the achievement of San Francisco's GHG emission reduction ordinance nor the statewide emission reductions required under AB 32. Therefore, Variant 2A is less than significant with respect to the cumulative impacts of climate change and GHG emissions.

Appendix T6 **LCW Consulting, CP-HPS Phase II Development Plan Transportation Study—Project Variant 2A, March 15, 2010**

LCW Consulting

Memo

To: Bill Wycko, San Francisco Planning Department, MEA

From: Luba C. Wyznyckyj, LCW Consulting
Chris Mitchell, Eric Womeldorff, Fehr & Peers

Date: March 15, 2010

Re: CP-HPS Phase II Development Plan Transportation Study – Project Variant 2A

This memorandum is a supplement to the *Candlestick Point-Hunters Point Shipyard Phase II Development Plan Transportation Study* (November 2009) that was prepared to address the impacts associated with a new Variant 2A: the Housing/R&D variant. The memorandum summarizes the results of the transportation analysis conducted for Variant 2A: Housing/R&D, and compares Variant 2A to the Project. Variant 2A would be similar to Variant 2 analyzed in the Transportation Study, with the exception that an additional 275 residential units would be shifted from Candlestick Point to Hunters Point Shipyard, and an additional 500,000 gsf of R&D uses would be provided in HPS. For comparison purposes, the tables included in this memorandum provide information for the Proposed Project, Variant 2 and Variant 2A.

The travel demand and impact methodologies for analysis of Variant 2A are the same as described for the Project, Project Variants and Alternatives to the Project in the Transportation Study in Chapter 4 (Development of Future Conditions and Significance Criteria) of the Transportation Study. Referenced Project Mitigations Measures are described in detail in Chapter 7 (Mitigation Measures) of the Transportation Study on pages 358 to 375.

The memorandum presents the Variant 2A project description and travel demand, presents a summary of project impacts by topic (i.e., traffic, transit, bicycle, pedestrian, parking, loading, emergency vehicle access, air traffic, construction, and arena impacts), and presents a summary of the mitigation measures applicable to Variant 2A.

1. PROJECT VARIANT 2A DESCRIPTION

Variant 2A assumes that the 49ers stadium would not be constructed at Hunters Point Shipyard, and, that instead the 49ers would move to the City of Santa Clara. The land use program would be the same as for the Project, with the exception that:

- 4,275 residential units, rather than 2,650 units, would be developed at Hunters Point Shipyard;
- An additional 500,000 square feet, for a total of 3,000,000 square feet of R&D would be developed at Hunters Point Shipyard;
- 6,225 residential units, rather than 7,850 units, would be developed at Candlestick Point Shipyard.

Table 1 summarizes the land use assumptions for the Project, Project Variant 2, and Project Variant 2A. **Table 2** presents a comparison of the transportation network improvements for the Project, Project Variant 2, and Project Variant 2A.

Table 1
Summary of Project and Project Variants – Land Use Program

	Project	Project Variant 2 (Housing Variant)	Project Variant 2A (Housing/R&D Variant)
Hunters Point Shipyard			
Residential (units)	2,650	***4,000***	***4,275***
Neighborhood Retail (gsf)	125,000	125,000	125,000
Research & Development (gsf)	2,500,000	2,500,000	***3,000,000***
Artists Studios (gsf) [1]	255,000	255,000	255,000
Community Services (gsf)	50,000	50,000	50,000
Marina (slips)	300	300	300
Park (acres)	238	238	238
Stadium (seats)	69,000	--	--
Candlestick Point			
Residential (units) [2]	7,850	***6,500***	***6,225***
Neighborhood Retail (gsf)	125,000	125,000	125,000
Regional Retail (gsf)	635,000	635,000	635,000
Office (gsf)	150,000	150,000	150,000
Hotel (rooms)	220	220	220
Community Services (gsf)	50,000	50,000	50,000
Park (acres)	147	147	147
Arena (seats)	10,000	10,000	10,000

Notes:
1. Project and Variants includes 225,000 sf of existing artist studio space that would be renovated and replaced.
2. Project and Variants include existing 256 units at Alice Griffith housing complex that would be replaced.

Source: San Francisco County Redevelopment Agency, Lennar Urban.

Table 2 Summary of Transportation Improvements - Project and Project Variants			
Improvement	**Project**	**Project Variant 2 (Housing Variant)**	**Project Variant 2A (Housing/R&D Variant)**
Harney Widening	X X		X
New and Improved Roadways	X X		X
Streetscape Improvements	X X		X
Yosemite Slough Bridge	X X		X
New Signals			
Palou/Griffith	X X		X
Palou/Hawes	X X		X
Palou/Ingalls	X X		X
Palou/Jennings	X X		X
Palou/Keith	X X		X
Palou/Lane	X X		X
Carroll/Ingalls	X X		X
Thomas/Ingalls	X X		X
A. Walker Dr/Carroll	X X		X
A. Walker Dr/Gilman	X X		X
A. Walker Dr/Ingerson	X X		X
A. Walker Dr/Harney	X X		X
Pennsylvania/25th	X X		X
Evans/Jennings/Middlepoint	X X		X
Intersection Improvements			
Evans/Jennings/Middlepoint	X X		X
Palou/Griffith/Crisp	X X		X
Carroll/Ingalls	X X		X
Thomas/Ingalls	X X		X
Transp Management System			
Extended & New Bus Routes	X X		X
BRT Service	X X		X
Harney/Geneva BRT/TPS	X X		X
Hunters Point Transit Center	X X		X
BRT Stops	X X		X
Palou Avenue TPS	X X		X
Bay Trail & Bicycle Improvements	X X		X
Pedestrian Improvements	X X		X
TDM Plan	X X		X

Source: Lennar Urban, Fehr & Peers.

Variant 2A assumes the same roadway and transit improvements as the Project, including construction of the Yosemite Slough bridge. The bridge would be narrower than the bridge included as part of the Project, with a 39-foot wide right-of-way to accommodate two 11-foot wide BRT lanes, a sidewalk, and a Class I bicycle path.

As with the Project, Variant 2A would implement a Transportation Demand Manage plan as described in Project Mitigation Measure 1, and a Transit Operating Plan as described in Project Mitigation Measure 7.

2. PROJECT TRAVEL DEMAND

Table 3 presents the daily person trip generation for the Project, Variant 2, and Variant 2A.

Table 3
Daily Person Trip Generation Summary
Project, Project Variant 2, and Project Variant 2A

Scenario	Hunters Point Shipyard	Candlestick Point	Total
Project	65,168	154,483	219,651
Project – Variant 2 (Housing)	77,056	141,933	218,989
Project – Variant 2A (Housing/R&D)	82,103	138,221	220,323

Note:
Does not include travel demand associated with stadium or arena events.
Source: Fehr & Peers.

Table 4 summarizes the daily, weekday AM and PM peak hour, and Sunday PM peak hour person trip generation for the Project, Variant 2, and Variant 2A.

Table 4
Person Trip Generation Summary
Project, Project Variant 2, and Project Variant 2A

Scenario	Hunters Point Shipyard	Candlestick Point	Total
Project			
Weekday Daily	65,168	154,483	219,651
Weekday AM	5,834	7,749	13,5583
Weekday PM	6,441	13,971	20,412
Sunday PM	4,839	13,289	18,128
Project – Variant 2 (Housing)			
Weekday Daily	77,056	141,933	218,989
Weekday AM	6,691	6,798	13,489
Weekday PM	7,511	12,848	20,359
Sunday PM	5,773	12,348	18,121
Project – Variant 2A (Housing/R&D)			
Weekday Daily	82,102	138,221	220,323
Weekday AM	7,439	6,604	14,042
Weekday PM	8,188	12,539	20,727
Sunday PM	6,087	12,153	18,240

Source: Fehr & Peers.

Table 5 presents trip generation by mode for the weekday AM and PM peak hours, while **Table 6** presents this information for the Sunday PM peak hour.

Table 5
Weekday AM and PM Peak Hour Trips By Mode
Project, Project Variant 2, and Project Variant 2A

	Person Trips					Vehicle Trips
	Auto	**Transit**	**Bicycle**	**Internal /Linked**	**Total**	
WEEKDAY AM PEAK						
Project						
Hunters Point Shipyard	3,078	845	121	1,789	5,833	1,924
Candlestick	3,696 966	___ 144	___ 2,942	_____	7,748 2,310	_____
Total	*6,774*	*1,811*	*265*	*4,731*	*13,581*	*4,234*
Project – Variant 2						
Hunters Point Shipyard	3,271	904	129	2,388	6,692	2,044
Candlestick	3,502	904 136	___ 2,257	_____	6,799 2,189	_____
Total	*6,773*	*1,808*	*265*	*4,645*	*13,491*	*4,233*
Project – Variant 2A						
Hunters Point Shipyard	3,718 1,027		147	2,547	7,439	2,324
Candlestick	3,455 888	___ 134	___ 2,126	_____ 6,603	_____ 2,160	_____
Total	*7,173*	*1,915*	*281*	*4,673*	*14,042*	*4,483*
WEEKDAY PM PEAK						
Project						
Hunters Point Shipyard	3,463	1,001	138	1,839	6,441	2,164
Candlestick	7,861 1,889	_____ 302	___ 3,920	_____	13,972 4,913	_____
Total	*11,324*	*2,890*	*440*	*5,759*	*20,413*	*7,077*
Project – Variant 2						
Hunters Point Shipyard	3,739	1,082	149	2,540	7,510	2,337
Candlestick	7,708 1,817	_____ 295	___ 3,028	_____ 12,848	______ 4,817	_____
Total	*11,447*	*2,899*	*444*	*5,568*	*20,358*	*7,154*
Project – Variant 2A						
Hunters Point Shipyard	4,204 1,224		168	2,592	8,188	2,628
Candlestick	7,667 1,801	_____ 293	___ 2,778	_____ 12,539	______ 4,792	_____
Total	*11,872*	*3,024*	*461*	*5,370*	*20,727*	*7,420*

Source: Fehr & Peers.

Table 6 Sunday PM Peak Hour Trips By Mode Project, Project Variant 2, and Project Variant 2A						
	Person Trips					Vehicle Trips
	Auto	Transit	Bicycle	Internal /Linked	Total	
Project						
Hunters Point Shipyard	2,674	518	99	1,548	4,839	1,666
Candlestick	7,460	1,379	273	4,176	13,288	4,663
Total	*10,134*	*1,897*	*372*	*5,724*	*18,127*	*6,329*
Project – Variant 2						
Hunters Point Shipyard	2,765	704	107	2,196	5,772	1,728
Candlestick	7,287	1,538	273	3,250	12,348	4,554
Total	*10,052*	*2,242*	*380*	*5,446*	*18,120*	*6,282*
Project – Variant 2A						
Hunters Point Shipyard	3,031	773	117	2,166	6,087	1,894
Candlestick	7,649	1,152	272	3,081	12,154	4,780
Total	*10,680*	*1,925*	*389*	*5,247*	*18,241*	*6,674*

Source: Fehr & Peers.

Parking Demand

Table 7 presents the residential and non-residential parking demand for the Project, Project Variant 2, and Project Variant 2A.

Table 7 Parking Demand – Project, Project Variant 2, and Project Variant 2A				
Scenario/Project Area	**Residential**	**Non-Residential**		**Total Demand [1]**
	Long Term Demand	**Long Term Demand**	**Short-Term Demand**	
Project				
Hunters Point Shipyard	3,110	3,818	996	7,924
Candlestick Point	9,212	1,475	2,622	13,309
Total	*12,322*	*5,293*	*3,618*	*21,233*
Project – Variant 2 (Housing)				
Hunters Point Shipyard	4,694	3,811	911	9,416
Candlestick Point	7,627	1,480	2,787	11,894
Total	*12,321*	*5,291*	*3,698*	*21,310*
Variant. 2A – (Housing/R&D)				
Hunters Point Shipyard	5,016	4,508	980	10,504
Candlestick Point	7,305	1,180	2,787	11,272
Total	*12,321*	*5,688*	*3,767*	*21,776*

Source: CHS Consulting, LCW Consulting.

Loading Demand

Table 8 presents the number of trucks generated on a daily basis, and the demand for loading dock spaces during the peak hour of loading activities.

Table 8
Loading Demand – Project, Project Variant 2, and Project Variant 2A

Scenario/Project Area	Daily Truck Generation	Peak Hour Loading Dock Space Demand
Project		
Hunters Point Shipyard	713	41
Candlestick Point	507	29
Total	*1,220*	*70*
Project – Variant 2 (Housing)		
Hunters Point Shipyard	766	44
Candlestick Point	458	27
Total	*1,224*	*71*
Project – Variant 2A (Housing/R&D)		
Hunters Point Shipyard	713	41
Candlestick Point	507	29
Total	*1,220*	*70*

Source: LCW Consulting.

3. TRAFFIC IMPACTS

Intersection Operations

Tables 9 and 10 present a comparison of the intersection LOS analysis for the existing, 2030 No Project, and 2030 Project, Project Variant 2 and Project Variant 2A conditions for the weekday AM and PM peak hours, respectively. **Table 11** presents this comparison for Sunday PM peak hour conditions. **Table 12** presents the summary table of Project traffic impacts for Project, Project Variant 2, and Project Variant 2A.

Table 9 Intersection LOS Project, Project Variant 2, and Project Variant 2A – Weekday AM Peak Hour – 2030 Conditions												
Intersection		**Existing**		**No Project (Alt 1)**		**Project**		**Project – Variant 2 (Housing)**		**Project–Variant 2A (Housing/R&D)**		
		Delay [1]	**LOS** [2]	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	
1	Third St/25th St	14 B		**>80/1.43**	**F**	**>80/1.54**	**F**	**>80/1.53**	**F**	**>80/1.62**	**F**	
2	Third St/Cesar Chavez St	36 D		**>80/1.61**	**F**	**>80/1.63**	**F**	**>80/1.63**	**F**	**>80/1.65**	**F**	
3	Third St/Cargo Way	23 C		**>80/1.36**	**F**	**>80/1.90**	**F**	**>80/1.90**	**F**	**>80/1.92**	**F**	
4	Third St/Evans Ave	35 C		**>80/1.41**	**F**	**>80/1.43**	**F**	**>80/1.44**	**F**	**>80/1.48**	**F**	
5	Third St/Oakdale Ave	17 B		21	C	25	C	24	C	24	C	
6	Third St/Palou Ave	15 B		**>80/1.77**	**F**	**>80/1.91**	**F**	**>80/1.97**	**F**	**>80/2.13**	**F**	
7	Third St/Revere Ave	19 B		35	C	51	D	46	D	48	D	
8	Third St/Carroll Ave	12 B		12	B	23	C	19	B	18	B	
9	Third St/Paul Ave	27 C		**>80/1.23**	**F**	**>80/2.00**	**F**	**>80/1.89**	**F**	**>80/1.88**	**F**	
10	Third St/Ingerson Ave	5 A		5	A	6	A	6	A	6	A	
11	Third St/Jamestown Ave	13 B		29	C	**>80/1.03**	**F**	**77/0.99**	**E**	53 D		
12	Third/Le Conte/US 101 nb off	11 B		50	D	50	D	50	D	50	D	
13	25th St/Illinois St	7 A 14			B	13	B	13	B	14	B	
14	25th St/Pennsylvania Ave	9 A 26			D	29	C	29	C	29	C	
15	Cesar Chavez/Penns/I-280	**78**	**E**	**>80/1.39**	**F**	**>80/1.39**	**F**	**>80/1.39**	**F**	**>80/1.39**	**F**	
16	Cesar Chavez St/Evans Ave	21 C		**>80/1.92**	**F**	**>80/1.91**	**F**	**>80/1.92**	**F**	**>80/1.93**	**F**	
17	Cesar Chavez St/Illinois St	13 B		25	C	34	C	24	C	25	C	
18	Bayshore Blvd/Paul Ave	21 C		**61/1.56**	**E**	**>80/2.64**	**F**	**>80/2.63**	**F**	**>80/2.66**	**F**	
19	Bayshore/Hester/US 101 sb off	28 C		**>80/1.34**	**F**	**>80/1.36**	**F**	**>80/1.36**	**F**	**>80/1.36**	**F**	
20	Bayshore Blvd/Tunnel Ave	19 B		**>80/2.00**	**F**	**>80/2.05**	**F**	**>80/2.05**	**F**	**>80/2.05**	**F**	

Notes:
1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.

Source: Fehr & Peers.

Table 9 (continued)
Intersection LOS
Project, Project Variant 2, and Project Variant 2A – Weekday AM Peak Hour – 2030 Conditions

	Intersection	Existing		No Project		Project		Project – Variant 2 (R&D)		Project – Variant 2A (Housing/R&D)	
		Delay [1]	LOS [2]	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
21	Bayshore Blvd/Bacon St	**76**	**E**	**>80/4.05**	**F**	**>80/4.08**	**F**	**>80/4.18**	**F**	**>80/4.18**	**F**
22	Bayshore Blvd/Arleta St	25 C		**>80/1.21**	**F**	**>80/1.23**	**F**	**>80/1.23**	**F**	**>80/1.23**	**F**
23	Bayshore Blvd/Leland Ave	21 C		**>80/1.24**	**F**	**>80/1.26**	**F**	**>80/1.26**	**F**	**80/1.26**	**E**
24	Bayshore Blvd/Visitacion Ave	17 B		**>80/1.55**	**F**	**>80/1.56**	**F**	**>80/1.56**	**F**	**>80/1.56**	**F**
25	Bayshore Blvd/Sunnydale Ave	20 C		**>80/1.32**	**F**	**>80/1.34**	**F**	**>80/1.34**	**F**	**>80/1.34**	**F**
26	Tunnel Ave/Blanken	11 B		43	D	**>80/1.06**	**F**	**>80/1.06**	**F**	**>80/1.07**	**F**
27	Geneva/U.S. 101 SB Ramps [3]	10 A		**>80/2.17**	**F**	**>80/2.31**	**F**	**>80/2.31**	**F**	**>80/2.33**	**F**
28	Harney/U.S. 101 NB Ramps [3]	8 A		**>80/1.20**	**F**	**>80/1.35**	**F**	**>80/1.35**	**F**	**>80/1.36**	**F**
29	Harney Way/Jamestown Ave [4]	8 A		12	B	20	B	22	B	23	C
30	Crisp Ave/Palou Ave [4]	11.4 (nb)	B	**57/0.99**	**E**	44 D		42	D	46	D
31	Ingalls St/Thomas Ave [4]	11.3 (wb)	B	19.0 (wb)	C 22		C	22	C	23	C
32	Ingalls St/Carroll Ave [4]	8 A		15	B	28	C	28	C	29	C
33	Ingalls St/Egbert Ave	8 A		8	A	9	A	9	A	9	A
34	A.Walker/Gilman Ave [4]	9.1 (sb)	A	**>60 (eb)**	**F**	30 C		31	C	30	C
35	Amador St/Cargo Way	28 C		**65/1.06**	**E**	54 D		**56/1.02**	**E**	**61/1.04**	**E**
36	Bayshore Blvd/Cortland Ave	19 B		37	D	**>80/1.18**	**F**	**>80/1.18**	**F**	**>80/1.19**	**F**
37	Bayshore Blvd/Oakdale Ave	30 C		43	D	51	D	50	D	50	D
38	Bayshore/Alemany/Industrial	44 D		**>80/1.00**	**F**	**>80/1.05**	**F**	**>80/1.04**	**F**	**>80/1.04**	**F**
39	Bayshore/US 101 nb off to Cesar	43 D		**74/0.91**	**E**	**>80/0.94**	**F**	**>80/0.93**	**F**	**>80/0.95**	**F**
40	Bayshore Blvd/Silver Ave	50 D		**>80/1.58**	**F**	**>80/1.70**	**F**	**>80/1.75**	**F**	**>80/1.77**	**F**

Notes:
1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.
3. Year 2030 analysis includes signalization as part of Executive Park Development or new Harney Interchange.
4. Year 2030 analysis includes signalization as part of Project.
Source: Fehr & Peers.

Table 9 (continued)
Intersection LOS
Project, Project Variant 2, and Project Variant 2A – Weekday AM Peak Hour – 2030 Conditions

	Intersection	Existing		No Project		Project		Project – Variant 2 (Housing)		Project – Variant 2A (Housing/R&D)	
		Delay [1]	**LOS [2]**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
41	Bayshore Blvd/Blanken Ave	12 B		**>80/1.48**	**F**	**>80/1.51**	**F**	**>80/1.51**	**F**	**>80/1.51**	**F**
42	San Bruno Ave/Paul Ave	20 B		**>80/1.21**	**F**	**>80/1.23**	**F**	**>80/1.23**	**F**	**>80/1.23**	**F**
43	San Bruno Ave/Silver Ave	75 E		**>80/1.43**	**F**	**>80/1.41**	**F**	**>80/1.41**	**F**	**>80/1.42**	**F**
44	San Bruno/Mansell/101 sb off	17 C		**>80/1.08**	**F**	**>80/1.11**	**F**	**>80/1.11**	**F**	**>80/1.11**	**F**
45	San Bruno/Silliman/101 sb off	24 C		**>80/1.08**	**F**	**>80/1.08**	**F**	**>80/1.07**	**F**	**>80/1.07**	**F**
46	Innes Ave/A.Walker Drive [4]	8.6 (sb)	A	5	A	6	A	5	A	5	A
47	Innes Ave/Earl St	8.5 (sb)	A	17.3 (sb)	C	13.3 (sb)	B	15.0 (sb)	B	15.6 (sb)	C
48	Evans Ave/Jennings St	9 A		**>80/1.96**	**F**	28 C		30	C	35	C
49	Bayshore Blvd/Geneva Ave	24 C		**>80/1.39**	**F**	**>80/1.40**	**F**	**>80/1.40**	**F**	**>80/1.40**	**F**
50	Bayshore/Guadalupe Pkwy	16 B		21	C	21	C	21	C	21	C
51	Bayshore Blvd/Valley Dr	23 C		20	C	20	C	20	C	20	B
52	Bayshore Blvd/Old County Rd	28 C		40	D	39	D	39	D	39	D
53	Sierra Pt/Lagoon Way	12 B		**>80/1.85**	**F**	**>80/1.85**	**F**	**>80/1.85**	**F**	**>80/1.85**	**F**
54	Ingalls St/Palou Ave [4]	9 A		16	B	18	B	18	B	18	B
55	Keith St/Palou Ave [4]	9 A		10	A	9	A	10	A	9	A
56	Third/Williams/Van Dyke	22 C		18	B	30	C	29	C	29	C
57	Third St/Jerrold Ave	22 C		49	D	**>80/0.74**	**F**	**>80/0.73**	**F**	**>80/0.73**	**F**
58	Evans/Napoleon/Toland	37 D		**>80/1.45**	**F**	**>80/1.50**	**F**	**>80/1.50**	**F**	**>80/1.51**	**F**
59	Harney/Executive Park East	9.1 (sb)	A	25	C	25	C	25	C	25	C
60	Harney/Thomas Mellon	-- --		30	C	34	C	34	C	34	C

Notes:
1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.
3. Year 2030 analysis includes signalization as part of Executive Park Development or new Harney Interchange.
4. Year 2030 analysis includes signalization as part of Project.
Source: Fehr & Peers.

Table 10
Intersection LOS
Project, Project Variant 2, and Project Variant 2A – Weekday PM Peak Hour – 2030 Conditions

	Intersection	Existing		No Project (Alt 1)		Project		Project – Variant 2 (Housing)		Project – Variant 2A (Housing/R&D)	
		Delay [1]	LOS [2]	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1	Third St/25th St	16 B		**>80/2.45**	**F**	**>80/2.92**	**F**	**>80/2.93**	**F**	**>80/2.97**	**F**
2	Third St/Cesar Chavez St	31 C		**>80/1.56**	**F**	**>80/1.76**	**F**	**>80/1.75**	**F**	**>80/1.77**	**F**
3	Third St/Cargo Way	20 B		**>80/1.44**	**F**	**>80/1.74**	**F**	**>80/1.74**	**F**	**>80/1.77**	**F**
4	Third St/Evans Ave	34 C		**>80/1.36**	**F**	**>80/1.53**	**F**	**>80/1.56**	**F**	**>80/1.61**	**F**
5	Third St/Oakdale Ave	19 B		30	C	**60/1.12**	**E**	**60/1.12**	**E**	**62/1.12**	**E**
6	Third St/Palou Ave	30 C		**>80/4.71**	**F**	**>80/5.99**	**F**	**>80/6.07**	**F**	**>80/6.00**	**F**
7	Third St/Revere Ave	31 C		37	D	**>80/1.14**	**F**	**>80/1.14**	**F**	**>80/1.15**	**F**
8	Third St/Carroll Ave	14 B		14	B	**75/0.93**	**E**	**67/0.92**	**E**	**63/0.92**	**E**
9	Third St/Paul Ave	24 C		**>80/1.37**	**F**	**>80/3.36**	**F**	**>80/3.32**	**F**	**>80/3.41**	**F**
10	Third St/Ingerson Ave	5 A		7	A	43	D	52	D	54	D
11	Third St/Jamestown Ave	14 B		30	C	**>80/6.64**	**F**	**>80/6.15**	**F**	**>80/1.48**	**F**
12	Third/Le Conte/US 101 nb off	11 B		24	C	23	C	23	C	23	C
13	25th St/Illinois St	7 A 14			B	14	B	14	B	15	B
14	25th St/Pennsylvania Ave	12 B		**>80/1.42**	**F**	40 D		40	D	40	D
15	Cesar Chavez/Penns/I-280	39 D		**>80/1.36**	**F**	**>80/1.37**	**F**	**>80/1.37**	**F**	**>80/1.37**	**F**
16	Cesar Chavez St/Evans Ave	21 C		**>80/1.83**	**F**	**>80/1.84**	**F**	**>80/1.84**	**F**	**>80/1.85**	**F**
17	Cesar Chavez St/Illinois St	19 B		22	C	23	C	23	C	23	C
18	Bayshore Blvd/Paul Ave	17 B		**>80/2.00**	**F**	**>80/2.90**	**F**	**>80/2.93**	**F**	**>80/2.93**	**F**
19	Bayshore/Hester/US 101 sb off	13 B		**>80/1.25**	**F**	**>80/1.28**	**F**	**>80/1.28**	**F**	**>80/1.28**	**F**
20	Bayshore Blvd/Tunnel Ave	16 B		**>80/2.30**	**F**	**>80/2.51**	**F**	**>80/2.51**	**F**	**>80/2.51**	**F**

Notes:

1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.

Source: Fehr & Peers.

Table 10 (continued)
Intersection LOS
Project, Project Variant 2, and Project Variant 2A – Weekday PM Peak Hour – 2030 Conditions

	Intersection	Existing		No Project		Project		Project – Variant 2 (Housing)		Project – Variant 2A (Housing/R&D)	
		Delay [1]	LOS [2]	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
21	Bayshore Blvd/Bacon St	22 C		**>80/1.87**	**F**	**>80/1.91**	**F**	**>80/1.95**	**F**	**>80/1.97**	**F**
22	Bayshore Blvd/Arleta St	25 C		**>80/1.36**	**F**	**>80/1.39**	**F**	**>80/1.39**	**F**	**>80/1.39**	**F**
23	Bayshore Blvd/Leland Ave	22 C		**>80/1.58**	**F**	**>80/1.67**	**F**	**>80/1.67**	**F**	**>80/1.67**	**F**
24	Bayshore Blvd/Visitacion Ave	15 B		**>80/1.43**	**F**	**>80/1.47**	**F**	**>80/1.47**	**F**	**>80/1.47**	**F**
25	Bayshore Blvd/Sunnydale Ave	19 B		**>80/1.15**	**F**	**>80/1.19**	**F**	**>80/1.19**	**F**	**>80/1.19**	**F**
26	Tunnel Ave/Blanken	9 A		**>80/1.46**	**F**	**>80/1.45**	**F**	**>80/1.45**	**F**	**>80/1.46**	**F**
27	Geneva/U.S. 101 SB Ramps [3]	9 A		**>80/2.94**	**F**	**>80/3.25**	**F**	**>80/3.25**	**F**	**>80/3.26**	**F**
28	Harney/U.S. 101 NB Ramps [3]	8 A		**>80/1.43**	**F**	**>80/1.74**	**F**	**>80/1.74**	**F**	**>80/1.75**	**F**
29	Harney Way/Jamestown Ave [4]	8 A		**40/1.03**	**E**	41 D		41	D	44	D
30	Crisp Ave/Palou Ave [4]	11.6 (nb)	B	**58/0.97**	**E**	54 D		55	D	**67/1.05**	**E**
31	Ingalls St/Thomas Ave [4]	11.5 (wb)	B	27.9 (wb)	C	33	C	33	C	37	D
32	Ingalls St/Carroll Ave [4]	8 A		17	C	38	D	38	D	42	D
33	Ingalls St/Egbert Ave	8 A		9	A	9	A	9	A	9	A
34	A.Walker/Gilman Ave [4]	9.2 (sb)	A	**>80 (eb)**	**F**	36 D		36	D	36	D
35	Amador St/Cargo Way	24 C		**60/1.05**	**E**	**59/1.04**	**E**	**60/1.05**	**E**	**66/1.08**	**E**
36	Bayshore Blvd/Cortland Ave	25 C		**>80/1.48**	**F**	**>80/1.87**	**F**	**>80/1.87**	**F**	**>80/1.87**	**F**
37	Bayshore Blvd/Oakdale Ave	26 C		33	C	55	D	**55/1.05**	**E**	**55/1.05**	**E**
38	Bayshore/Alemany/Industrial	**58/**	**E**	**>80/1.23**	**F**	**>80/1.18**	**F**	**>80/1.18**	**F**	**>80/1.18**	**F**
39	Bayshore/US 101 nb off to Cesar	48 D		**>80/0.88**	**F**	**>80/0.91**	**F**	**>80/0.91**	**F**	**>80/0.92**	**F**
40	Bayshore Blvd/Silver Ave	50 D		**>80/2.64**	**F**	**>80/2.91**	**F**	**>80/2.91**	**F**	**>80/2.91**	**F**

Notes:
1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.
3. Year 2030 analysis includes signalization as part of Executive Park Development or new Harney Interchange.
4. Year 2030 analysis includes signalization as part of Project.
Source: Fehr & Peers.

	Table 10 (continued) Intersection LOS Project, Project Variant 2, and Project Variant 2A – Weekday PM Peak Hour – 2030 Conditions										
	Intersection	**Existing**		**No Project**		**Project**		**Project – Variant 2 (Housing)**		**Project – Variant 2A (Housing/R&D)**	
		Delay [1]	**LOS** [2]	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
41	Bayshore Blvd/Blanken Ave	11 B		**>80/1.33**	**F**	**>80/1.40**	**F**	**>80/1.40**	**F**	**>80/1.40**	**F**
42	San Bruno Ave/Paul Ave	20 B		**>80/2.10**	**F**	**>80/2.71**	**F**	**>80/2.75**	**F**	**>80/2.77**	**F**
43	San Bruno Ave/Silver Ave	46 D		**>80/1.46**	**F**	**>80/1.56**	**F**	**>80/1.57**	**F**	**>80/1.59**	**F**
44	San Bruno/Mansell/101 sb off	33 D		**64/1.15**	**F**	**>80/1.22**	**F**	**>80/1.20**	**F**	**>80/1.22**	**F**
45	San Bruno/Silliman/101 sb off	20 B		38	D	38	D	38	D	38	D
46	Innes Ave/A.Walker Drive [4]	8.7 (sb)	A	5	A	6	A	6	A	6	A
47	Innes Ave/Earl St	8.6 (sb)	A	23.1 (sb)	C	19.4 (sb)	C	19.7 (sb)	C	22.7 (sb)	C
48	Evans Ave/Jennings St	10 A		**>80/2.41**	**F**	31 C		33	C	38	C
49	Bayshore Blvd/Geneva Ave	25 C		**>80/1.73**	**F**	**>80/1.76**	**F**	**>80/1.76**	**F**	**>80/1.76**	**F**
50	Bayshore/Guadalupe Pkwy	14 B		50	D	49	D	49	D	49	D
51	Bayshore Blvd/Valley Dr	16 B		40	D	40	D	40	D	40	D
52	Bayshore Blvd/Old County Rd	29 C		**>80/1.10**	**F**	**>80/1.13**	**F**	**>80/1.13**	**F**	**>80/1.13**	**F**
53	Sierra Pt/Lagoon Way	16 C		**>80/4.38**	**F**	**>80/4.38**	**F**	**>80/4.38**	**F**	**>80/4.38**	**F**
54	Ingalls St/Palou Ave [4]	9 A		16	B	22	C	22	C	25	C
55	Keith St/Palou Ave [4]	9 A		8	A	8	A	8	A	8	A
56	Third/Williams/Van Dyke	22 C		17	B	**>80/0.98**	**F**	**>80/0.98**	**F**	**>80/0.99**	**F**
57	Third St/Jerrold Ave	23 C		**>80/0.72**	**F**	**>80/0.88**	**F**	**>80/0.89**	**F**	**>80/0.89**	**F**
58	Evans/Napoleon/Toland	46 D		**>80/1.53**	**F**	**>80/1.61**	**F**	**>80/1.62**	**F**	**>80/1.63**	**F**
59	Harney/Executive Park East	8.9 (sb)	A	25	C	26	C	27	C	26	C
60	Harney/Thomas Mellon	-- --		19	B	26	C	26	C	26	C

Notes:
1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.
3. Year 2030 analysis includes signalization as part of Executive Park Development or new Harney Interchange.
4. Year 2030 analysis includes signalization as part of Project.
Source: Fehr & Peers.

Table 11
Intersection LOS
Project, Project Variant 2, and Project Variant 2A – Sunday PM Peak Hour – 2030 Conditions

	Intersection	**Existing**		**No Project (Alt 1)**		**Project**		**Project – Variant 2 (Housing)**		**Project – Variant 2A (Housing/R&D)**	
		Delay [1]	**LOS** [2]	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
1	Third St/25th St	13 B		**63/0.57**	**E**	**58/0.70**	**E**	**61/0.74**	**E**	**63/0.75**	**E**
2	Third St/Cesar Chavez St	23 C		31	C	**66/0.73**	**E**	**>80/0.78**	**F**	**>80/0.78**	**F**
3	Third St/Cargo Way	17 B		30	C	30	C	33	C	34	C
4	Third St/Evans Ave	32 C		**57/0.65**	**E**	**59/0.87**	**E**	**67/0.91**	**E**	**69/0.93**	**E**
5	Third St/Oakdale Ave	15 B		14	C	15	B	15	B	15	B
6	Third St/Palou Ave	29 C		**>80/0.92**	**F**	**>80/4.03**	**F**	**>80/2.51**	**F**	**>80/2.92**	**F**
7	Third St/Revere Ave	22 C		20	B	24	C	24	C	25	C
8	Third St/Carroll Ave	9 A 10			B	**55/0.66**	**E**	**60/0.65**	**E**	**56/0.64**	**E**
9	Third St/Paul Ave	21 C		**64/0.73**	**E**	**>80/1.89**	**F**	**>80/1.82**	**F**	**>80/1.83**	**F**
10	Third St/Ingerson Ave	3 A		3	A	27	C	27	C	27	C
11	Third St/Jamestown Ave	21 C		24	C	**>80/1.24**	**F**	**>80/1.14**	**F**	**>80/1.14**	**F**
12	Third/Le Conte/US 101 nb off	12 B		14	B	13	B	14	B	14	B
13	25th St/Illinois St	7 A 10			A	10	A	10	A	10	A
14	25th St/Pennsylvania Ave	10 A		**45/1.01**	**E**	34 C		34	C	35	C
15	Cesar Chavez/Penns/I-280	28 C		**61/0.65**	**E**	**60/0.65**	**E**	**60/0.65**	**E**	**60/0.51**	**E**
16	Cesar Chavez St/Evans Ave	15 B		18	B	19	B	19	B	19	B
17	Cesar Chavez St/Illinois St	14 B		18	B	18	B	18	B	18	B
18	Bayshore Blvd/Paul Ave	12 B		14	B	54	D	55	D	55	D
19	Bayshore/Hester/US 101 sb off	14 B		14	B	14	B	14	B	14	B
20	Bayshore Blvd/Tunnel Ave	8 A 53			D	**60/1.59**	**E**	**60/1.59**	**E**	**60/1.59**	**E**
21	Bayshore Blvd/Bacon St	13 B		17	B	31	C	31	C	30	C

Notes:
1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.

Source: Fehr & Peers,

Table 11 (continued)
Intersection LOS
Project, Project Variant 2, and Project Variant 2A – Sunday PM Peak Hour – 2030 Conditions

	Intersection	Existing		No Project		Project		Project – Variant 2 (Housing)		Project – Variant 2A (Housing/R&D)	
		Delay [1]	**LOS** [2]	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
22	Bayshore Blvd/Arleta St	12 B		54	D	49	D	49	D	49	D
23	Bayshore Blvd/Leland Ave	24 C		41	D	38	D	38	D	38	D
24	Bayshore Blvd/Visitacion Ave	18 B		**64/0.98**	**E**	**70/1.03**	**E**	**69/1.02**	**E**	**69/1.02**	**E**
25	Bayshore Blvd/Sunnydale Ave	15 B		55	D	55	D	55	D	55	D
26	Tunnel Ave/Blanken	19 B		30	C	51	D	51	D	51	D
27	Geneva/U.S. 101 SB Ramps [3]	8 A		**>80/2.04**	**F**	**>80/2.34**	**F**	**>80/2.36**	**F**	**>80/2.38**	**F**
28	Harney/U.S. 101 NB Ramps [3]	8 A		54	D	**>80/1.36**	**F**	**>80/1.28**	**F**	**>80/1.29**	**F**
29	Harney Way/Jamestown Ave [4]	9 A		22	C	24	C	24	C	25	C
30	Crisp Ave/Palou Ave [4]	7 A		37	D	46	D	44	D	46	D
31	Ingalls St/Thomas Ave [4]	11.1 (sb)	B 11.8	(wb)	B 26		C	25	C	26	C
32	Ingalls St/Carroll Ave [4]	9.9 (wb)	A	9	A	28	C	27	C	28	C
33	Ingalls St/Egbert Ave	7 A		8	A	8	A	8	A	8	A
34	A.Walker/Gilman Ave [4]	7 A		**72.5 (eb)**	**F**	36 D		36	D	36	D
35	Amador St/Cargo Way	8.9 (sb)	A	21	C	20	B	20	C	20	C
36	Bayshore Blvd/Cortland Ave	28 C		23	C	25	C	25	C	25	C
37	Bayshore Blvd/Oakdale Ave	17 B		21	C	21	C	21	C	21	C
38	Bayshore/Alemany/Industrial	24 C		40	D	52	D	51	D	51	D
39	Bayshore/US 101 nb off to Cesar	35 D		25	C	26	C	26	C	26	C
40	Bayshore Blvd/Silver Ave	25 C		19	B	26	C	26	C	26	C

Notes:
1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.
3. Year 2030 analysis includes signalization as part of Executive Park Development or new Harney Interchange.
4. Year 2030 analysis includes signalization as part of Project.
Source: Fehr & Peers.

Table 11 (continued)
Intersection LOS
Project, Project Variant 2, and Project Variant 2A – Sunday PM Peak Hour – 2030 Conditions

	Intersection	Existing		No Project		Project		Project – Variant 2 (Housing)		Project – Variant 2A (Housing/R&D)	
		Delay [1]	**LOS** [2]	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
41	Bayshore Blvd/Blanken Ave	9 A		51	D	**68/1.16**	**E**	**68/1.16**	**E**	**68/1.16**	**E**
42	San Bruno Ave/Paul Ave	16 B		39	D	**>80/1.46**	**F**	**>80/1.36**	**F**	**>80/1.36**	**F**
43	San Bruno Ave/Silver Ave	41 D		**>80/1.29**	**F**	**>80/1.40**	**F**	**>80/1.37**	**F**	**>80/1.37**	**F**
44	San Bruno/Mansell/101 sb off	16 C		27	D	**38/1.00**	**E**	**36/0.98**	**E**	**35/0.98**	**E**
45	San Bruno/Silliman/101 sb off	17 B		**78/0.36**	**E**	**70/0.37**	**E**	**77/0.36**	**E**	**77/0.36**	**E**
46	Innes Ave/A.Walker Drive [4]	8.5 (sb)	A	4	A	6	A	5	A	5	A
47	Innes Ave/Earl St	8.5 (sb)	A	9.9 (sb)	A	10 (sb)	B	10.5 (sb)	B 10.7	(sb)	B
48	Evans Ave/Jennings St	8 A		33	D	20	C	20 C		20	C
49	Bayshore Blvd/Geneva Ave	20 C		44	D	43	D	43	D	43	D
50	Bayshore/Guadalupe Pkwy	10 B		9	A	9	A	9	A	9	A
51	Bayshore Blvd/Valley Dr	11 B		10	A	10	A	10	B	10	A
52	Bayshore Blvd/Old County Rd	26 C		43	D	42	D	42	D	42	D
53	Sierra Pt/Lagoon Way	8 A		43	D	**44/1.01**	**E**	**44/1.01**	**E**	**44/1.01**	**E**
54	Ingalls St/Palou Ave [4]	8 A		16	B	22	C	20 C		20	C
55	Keith St/Palou Ave [4]	8 A		10	B	7	A	8	A	7	A
56	Third/Williams/Van Dyke	22 C		14	B	23	C	23	C	23	C
57	Third St/Jerrold Ave	21 C		23	C	31	C	34	C	35	C
58	Evans/Napoleon/Toland	32 C		**57/0.50**	**E**	**60/0.57**	**E**	**60/0.58**	**E**	**60/0.58**	**E**
59	Harney/Executive Park East	8.8 (eb)	A	18	B	22	C	15	B	15	B
60	Harney/Thomas Mellon	-- --		15	B	19	B	15	B	15	B

Notes:
1. Delay in seconds per vehicle. For Side Street STOP-controlled intersections, delay and LOS presented for worst approach. Worst approach indicated in ( ).
2. Intersections operating at LOS E or LOS F conditions highlighted in **bold** and overall intersection volume-to-capacity (v/c) ratio is presented.
3. Year 2030 analysis includes signalization as part of Executive Park Development or new Harney Interchange.
4. Year 2030 analysis includes signalization as part of Project.
Source: Fehr & Peers.

Table 12
Summary of Impacts at Intersections Operating at LOS E or LOS F

	Intersection	Project	Project Variant 2 (Housing)	Project Variant 2A (Housing/R&D)
1	Third St/25th St	SC/PI SC/PI SC/PI		
2	Third St/Cesar Chavez St	SC/PI SC/PI SC/PI		
3	Third St/Cargo Way	SC/PI SC/PI SC/PI		
4	Third St/Evans Ave	SC/PI SC/PI SC/PI		
5	Third St/Oakdale Ave	PI PI PI		
6	Third St/Palou Ave	SC/PI SC/PI SC/PI		
7	Third St/Revere Ave	PI PI PI		
8	Third St/Carroll Ave	PI PI PI		
9	Third St/Paul Ave	SC/PI SC/PI SC/PI		
10	Third St/Ingerson Ave	-- -- --		
11	Third St/Jamestown Ave	PI PI PI		
12	Third/Le Conte/US 101 nb off	-- -- --		
13	25th St/Illinois St	-- -- --		
14	25th St/Pennsylvania Ave	-- -- --		
15	Cesar Chavez/Penns/I-280	SC/PI SC/PI SC/PI		
16	Cesar Chavez St/Evans Ave	NSC SC/PI		SC/PI
17	Cesar Chavez St/Illinois St	-- -- --		
18	Bayshore Blvd/Paul Ave	PI PI PI		
19	Bayshore/Hester/US 101 sb off	NSC NSC NSC		
20	Bayshore Blvd/Tunnel Ave	NSC NSC NSC		
21	Bayshore Blvd/Bacon St	SC/PI SC/PI SC/PI		
22	Bayshore Blvd/Arleta St	NSC NSC NSC		
23	Bayshore Blvd/Leland Ave	NSC NSC NSC		
24	Bayshore Blvd/Visitacion Ave	SC/PI SC/PI SC/PI		
25	Bayshore Blvd/Sunnydale Ave	SC/PI SC/PI SC/PI		
26	Tunnel Ave/Blanken	PI PI PI		
27	Geneva/U.S. 101 SB Ramps	SC/PI SC/PI SC/PI		
28	Harney/U.S. 101 NB Ramps	SC/PI SC/PI SC/PI		
29	Harney Way/Jamestown Ave	-- -- --		
30	Crisp Ave/Palou Ave	-- --		PI
31	Ingalls St/Thomas Ave	-- -- --		
32	Ingalls St/Carroll Ave	-- -- --		
33	Ingalls St/Egbert Ave	-- -- --		
34	A.Walker/Gilman Ave	-- -- --		
35	Amador St/Cargo Way	SC/PI SC/PI SC/PI		
36	Bayshore Blvd/Cortland Ave	PI PI PI		
37	Bayshore Blvd/Oakdale Ave	-- PI		PI
38	Bayshore/Alemany/Industrial	SC/PI SC/PI SC/PI		
39	Bayshore/US 101 nb off to Cesar	PI PI PI		
40	Bayshore Blvd/Silver Ave	NSC NSC NSC		
47	Innes Ave/Earl St	-- -- --		
48	Evans Ave/Jennings St	-- -- --		
49	Bayshore Blvd/Geneva Ave	SC/PI SC/PI SC/PI		
50	Bayshore/Guadalupe Pkwy	-- -- --		

Table 12 (continued) Summary of Impacts at Intersections Operating at LOS E or LOS F				
	Intersection	Project	Project Variant 2 (Housing)	Project Variant 2A (Housing/R&D)
51	Bayshore Blvd/Valley Dr	--	--	--
52	Bayshore Blvd/Old County Rd	NSC	NSC	NSC
53	Sierra Pt/Lagoon Way	NSC	NSC	NSC
54	Ingalls St/Palou Ave [4]	--	--	--
55	Keith St/Palou Ave [4]	--	--	--
56	Third/Williams/Van Dyke	PI	PI	PI
57	Third St/Jerrold Ave	PI	PI	PI
58	Evans/Napoleon/Toland	SC/PI	SC/PI	SC/PI
59	Harney/Executive Park East	--	--	--
60	Harney/Thomas Mellon	--	--	--

Notes:
1. PI – Project Impact. Project results in a change in intersection operations from LOS D or better under 2030 No Project conditions, to LOS E or LOS F with the Project, Project Variants, or Project Alternatives, or from LOS E under 2030 No Project conditions to LOS F with the Project, Project Variants or Alternatives**.**
2. NSC – No Significant Contribution. Project would not contribute significantly to intersections operating at LOS E or LOS F under 2030 No Project conditions. No impacts.
3. SC/PI – Significant Contribution/Project Impact. Project would contribute significantly to intersections that would be operating at LOS E or LOS F under 2030 No Project conditions, resulting in a Project Impact.
Source: Fehr & Peers.

Under Project Variant 2A conditions, 41 of the 60 study intersections would operate at LOS E or LOS F conditions during the weekday AM or PM, or Sunday PM peak hours. At 12 of the 41 intersections the Project Variant 2A would result in project-specific impacts (i.e., project trips would cause intersections expected to operate at LOS D or better under 2030 No Project conditions to operate at LOS E or F, or intersections operating at LOS E under 2030 No Project conditions to deteriorate to LOS F conditions). At the remaining 29 of the 41 intersections that would operate at LOS E or LOS F, Project Variant 2A contributions were determined to be less than significant at 9 intersections, and significant at 20 intersections (as identified in Table 12). Development associated with Project Variant 2A would therefore result in impacts at 32 intersections (12 project-specific and 20 with significant contributions to LOS E or LOS F conditions).

Mitigation measures were identified for the following six intersections:

26. Tunnel/Blanken
27. Geneva/U.S. 101 Southbound Ramps (Alana/Beatty)
28. Harney/U.S. 101 Northbound Ramps (Alana/Harney/Thomas Mellon)
30. Crisp/Palou/Griffith
35. Amador/Cargo
49. Bayshore/Geneva

26. Tunnel/Blanken – At the signalized intersection of Tunnel/Blanken (currently unsignalized and required to be signalized as part of the Visitacion Valley Redevelopment), the intersection operating conditions would worsen in the AM peak hour from LOS D under 2030 No Project conditions to LOS F with Project Variant 2A. In the PM peak hour, the intersection would operate at LOS F under 2030 No Project and Project Variant 2A conditions.

> ***Project Variant 2A Mitigation Measure 3*****:** Implement Project Mitigation Measure 2 to reconfigure the northbound and southbound approaches to the intersection of Tunnel/Blanken to provide left turn lanes adjacent to shared through/right lanes. With implementation of Project Mitigation Measure 2, operations at this intersection would improve, but not to acceptable LOS D or better conditions in the AM and PM peak hours. Therefore, project-related impacts at this intersection would remain *significant and unavoidable*.

27. Geneva/U.S. 101 Southbound Ramps (existing Alana/Beatty)
28. Harney/U.S. 101 Northbound Ramps (existing Alana/Harney/Thomas Mellon)
Project Variant 2A would contribute significantly to cumulative impacts at these intersections.

> ***Project Variant 2A Mitigation Measure 4*****:** Implement Project Mitigation Measure 3. The SFCTA shall coordinate with the City of Brisbane and Caltrans to ensure that Project-generated vehicle trips are accounted for the Harney Interchange analyses and design. Since implementation of Project Mitigation Measure 5 would be under the jurisdiction of the City of Brisbane, the implementation of the mitigation measure is uncertain. Therefore, the Variant 2A-related impacts at these intersections would remain *significant and unavoidable.*

30. Crisp/Palou/Griffith – The intersection of Crisp/Palou is currently unsignalized, but would be signalized with implementation of Project Variant 2A. With Project Variant 2A, the intersection of Crisp/Palou would worsen in the PM peak hour from LOS E under 2030 No Project conditions (as an unsignalized intersection) to LOS F with Project Variant 2A (as a signalized intersection).

> ***Project Variant 2A Mitigation Measure 5***: Restripe the southbound approach to provide a dedicated left-turn lane and a shared through/right-turn lane. On-street parking would be prohibited on Griffith Street between Palou Avenue and Oakdale Avenue. Implementation of this improvement would be the responsibility of SFMTA and DPW, and shall be implemented as part of Hunters Point Shipyard Phase 3 roadway network improvements. The Project Applicant, in collaboration with the City, shall monitor traffic conditions at completion of Phase 2, Phase 3 and Phase 4 to determine whether the intersection operations would warrant reconfiguration and when it should be implemented. Based on the monitoring, if the City determines reconfiguration is warranted, the Project Applicant shall be required to fund the cost of reconfiguration. The SFMTA and DPW shall design and implement the measure as necessary. With

implementation of Project Variant 2A Mitigation Measure 5, this intersection would operate at acceptable LOS D or better in the AM and PM peak hours, and therefore with its implementation, project-related impacts at this intersection would be *less than significant*.

35. Amador/Cargo/Illinois – Project Variant 2A would contribute significantly to cumulative impacts at this intersection.

Project Variant 2A Mitigation Measure 6**:** Implement Project Mitigation Measure 4. SFMTA shall conduct a feasibility study of the intersection with the Port of San Francisco to determine the feasibility of reconfiguring the southbound approach on Illinois Street to provide a dedicated left turn lane and a dedicated right turn lane. With implementation of Project Mitigation Measure 5**,** operations at this intersection would improve to acceptable levels. However, since a feasibility study would be required, implementation of Mitigation Measure 4 is uncertain, and therefore, Variant 2A-related impacts at this intersection would remain *significant and unavoidable.*

49. Bayshore/Geneva – Project Variant 2A would contribute significantly to cumulative impacts at this location.

Project Variant 2A Mitigation Measure 7**:** Implement Project Mitigation Measure 5. The SFMTA and SFCTA shall coordinate with the City of Brisbane to ensure that projected traffic volumes are accounted for in the design of the Geneva Avenue Extension. S ince implementation of Project Mitigation Measure 5 would be under the jurisdiction of the City of Brisbane, the implementation of the mitigation measure is uncertain. Therefore, the Project Variant 2A-related impacts at this intersection would remain *significant and unavoidable.*

The Project discussion did not identify any feasible mitigation measures for 26 of the 32 intersections that would be impacted by Project Variant 2A, which include the following:

1. Third/25th
2. Third/Cesar Chavez
3. Third/Cargo
4. Third/Evans
5. Third/Oakdale
6. Third/Palou
7. Third/Revere
8. Third/Carroll
9. Third/Paul
11. Third/Jamestown
15. Cesar/Pennsylvania/I-280

16. Cesar/Evans
18. Bayshore/Paul
21. Bayshore/Bacon
24. Bayshore/Visitacion
25. Bayshore/Sunnydale
36. Bayshore/Cortland
37. Bayshore/Oakdale
38. Bayshore/Alemany/Industrial
39. Bayshore/U.S. 101 northbound off to Cesar
42. San Bruno/Paul
43. San Bruno/Silver
44. San Bruno/Mansell/U.S. 101 Southbound Off-ramp
56. Third/Williams/Van Dyke
57. Third/Jerrold
58. Evans/Napoleon/Toland

At the 26 intersections where feasible mitigation measures have not been identified, Variant 2A impacts would remain *significant and unavoidable.*

Traffic spillover effect for Variant 2A would be *significant and unavoidable*, as with the Project. Project and cumulative impacts on Harney Way would be the same as the Project, and widening of Harney Way, as described in Project Mitigation Measure 3, would also apply to Variant 2A.

Freeway Operations

Tables 13 through 15 present the results of the freeway mainline and weaving section analysis for conditions with the Project conditions for the AM and PM, and Sunday peak hours, respectively. **Table 16** presents a summary table of project impacts for Project, Project Variant 2, and Project Variant 2A.

Tables 17 through 19 present the results of the freeway mainline and weaving section analysis for conditions with the Project conditions for the AM and PM, and Sunday peak hours, respectively. **Table 20** presents a summary table of project impacts for Project, Project Variant 2, and Project Variant 2A. **Tables 21 through 23** present the results of the freeway diverge (off-ramp) queue storage analysis.

Table 13
Mainline and Weaving Segment LOS
Project, Project Variant 2, and Project Variant 2A Conditions – Weekday AM Peak Hour

Mainline Segment	Existing		No Project (Alt 1)		Project		Project-Var. 2 (Housing)		Project-Var. 2A (Housing/R&D)	
	LOS	Density[1] (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
U.S. 101										
NB - Cesar Chavez to Vermont	**E**	**44.6**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB – Harney Way to Third/Bayshore	D	33.8	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB – Sierra Point to Harney Way	D	33.8	**E**	**40.5**	**E**	**44.0**	**E**	**43.9**	**E**	**44.5**
SB – I-80 Merge to Cesar Chavez	D	33.4	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB – Third/Bayshore to Harney Way	**E**	**43.0**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB – Harney/Geneva to Sierra Point	**E**	**42.2**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
I-280										
NB – Alemany Off to Alemany On	**E**	**39.1**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**>45**
SB – Alemany On to Alemany Off C		23.9	D	34.6	D	34.6 D		34.6	D	34.6
Weaving Segment	**LOS**	**Service Vol. (pc/l)**	**LOS**	**Service Vol. (pc/l)**	**LOS**	**Service Vol. (pc/l)**	**LOS**	**Service Vol. (pc/l)**	**LOS**	**Service Vol. (pc/l)**
I-280										
NB – 25th Street to Mariposa Street	**E**	**1,680**	**F**	**>1,900**	**F**	**>1,900**	**F**	**>1,900**	**F**	**>1,900**
SB – Mariposa Street to 25th Street	B	810	**E**	**1,710**	**E**	**1,710**	**E**	**1,710**	**E**	**1,690**

Notes:
1. Density of vehicles per segment. pc/mi/ln = passenger cars per mile per lane.
2. For weaving sections service volume is reported as the measure of effectiveness. pc/h = passenger cars per hour
3. Segments operating at LOS E or LOS F conditions highlighted in **bold**

Source: Fehr and Peers.

Table 14
Mainline and Weaving Segment LOS
Project, Project Variant 2, and Project Variant 2A Conditions - Weekday PM Peak Hour

Mainline Segment	Existing		No Project (Alt 1)		Project		Project-Var. 2 (Housing)		Project-Var. 2A (Housing/R&D)	
	LOS [1]	Density [2] (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
U.S. 101										
NB - Cesar Chavez to Vermont	D	26.8	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB – Harney Way to Third/Bayshore	**E**	**42.3**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB – Sierra Point to Harney Way	**E**	**42.9**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB – I-80 Merge to Cesar Chavez	D	33.8	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB – Third/Bayshore to Harney Way	**E**	**36.0**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB – Harney/Geneva to Sierra Point	**E**	**36.8**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
I-280										
NB – Alemany Off to Alemany On C		23.9	D	33.3	D	33.3 D		33.3	D	33.3
SB – Alemany On to Alemany Off	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
Weaving Segment	LOS	Service [3] Vol. (pc/l)	LOS	Service Vol. (pc/l)	LOS	Service Vol. (pc/l)	LOS	Service Vol. (pc/l)	LOS	Service Vol. (pc/l)
I-280										
NB – 25th Street to Mariposa Street	C	1,350	**F**	**>1,900**	**F**	**>1,900**	**F**	**>1,900**	**F**	**>1,900**
SB – Mariposa Street to 25th Street	**E**	**1,630**	**F**	**>1,900**	**F**	**>1,900**	**F**	**>1,900**	**F**	**>1,900**

Notes:
1. Segments operating at LOS E or LOS F conditions highlighted in **bold**
2. Density of vehicles per segment. pc/mi/ln = passenger cars per mile per lane.
3. For weaving sections service volume is reported as the measure of effectiveness. pc/h = passenger cars per hour
Source: Fehr and Peers.

Table 15
Mainline and Weaving Segment LOS
Project, Project Variant 2, and Project Variant 2A Conditions - Sunday PM Peak Hour

Mainline Segment	Existing		No Project (Alt 1)		Project		Project-Var. 2 (Housing)		Project-Var. 2A (Housing)	
	LOS [1]	Density [2] (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
U.S. 101										
NB - Cesar Chavez to Vermont	C	20.6	D	32.3	D	33.7	D	34.0	D	34.1
NB – Harney Way to Third/Bayshore	C	22.0	D	30.4	D	32.3	D	32.4	D	32.4
NB – Sierra Point to Harney Way	C	21.9	D	27.3	D	31.4	D	31.0	D	31.0
SB – I-80 Merge to Cesar Chavez	D	28.8	D	33.3	D	34.1	D	34.0	D	33.7
SB – Third/Bayshore to Harney Way	C	21.4	D	32.0	D	34.3	D	34.4	D	34.1
SB – Harney/Geneva to Sierra Point	C	21.2	C	24.9	D	28.6	D	28.4	D	28.4
I-280										
NB – Alemany Off to Alemany On	B	15.6	C	21.6	C	21.6	C	21.6	C	21.6
SB – Alemany On to Alemany Off	D	27.0	D	29.5	D	29.5	D	29.5	D	29.5
Weaving Segment	**LOS**	**Service [3, 4] Vol. (pc/l)**	**LOS**	**Service Vol. (pc/l)**	**LOS**	**Service Vol. (pc/l)**	**LOS**	**Service Vol. (pc/l)**	**LOS**	**Service Vol. (pc/l)**
I-280										
NB – 25th Street to Mariposa Street	A	-	C	1,200	C	1,220	C	1,230	C	1,270
SB – Mariposa Street to 25th Street	A	-	C	1,310	C	1,300	C	1,320	C	1,260

Notes:

1. Segments operating at LOS E or LOS F conditions highlighted in **bold**
2. Density of vehicles per segment. pc/mi/ln = passenger cars per mile per lane.
3. For weaving sections service volume is reported as the measure of effectiveness. pc/h = passenger cars per hour
4. Weaving segments with speeds greater than 50 mph are outside of the realm of the weaving analysis, and thus are assumed to operate at LOS A.

Source: Fehr and Peers.

Table 16
Summary of Impacts at Mainline and Weaving Segments Operating at LOS E or LOS F

Mainline Segment	Project	Project Variant 2 (Housing)	Project Variant 2A (Housing/R&D)
U.S. 101			
NB - Cesar Chavez to Vermont	NSC	NSC	NSC
NB – Harney Way to Third/Bayshore	NSC	NSC	NSC
NB –Sierra Point to Harney Way	**SC/PI**	**PI**	**PI**
SB – I-80 Merge to Cesar Chavez	**SC/PI**	NSC NSC	
SB – Third/Bayshore to Harney Way	**SC/PI**	**SC/PI**	**SC/PI**
SB – Harney/Geneva to Sierra Point	**SC/PI**	**SC/PI**	**SC/PI**
I-280			
NB – Alemany Off to Alemany On	NSC	NSC	NSC
SB – Alemany On to Alemany Off	NSC	NSC	NSC
NB – 25th Street to Mariposa Street	NSC	NSC	NSC
SB – Mariposa Street to 25th Street	NSC	NSC	NSC

Notes:
1. PI – Project Impact. Project results in a change in mainline segments from LOS D or better under 2030 No Project conditions, to LOS E or LOS F with the Project, Project Variants, or Project Alternatives.
2. NSC – No Significant Contribution. Project would not contribute significantly to mainline segments operating at LOS E or LOS F under 2030 No Project conditions. No impacts.
3. SC/PI – Significant Contribution/Project Impact. Project would contribute significantly to mainline segment operating at LOS E or LOS F under 2030 No Project conditions, resulting in a Project Impact.

Table 17
Ramp Junction LOS
Project, Project Variant 2, and Project Variant 2A Conditions - Weekday AM Peak Hour

Ramp Location	Existing		2030 No Project		Project		Project-Var. 2 (Housing)		Project-Var. 2 (Housing/R&D)	
	LOS	Density[1] (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
U.S. 101										
NB on from Sierra Point Parkway C		27.0	C	27.5	D	30.4	D	30.3	D	30.7
NB on from Harney Way[2] C		20.2	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB on from Bayshore	D	31.2	C 22.5		C	23.6	C	23.5	C	24.0
NB on from Alemany/Industrial	**E**	**36.4**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB on from Bayshore/Cesar Chavez	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB off to Bayshore/Cesar Chavez	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Cesar Chavez/Potrero	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Alemany/San Bruno	C	24.1 D		28.8	C	24.1	C	24.1	C	24.1
SB on from Third/Bayshore	D	30.0	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Harney/Geneva[2] D		29.7	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Sierra Point/Lagoon	C	27.7	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
I-280										
NB off to Cesar Chavez	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB on from Indiana/25th	D	33.4	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB off to Pennsylvania/25th	C	23.6	**E**	**37.0**	**E**	**36.9**	**E**	**36.9**	**E**	**36.9**
SB on from Pennsylvania/25th	C	22.9	**E**	**36.3**	**E**	**36.1**	**E**	**36.3**	**E**	**36.3**

Notes:
1. Density of vehicles per segment. pc/mi/ln = passenger cars per mile per lane.
2. Cumulative 2030 No Project conditions assume the reconstruction of the Harney Way interchange, as well as the extension of Geneva Avenue from Bayshore Boulevard east to the reconstructed interchange.
3. Ramp junctions at LOS E or LOS F conditions highlighted in **bold**
Source: Fehr and Peers.

Table 18
Ramp Junction LOS
Project, Project Variant 2, and Project Variant 2A Conditions - Weekday PM Peak Hour

Ramp Location	Existing		2030 No Project		Project		Project-Var. 2 (Housing)		Project-Var. 2A (Housing/R&D)	
	LOS	Density[1] (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)	LOS	Density (pc/mi/ln)
U.S. 101										
NB on from Sierra Point Parkway	D	29.7	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB on from Harney Way[2] D		30.0	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB on from Bayshore	D	28.6	D 27.9		D	30.0	D	30.0	D	30.3
NB on from Alemany/Industrial	D	30.2	**E**	**35.9**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB on from Bayshore/Cesar Chavez	B	19.6	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB off to Bayshore/Cesar Chavez	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Cesar Chavez/Potrero	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Alemany/San Bruno	C	24.5 D		29.6	D	32.6	D	32.7	D	32.4
SB on from Third/Bayshore	C	26.5	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Harney/Geneva[2] C		24.2	D	31.9	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Sierra Point/Lagoon	C 26.5		C	22.7	D	28.5	D	28.5	D	28.5
I-280										
NB off to Cesar Chavez	D	28.4	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
NB on from Indiana/25th	C	27.4	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB off to Pennsylvania/25th	**E**	**36.7**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Pennsylvania/25th	**E**	**38.5**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**

Notes:
1. Density of vehicles per segment. pc/mi/ln = passenger cars per mile per lane.
2. Cumulative 2030 No Project conditions assume the reconstruction of the Harney Way interchange, as well as the extension of Geneva Avenue from Bayshore Boulevard east to the reconstructed interchange.
3. Ramp junctions at LOS E or LOS F conditions highlighted in **bold**
Source: Fehr and Peers.

Table 19 Ramp Junction LOS Project, Project Variant 2 and Project Variant 2A Conditions - Sunday PM Peak Hour										
Ramp Location	**Existing**		**2030 No Project**		**Project**		**Project-Var. 2 (Housing)**		**Project-Var. 2A (Housing/R&D)**	
	LOS	**Density[1] (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**	**LOS**	**Density (pc/mi/ln)**
U.S. 101										
NB on from Sierra Point Parkway B		19.3	C	22.5	C	25.3	C	25.1	C	25.1
NB on from Harney Way[2] B		19.5	D	33.0	**E**	**35.1**	**E**	**35.3**	**E**	**35.4**
NB on from Bayshore	B	16.8	C 21.9		C	22.4	C	21.9	C	22.4
NB on from Alemany/Industrial	C 23.5		C	24.6	C	25.6	C	24.6	C	25.8
NB on from Bayshore/Cesar Chavez	C	26.1	D	31.7	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB off to Bayshore/Cesar Chavez	**E**	**37.5**	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Cesar Chavez/Potrero	D	30.6	**F**	**>45**	**F**	**>45**	**F**	**>45**	**F**	**>45**
SB on from Alemany/San Bruno	B	17.3 C		21.2	C	22.5	C	22.5	C	22.3
SB on from Third/Bayshore	B	16.5 C		23.9	D	26.1	C	25.9	C	25.8
SB on from Harney/Geneva[2] B		18.7	C	24.8	D	29.8	D	29.5	D	29.5
SB on from Sierra Point/Lagoon	B 18.3		C	21.6	C	22.6	C	22.4	C	22.4
I-280										
NB off to Cesar Chavez	B	19.2	C	26.0	D	26.0	C	26.0	C	26.0
NB on from Indiana/25th	B	18.4 C		25.6	D	25.8	C	26.0	C	26.1
SB off to Pennsylvania/25th	C	27.0 D		30.7	D	30.9	D	31.1	D	31.1
SB on from Pennsylvania/25th	C	26.4 D		29.5	D	29.5	D	29.5	D	29.5

Notes:
1. Density of vehicles per segment. pc/mi/ln = passenger cars per mile per lane.
2. Cumulative 2030 No Project conditions assume the reconstruction of the Harney Way interchange, as well as the extension of Geneva Avenue from Bayshore Boulevard east to the reconstructed interchange.
3. Ramp junctions at LOS E or LOS F conditions highlighted in **bold**
Source: Fehr and Peers.

Table 20 Summary of Impacts at Ramp Junctions Operating at LOS E or LOS F			
Ramp Location	**Project**	**Project Variant 2 (Housing)**	**Project Variant 2A (Housing/R&D)**
U.S. 101			
NB on from Sierra Point Parkway	NSC	NSC	NSC
NB on from Harney Way[2]	SC/PI SC/	PI SC/	PI
NB on from Bayshore	--	--	--
NB on from Alemany/Industrial	PI	PI	PI
NB on from Bayshore/Cesar	SC/PI SC/	PI SC/	PI
SB off to Bayshore/Cesar Chavez	SC/PI	SC/PI	SC/PI
SB on from Cesar Chavez/Potrero	NSC	NSC	NSC
SB on from Alemany/San Bruno	--	--	--
SB on from Third/Bayshore	SC/PI SC/	PI SC/	PI
SB on from Harney/Geneva[2]	PI PI PI		
SB on from Sierra Point/Lagoon	NSC	NSC	NSC
I-280			
NB off to Cesar Chavez	SC/PI	SC/PI	SC/PI
NB on from Indiana/25th	SC/PI SC/	PI SC/	PI
SB off to Pennsylvania/25th	SC/PI SC/	PI SC/	PI
SB on from Pennsylvania/25th	NSC NSC NSC		

Notes:
1. PI – Project Impact. Project results in a change in ramp merge/diverge from LOS D or better under 2030 No Project conditions, to LOS E or LOS F with the Project, Project Variants, or Project Alternatives**.**
2. NSC – No Significant Contribution. Project would not contribute significantly to ramp merge/diverges operating at LOS E or LOS F under 2030 No Project conditions. No impacts.
3. SC/PI – Significant Contribution/Project Impact. Project would contribute significantly to ramp merge/diverges operating at LOS E or LOS F under 2030 No Project conditions, resulting in a Project Impact.

Table 21
Freeway Diverge Queue Storage
Project, Project Variant 2, and Project Variant 2A Conditions - Weekday AM Peak Hour

Ramp Location	Ramp Storage	Existing	2030 No Project	Project	Project Variant 2 (Housing)	Project Variant 2A (Housing/R&D)
		95th % Queue[1]	**95th % Queue**	**95th % Queue**	**95th % Queue**	**95th % Queue**
U.S. 101						
NB off to Harney Way[2] 2,800		< 100	1,725	2,350 2,350		2,500
NB off to Bayshore/Cesar Chavez	750	400	**Spillback**	**Spillback**	**Spillback**	**Spillback**
SB off to San Bruno/Silliman	600	225	225	225	225	225
SB off to San Bruno/Mansell	650	< 100	< 100	<100	< 100	< 100
SB off to Bayshore/Hester	1,700	225	275	275	275	275
SB off to Harney/Geneva[2] 1,000		< 100	**Spillback**	**Spillback**	**Spillback**	**Spillback**
SB off to Sierra Point/Lagoon	1,250	< 100	**Spillback**	**Spillback**	**Spillback**	**Spillback**
I-280						
NB off to Cesar Chavez	2,500	1,500	**Spillback**	**Spillback**	**Spillback**	**Spillback**
SB on from Pennsylvania/25th	900	< 100	< 100	< 100	<100.0	100

Notes:
1. Ramps where there is potential for spillback are highlighted in **bold.**
2. 95th percentile queue is the length of queue that has a probability of 5 percent or less of being exceeded during the peak hour.
3. 2030 No Project conditions assume the reconstruction of the Harney Way Interchange as well as the connection of Geneva Avenue to the reconstructed interchange.
Source: Fehr & Peers.

Table 22 Freeway Diverge Queue Storage Project, Project Variant 2, and Project Variant 2A Conditions - Weekday PM Peak Hour						
Ramp Location	**Ramp Storage**	**Existing**	**2030 No Project**	**Project**	**Project Variant 2A (Housing)**	**Project. Variant 2A (Housing/R&D)**
		95th % Queue[1]	**95th % Queue**	**95th % Queue**	**95th % Queue**	**95th % Queue**
U.S. 101						
NB off to Harney Way[2] 2,800		< 100	**Spillback**	**Spillback**	**Spillback**	**Spillback**
NB off to Bayshore/Cesar Chavez	750	375	525	525	525	525
SB off to San Bruno/Silliman	600	325	425	425	425	425
SB off to San Bruno/Mansell	650	150	350	350	350	350
SB off to Bayshore/Hester	1,700	225	125	125	125	125
SB off to Harney/Geneva[2] 1,000		< 100	**Spillback**	**Spillback**	**Spillback**	**Spillback**
SB off to Sierra Point/Lagoon 1,250		< 100	1,000	1,000 1,000	1,000	
I-280						
NB off to Cesar Chavez	2,500	650	900	900	900	900
SB on from Pennsylvania/25th	900	< 100	875	875 875 875		

Notes:

1. Ramps where there is potential for spillback are highlighted in **bold.**
2. 95th percentile queue is the length of queue that has a probability of 5 percent or less of being exceeded during the peak hour.
3. 2030 No Project conditions assume the reconstruction of the Harney Way Interchange as well as the connection of Geneva Avenue to the reconstructed interchange.

Source: Fehr & Peers.

Table 23
Freeway Diverge Queue Storage
Project, Project Variant 2, and Project Variant 2A Conditions - Sunday PM Peak Hour

Ramp Location	Ramp Storage	Existing	2030 No Project	Project	Project Variant 2 (Housing)	Project Variant 2A (Housing/R&D)
		95th % Queue[1]	**95th % Queue**	**95th % Queue**	**95th % Queue**	**95th % Queue**
U.S. 101						
NB off to Harney Way[2] 2,800		< 100	1,450	**Spillback** 2,575		Spillback
NB off to Bayshore/Cesar Chavez	750	275	350	350	350	350
SB off to San Bruno/Silliman	600	175	250	250	250	250
SB off to San Bruno/Mansell	650	< 100	< 100	100	100	100
SB off to Bayshore/Hester	1,700	300	300	325	325	350
SB off to Harney/Geneva[2] 1,000		< 100	**Spillback**	**Spillback**	**Spillback**	**Spillback**
SB off to Sierra Point/Lagoon	1,250	< 100	125	125	125	125
I-280						
NB off to Cesar Chavez	2,500	300	825	825	825	825
SB on from Pennsylvania/25th	900	< 100	150	175 200 200		

<u>Notes:</u>
1. Ramps where there is potential for spillback are highlighted in **bold.**
2. 95th percentile queue is the length of queue that has a probability of 5 percent or less of being exceeded during the peak hour.
3. 2030 No Project conditions assume the reconstruction of the Harney Way Interchange as well as the connection of Geneva Avenue to the reconstructed interchange.
Source: Fehr & Peers.

Mainline and Weaving Segments

Project Variant 2A would result in similar significant traffic impacts at freeway mainline segments as the Project, although the magnitude of impacts may be somewhat greater, due to the increased traffic generation compared to the Project. As described in the discussion of Project impacts in the Transportation Study pages 208 to 220, no feasible mitigation measures have been identified for the freeway segments expected to experience significant impacts under Project conditions. Therefore, the Project Variant 2A contributions to LOS E and LOS F freeway operating conditions would be considered *significant and unavoidable*.

Ramp Junctions

Project Variant 2A would result in similar significant traffic impacts to freeway ramp junctions as the Project, although the magnitude of impacts may be greater, due to increased traffic generation compared to the Project. As described in the discussion of Project impacts in the Transportation Study pages 220 to 222, no feasible mitigation measures have been identified for the freeway ramp junctions expected to experience significant impacts under Project conditions. Therefore, the Project Variant 2A contributions to deficient freeway operating conditions are considered *significant and unavoidable*.

The Project Variant 2A contributions to all off-ramps expected to experience significant traffic impacts associated with queuing under Project conditions would be the same as the Project. As described in the discussion of Project impacts in the Transportation Study, no feasible mitigation measures have been identified for the freeway off-ramps expected to experience significant impacts under Project conditions. Therefore, the Project Variant 2A contributions to freeway segments operating at LOS E or LOS F would be considered *significant and unavoidable*.

4. TRANSIT IMPACTS

Transit Capacity Utilization

Table 24 summarizes the capacity utilization for each of the three cordons for the weekday AM and PM peak hours for conditions with the Project, Project Variant 2, and Project Variant 2A. With the transit capacity increases proposed by the Project (see page 256 of the Transportation Study), the total transit travel demand on Muni under Project conditions could be accommodated for each of the three cordons during the AM and PM peak hours. All three cordons would operate at less than Muni's 85 percent capacity utilization standards.

Table 24 Ridership and Capacity Utilization at Study Area Cordons Project, Project Variant 2, and Project Variant 2A – Weekday AM and PM Peak Hours						
Peak Hour/Cordon	**Project**		**Variant 2 (Housing)**		**Variant 2A (Housing/R&D)**	
	Total Ridership	**Total Ridership**	**Total Ridership**	**% Util.**	**Total Ridership**	**% Util.**
AM Peak Hour						
East of Third Cordon						
Inbound	2,512	2,512	2,585	65%	2,540	64%
Outbound	1,511	1,511	1,841	46%	1,573	39%
North Cordon						
Inbound	2,457	2,457	2,490	70%	2,468	71%
Outbound	2,145	2,145	2,257	64%	2,167	62%
West Cordon						
Inbound	3,057	3,057	3,108	78%	3,073	77%
Outbound	1,863	1,863	2,073	52%	1,901	48%
PM Peak Hour						
East of Third Cordon						
Inbound	2,014	2,014	2,280	57%	2,089	52%
Outbound	2,151	2,151	2,214	56%	2,179	55%
North Cordon						
Inbound	2,664	2,664	2,889	81%	2,708	74%
Outbound	2,237	2,237	2,299	65%	2,259	62%
West Cordon						
Inbound	1,922	1,922	2,076	52%	1,958	49%
Outbound	2,403	2,403	2,442	61%	2,418	60%

Source: Fehr & Peers.

If Project-related transit capacity improvements are not provided, then only the capacity presented in **Table 72 in the Transportation Study** (page 256) for the 2030 No Project conditions would be available to accommodate Project and cumulative transit ridership. Under 2030 No Project conditions, the capacity utilization at the study area cordons is projected to exceed Muni's 85 percent capacity utilization standard. With the addition of Project-generated transit trips, the severity of the standard exceedance would increase, and would result in significant impacts. Because the final transit plan has not been formally approved by SFMTA, Project Mitigation Measure 7 is required to ensure the final Transit Plan will be prepared and implemented. With implementation of Project Mitigation Measure 7, the Project's impacts and the Project's contribution to cumulative impacts on transit capacity at the study area cordons would be *less than significant.*

Table 25 summarizes the capacity utilization for the downtown screenlines for the AM and PM peak hours for the Project conditions, and for Project Variant 2 and Variant 2A. As with the Project, Project Variant 2A would only add peak-direction riders through the southeast downtown screenline. Ridership on other screenlines would remain unchanged. With the addition of project trips, all downtown screenlines would continue to operate with Muni's 85 percent utilization standard. Therefore, Project impact on transit capacity at the Downtown Screenlines would be *less than significant.*

Table 25
Ridership and Capacity Utilization at Downtown Screenlines
Project and Project Variants – Weekday AM and PM Peak Hours

Peak Hour/Screenline	Project		Variant 2 (Housing)		Variant 2A (Housing/R&D)	
	Total Ridership	Total Ridership	Total Ridership	% Util.	Total Ridership	% Util.
AM Peak Hour						
Northeast	3,008	3,008	3,008	78%	3,008	78%
Northwest 8,949		8,949	8,949	75%	8,949	75%
Southeast 7,553		7,553	7,573	74%	7,603	75%
Southwest 7,674	_____ 7,674	_____ 7,674	_____ 76%		7,674 76%	
Total All Screenlines	27,184 27,184		27,204	75%	27,234	75%
PM Peak Hour						
Northeast	3,140	3,140	3,140	78%	3,140	78%
Northwest 8,155		8,155	8,155	75%	8,155	75%
Southeast 8,263		8,263	8,306	84%	8,312	83%
Southwest 8,829	_____ 8,829	_____ 8,829	_____ 82%		8,829 82%	
Total All Screenlines	28,387 28,387		28,430	80%	28,436	80%

Source: Fehr & Peers.

Table 26 summarizes the capacity utilization for the regional transit provider screenlines for the AM and PM peak hours for the Project conditions, and for Project Variant 2 and Variant 2A. As with the Project, Project Variant 2A would contribute relatively small ridership increases to regional transit compared to 2030 No Project conditions. Regional cordons would operate at the same percentage of capacity utilization with the Project and Project Variant 2A as under 2030 No Project conditions, with one exception. The capacity utilization for the South Bay would increase from 69 to 70 percent during the PM peak hour with the Project and Project Variant 2, and to 71 percent with Project Variant 2A, compared to the 2030 No Project scenario. The Project and Project Variant 2A would contribute slightly fewer trips to the South Bay cordon in the off-peak directions (southbound in the AM peak hour and northbound in the PM peak hour) than in the peak directions. Off-peak direction ridership would remain within available capacity in the AM and PM peak hours.

Similar to the Project, the increase in Project Variant 2A transit trips would not result in any cordon or screenline expected to operate within available capacity without the Project to exceed its capacity. Project Variant 2A contributions to regional transit providers operating at more than 100 percent capacity utilization (e.g., BART to East Bay, Golden Gate Transit to North Bay) would be minimal, about 0.1 percent. Therefore, the Project Variant 2A's impacts on transit capacity would be *less than significant*.

Table 26
Project Transit Trips and Capacity Utilization at Regional Screenlines
Project, Project Variant 2, and Project Variant 2A – Weekday AM and PM Peak Hours

Peak Hour/Screenline	Project		Variant 2 (Housing)		Variant 2A (Housing/R&D)	
	Total Ridership	% Util.	Total Ridership	% Util.	Total Ridership	% Util.
AM Peak Hour						
East Bay						
BART	36,202	185%	36,200	185%	36,204	185%
AC Transit	3,347	61%	3,347	61%	3,347	61%
Ferries	1,971	83%	1,971	83%	1,971	83%
subtotal	*41,520*	*151%*	*41,518*	*151%*	*41,522*	*151%*
North Bay						
Golden Gate Transit	2,621	106%	2,621	106%	2,621	106%
Ferries	1,647	97%	1,647	97%	1,647	97%
subtotal	*4,268*	*102%*	*4,268*	*102%*	*4,268*	*102%*
South Bay						
BART	12,416	89%	12,413	89%	12,420	89%
Caltrain	4,451	70%	4,449	69%	4,453	69%
SamTrans	799	75%	798	75%	800	75%
Ferries	152	51%	152	51%	152	51%
subtotal	*17,818*	*82%*	*17,812*	*82%*	*17,826*	*82%*
Total All Screenlines	***63,606***	***119%***	***63,598***	***119%***	***63,616***	***119%***
PM Peak Hour						
East Bay						
BART	30,268	154%	30,268	154%	30,277	154%
AC Transit	4,485	68%	4,485	68%	4,485	68%
Ferries	2,147	79%	2,147	79%	2,147	79%
subtotal	*36,900*	*128%*	*36,900*	*128%*	*36,908*	*128%*
North Bay						
Golden Gate Transit	2,513	114%	2,513	114%	2,514	114%
Ferries	1,630	96%	1,630	96%	1,630	96%
subtotal	*4,143*	*106%*	*4,143*	*106%*	*4,144*	*106%*
South Bay						
BART	10,707	76%	10,708	76%	10,708	77%
Caltrain	4,008	63%	4,013	63%	4,028	63%
SamTrans	404	43%	408	43%	425	43%
Ferries	75	25%	75	25%	75	25%
subtotal	*15,194*	***70%***	*15,204*	***70%***	*15,258*	***71%***
Total All Screenlines	***56,237***	***103%***	***56,247***	***103%***	***56,312***	***103%***

Source: Fehr & Peers.

Project Transit Delay

Table 27 summarizes the increases in transit travel times associated with the Project, Project Variant 2, and Project Variant 2A for each route within the study area, compared to 2030 No Project conditions. **Table 28** identifies the number of additional vehicles that would be required to meet the proposed headways.

Table 29 presents the summary table of project transit impacts for Project, Project Variants, and Alternatives to the Project. On **Table 29**, Project impacts (PI) were identified where the Project would result in an increase in ridership that would result in an exceedance of the capacity utilization standard, or an increase in transit delay such that additional transit vehicles would be required to maintain proposed headways**.**

During the AM peak hour Project Variant 2A would require additional transit vehicles on the same routes as the Project. During the PM peak hour, Project Variant 2A would require additional vehicles on the same routes as the Project, except that the Project Variant 2A would also require additional vehicles on the 48-Quintara-24th Street. The number of vehicles required for each peak hour for the Project and Project Variant 2A is shown in **Table 28**. Impacts associated with Project Variant 2A would be somewhat more extensive than those for the Project. Project Variant 2A would require 8 additional vehicles in the AM peak hour, and 12 additional vehicles in the PM peak hour. As with the Project, these vehicles would be in addition to those required to maintain 2030 No Project headways (as shown on Table 83 on page 292 of the Transportation Study).

Project transit Mitigation Measures 7 though 14.2 would be applicable for Project Variant 2A, and would reduce the impacts associated with Project Variant 2A by similar amounts as described for the Project. However, as with the Project, impacts on transit operations would remain *significant and unavoidable*.

Table 27 Project Increases to Transit Travel Time (minutes:seconds)[1, 2] Project, Project Variant 2, and Project Variant 2A – Weekday AM and PM Peak Hours							
Route	**Proposed Headway (min.)**	**Northbound/Eastbound**			**Southbound/Westbound**		
		Project	**Variant 2 (Hsng)**	**Variant 2A (Hsng/R&D)**	**Project**	**Variant 2 (Hsng)**	**Variant 2A (Hsng/R&D)**
AM Peak Hour							
9-San Bruno	10	**1:09**	**1:19**	**1:20**	**8:04**	**8:09**	**7:00**
23-Monterey 15		0:41	0:38	0:26	3:51	3:51	4:18
24-Divisadero 6		**5:34**	**5:24**	**5:52**	**2:44**	**3:04**	**3:24**
28L-19th Ave Ltd	5	**3:36**	**3:36**	**3:37**	**1:01**	**0:39**	**1:01**
29-Sunset 10		**4:39**	**6:15**	**6:12**	**9:55**	**8:28**	**8:19**
44-O'Shaughnessy 6		**5:53**	**5:54**	**6:40**	**6:16**	**6:14**	**6:09**
48-Quintara-24th St	15	**2:00**	**3:06**	**4:12**	**2:20**	**6:39**	**6:25**
54-Felton 3 20		0:56	1:39	1:55	-0:17	-3:00	-1:59
T-Third 8		1:34	1:35	1:38 1:39		1:39	1:39
PM Peak Hour							
9-San Bruno	10	**4:03**	**3:55**	**3:06**	**6:49**	**6:49**	**6:25**
23-Monterey 15		0:56	0:58	0:53	1:57 1:57		1:28
24-Divisadero 6		**6:45**	**6:56**	**7:26**	**5:53**	**8:59**	**9:33**
28L-19th Ave Ltd	5	**2:59**	**2:59**	**2:59**	0:03 0:03		0:03
29-Sunset 10		**16:00**	**15:35**	**17:01**	**16:32**	**16:18**	**16:19**
44-O'Shaughnessy 6		**6:05**	**6:56**	**5:40**	**7:18**	**8:02**	**9:05**
48-Quintara-24th St	15	2:51	**7:21**	**5:38**	3:00	**5:26**	**6:31**
54-Felton 3 20		**3:48**	**4:09**	**4:30**	**5:32**	**3:13**	**4:35**
T-Third 8		**2:57**	**2:50**	**3:08**	**2:33**	**2:32**	**2:39**

Notes:
1. Delays measured for each route between project site and key destination/transfer point away from the project. The study segment for each route is as follows:
- 9-San Bruno: Bayshore Boulevard between Sunnydale Avenue and Jerrold Avenue
- 23-Monterey: between Ingalls Street/Oakdale Avenue and the Glen Park BART Station
- 24-Divisadero: between Hunters Point Shipyard and Mission Street
- 28L-19th Avenue Limited: between Hunters Point Shipyard and Mission Street
- 29-Sunset: between Candlestick Point and Mission Street
- 44-O'Shaughnessy: between Hunters Point Shipyard and the Glen Park BART Station
- 48-Quintara-24th St: between Hunters Point Shipyard and the 24th Street BART Station
- 54-Felton: between Jerrold Avenue/Earl Street and Mission Street
- T-Third: Third Street between Thomas Avenue and Jerrold Avenue (This segment represents the section of the T-Third route that does not provide exclusive right-of-way for transit and would be most affected by increased traffic congestion.)

2. Routes where the Project would increase travel times such that additional vehicles would be required highlighted in **bold**.
3. Due to roadway improvements proposed by the Project and differences between the No Project and Project land use assumptions at the Hunters Point Shipyard, there would be less traffic congestion along 54-Felton route in study area with the Project, than under 2030 No Project conditions.
Source: Fehr & Peers.

Table 28 Additional Muni Transit Vehicle Requirements Project, Project Variant 2, and Project Variant 2A – Weekday AM and PM Peak Hours			
Route	**Project**	**Variant 2 (Housing)**	**Variant 2A (Housing/R&D)**
AM Peak Hour			
9-San Bruno	**1**	**1**	**1**
23-Monterey 0		0	0
24-Divisadero	**1**	**2**	**2**
28L-19th Ave Ltd	**1**	**1**	**1**
29-Sunset	**1**	**1**	**1**
44-O'Shaughnessy	**2**	**2**	**2**
48-Quintara-24th Street	**1**	**1**	**1**
54-Felton [2] 0		0	1
T-Third 0	_	0	0
Total	***7***	***8***	***8***
PM Peak Hour			
9-San Bruno	**1**	**1**	**1**
23-Monterey 0		0	0
24-Divisadero	**3**	**2**	**2**
28L-19th Ave Ltd	**1**	**1**	**1**
29-Sunset	**3**	**3**	**3**
44-O'Shaughnessy	**2**	**2**	**2**
48-Quintara-24th Street	0	**1**	**1**
54-Felton	**1**	**1**	**1**
T-Third	**1**	**1**	**1**
Total	***12***	***12***	***12***

Note:
Transit vehicle requirements for Project and Project Variants are in addition to those required for the 2030 No Project condition (Alternative 1) identified in Table 83 on page 292 of the Transportation Study.
Source: Fehr & Peers.

Table 29 Summary of Transit Impacts – Capacity Utilization and Transit Operations			
Intersection	**Project**	**Project Variant 2 (Housing)**	**Project Variant 2A (Housing/R&D)**
Capacity Utilization Analyses			
Cordons			
North	-- --		--
West	-- --		--
East of Third	-- --		--
Downtown Screenlines			
Northeast	NSC NSC		NSC
Northwest	NSC NSC		NSC
Southeast	NSC NSC		NSC
Southwest	NSC NSC		NSC
Regional Screenlines			
East Bay	NSC NSC		NSC
North Bay	NSC NSC		NSC
South Bay	NSC NSC		NSC
Transit Operations Analyses			
9-San Bruno	PI PI		PI
23-Monterey	SC/PI SC/PI		SC/PI
24-Divisadero	PI PI		PI
28L-Geneva Limited	PI PI		PI
29-Sunset	PI PI		PI
44-O'Shaughnessy	PI PI		PI
48-Quintara-24th Street	PI PI		PI
54-Felton	PI PI		PI
T-Third	PI PI		PI

Notes:
1. PI – Project Impact. Project results in an increase in ridership that would result in an exceedance of the capacity utilization standard, or an increase in transit delay such that additional transit vehicles would be required to maintain proposed headways.
2. NSC – No Significant Contribution. Project would not contribute significantly to transit ridership at locations where capacity utilization under 2030 No Project condition exceeds capacity utilization standards. Or if Project would not contribute significantly to poor intersection operations that would affect transit operations. No impacts.
3. SC/PI – Significant Contribution/Project Impact. Project would contribute significantly to poor intersection operations that, therefore, would contribute to significantly to transit delays that would result in the need for additional transit vehicles to maintain proposed headways.
Source: Fehr & Peers.

5. BICYCLE IMPACTS

Project Variant 2A would include additional development within Hunters Point Shipyard and would result in increased bicycle travel within and adjacent to the Project area. The bicycle trips associated with the increased development would be accommodated within the proposed street network, and impacts on bicycle circulation would *be less than significant*.

As with the Project, potential significant impacts on bicycle travel on Palou Avenue would occur under Project Variant 2A. Project Mitigation Measure 15 would be applicable to Project Variant 2A. Because a feasibility study of the relocation of Bicycle Routes #70 and #170 on Palou Avenue would be required, the implementation of Project Mitigation Measure 15 is uncertain, and therefore the Project Variant 2A impacts on bicycle circulation would remain *significant and unavoidable.*

6. PEDESTRIAN IMPACTS

Project Variant 2A would include additional development within Hunters Point Shipyard and would result in increased pedestrian travel within and adjacent to the Project area. The pedestrian trips associated with the increased development would be accommodated within the proposed sidewalk network, and impacts on pedestrian circulation would *be less than significant*.

7. PARKING IMPACTS

Table 30 summarizes the aggregate of the parking demand calculated for Project land uses, and also presents the maximum permitted parking supply per the parking standards detailed in the draft D4D standards as well as the proposed number of new on-street parking spaces that would be provided on new and reconfigured streets. [1] **Table 31** summarizes the parking demand, and the resultant parking shortfalls assuming Project parking supply for two scenarios: based on the maximum permitted draft D4D standards; and, assuming provision of no off-street spaces but that only the on-street parking spaces would be available. Since the D4D standards do not include minimum requirements (instead specify the maximum parking supply that would be permitted to be provided) it is possible that the Project could be constructed without any off-street parking. However, most development projects in San Francisco develop the maximum permitted supply, and therefore the comparison of the parking demand to the maximum permitted off-street supply and to no off-street supply presents the range of potential parking impacts.

[1] The Project would include some on-street parking in the project site for both commercial and general/residential uses. About 683 on-street spaces would be provided within Hunters Point Shipyard and 1,360 spaces within Candlestick Point for a total of 2,043 spaces.

Table 30
Summary of Parking Demand and Maximum Permitted Supply
Project, Project Variant 2, and Project Variant 2A

Scenario/Project Component	Demand [1]				Supply[1]		
	Residential	Non-Residential		Total Demand	Maximum Permitted Off-Street [2]	New On-Street	Total Supply
	Long Term	Long Term	Short Term				
Project							
Hunters Point Shipyard	3,110	3,818	996	7,924	6,678	683	7,361
Candlestick Point	9,212	1,475	2,622	13,309	10,196	1,360	11,556
Total	*12,322*	*5,293*	*3,618*	*21,233*	*16,874*	*2,043*	*18,917*
Variant 2 (Housing)							
Hunters Point Shipyard	4,694	3,811	911	9,416	7,778	1,298	9,076
Candlestick Point	7,627	1,480	2,787	11,894	8,846	1,360	10,206
Total	*13,321*	*5,291*	*3,698*	*21,310*	*16,624*	*2,658*	*19,282*
Variant 2A (Housing/R&D)							
Hunters Point Shipyard	5,016	4,508	980	10,504	8,703	1,428	10,131
Candlestick Point	7,305	1,180	2,787	11,272	8,571	1,360	9,931
Total	*13,321*	*5,688*	*3,767*	*21,776*	*17,274*	*2,788*	*20,062*

Notes:
1. Does not include stadium parking supply or game day demand.
2. Maximum number of spaces permitted per draft Design for Development standard for Candlestick Point Hunters Point Shipyard Phase II Development Plan.

Source: CHS Consulting, LCW Consulting.

Table 31
Summary of Parking Shortfalls for No Minimum and Maximum Permitted Supply [1, 2]
Project, Project Variant 2, and Project Variant 2A

Scenario/Project Component	Total Demand	Minimum Supply		Maximum Supply	
		Supply	Shortfall	Supply	Shortfall
Project					
Hunters Point Shipyard	7,924	683	- 7,241	7,361	- 563
Candlestick Point	13,309	1,360	- 11,949	11,556 -	1,753
Total	*21,233*	*2,043*	*- 19,190*	*18,917*	*- 2,316*
Variant 2 (Housing)					
Hunters Point Shipyard	9,416	1,298	- 8,118	9,076	- 340
Candlestick Point	11,894	1,360	- 10 534	10,206 -	1,688
Total	*21,310*	*2,658*	*- 18,652*	*19,282*	*- 2,028*
Variant 2A (Housing/R&D)					
Hunters Point Shipyard	10,504	1,428	- 9,076	10,131	- 373
Candlestick Point	11,272	1,360	- 9,912	9,931 -	1,341
Total	*21,776*	*2,788*	*- 18,988*	*20,062*	*- 1,714*

Notes:
1. Includes off-street and new on-street supply.
2. Does not include stadium parking supply or demand.
Source: CHS Consulting, LCW Consulting.

The development program for Variant 2A would be similar to the Project, however, about 1,625 residential units would be shifted from Candlestick Point to Hunters Point Shipyard, and an additional 500,000 gsf of R&D uses would be developed within Hunters Point Shipyard. Parking impacts would be similar to the Project. Compared with a maximum supply of about 20,062 spaces, the parking demand of 21,776 spaces would result in an excess demand of 1,714 spaces. As with the Project, Variant 2A would not significantly impact parking conditions.

As indicated in **Table 31,** if no off-street parking is developed, the parking shortfall would be substantially greater than if the maximum permitted supply is provided. The parking shortfall would be 18,988 spaces for Variant 2A. As noted above, if no parking is provided, drivers may park outside of the project area, or may switch to transit, carpool, bicycle or other modes of travel. Due to parking shortfalls, there may be impacts to pedestrians, bicycles and transit caused by parking on the sidewalks, double-parking, and parking at intersections or other illegal parking activities. However, parking impacts for Project Variant 2A would be *less than significant*.

8. LOADING IMPACTS

Table 32 summarizes the estimate of daily truck trips generated by the proposed land uses and the associated demand for loading dock spaces during the peak hour of loading activities (which generally occurs between 10:00 a.m. and 1:00 p.m.), and the estimated supply that would be provided per draft Design for Development. As for the Project, the estimated loading supply would be greater than the loading demand during the peak hour of loading operations. Within the Hunters Point Shipyard the loading demand and estimated supply would be similar, while within Candlestick Point the supply would substantially exceed the demand. This is due primarily to the calculation for retail uses, which has the most intensive loading demand. For the regional retail uses within Candlestick Point, loading facilities would be located to meet multiple tenants within the retail development. Overall, Project Variant 2A impacts related to loading operations would be *less than significant.*

Table 32
Summary of Loading Demand and Supply
Project, Project Variant 2, and Project Variant 2A

Scenario/Project Area	Daily Truck Generation	Peak Hour Loading Dock Space Demand	Supply [1, 2,]
Project			
Hunters Point Shipyard	713	41	42
Candlestick Point	507	29	59
Total	*1,220*	*70*	*101*
Project – Variant 2 (Housing)			
Hunters Point Shipyard	766	44	47
Candlestick Point	458	27	55
Total	*1,224*	*71*	*102*
Project – Variant 2A (Housing/R&D)			
Hunters Point Shipyard	881	51	53
Candlestick Point	448	25	54
Total	*1,329*	*77*	*107*

Notes:
1. Minimum number of loading spaces permitted per draft Design for Development standard for the CP-HPS Phase II Development Plan.
2. Does not include stadium loading facilities.
Source: LCW Consulting.

9. EMERGENCY VEHICLE ACCESS IMPACTS

Emergency vehicle access impacts under Project Variant 2A would be similar to the Project; impacts on emergency access would be *less than significant.*

10. AIR TRAFFIC IMPACTS

Air traffic impacts under Project Variant 2A would be similar to the Project; impacts on air traffic safety would be *less than significant.*

11. HAZARDS DUE TO DESIGN FEATURES

Impacts related to hazards under Project Variant 2A would be similar to the Project; *less than significant.*

12. CONSTRUCTION IMPACTS

Construction activities associated with Variant 2A would be similar to the Project. Variant 2A does not include construction of a new stadium at Hunters Point Shipyard, instead assumes an additional 500,000 square feet of R&D uses, and reallocation of 1,625 residential units from Candlestick Point to Hunters Point Shipyard. Depending on the phasing of the additional development, the Variant 2A may result in fewer construction traffic impacts between future years 2012 and 2017 when the new stadium is proposed to be constructed, and somewhat greater impacts in the years the additional R&D space or housing units would be constructed. Implementation of a traffic control plan would reduce the project's contribution to significant cumulative impacts of overlapping construction traffic. However, as with the Project, cumulative transportation impacts associated with construction activities would be considered *significant and unavoidable.*

Implementation of Project Mitigation Measure 16 would be applicable to Project Variant 2A. A Hunters Point Shipyard – Candlestick Point Construction Traffic Management Program would help minimize the Project Variants' construction-related transportation impacts and contribution to cumulative-construction related transportation impacts. However, since some disruption and increased delays could still occur even with implementation of the mitigation measure, and it is possible that significant construction-related transportation impacts on local and regional roadways could still occur. Localized construction-related transportation impacts would therefore remain *significant and unavoidable.*

13. STADIUM AND ARENA IMPACTS

Project Variant 2A does not include construction of a new stadium. Furthermore, the existing stadium at Candlestick Point would be demolished, and the 49er games would be played elsewhere. Game day impacts for Project Variant 2A are *not applicable*.

Project Variant 2A includes a 10,000-seat arena in the Candlestick Point area. Although most events would have less than 10,000 attendees, preliminary economic analysis has indicated that the arena could hold up to 250 events annually with an average attendance of 5,000. The transportation analysis examines the worst-case scenario, in which a 10,000-person event is held on a weekday evening.

Project Variant 2A would include somewhat more development in the Hunters Point area and development in the Candlestick Point area would be the similar to the Project, including construction of a 10,000-seat arena. Overall, since new facilities, including local streets and freeway facilities, would experience congested traffic prior to an arena event, traffic impacts associated with the new Arena during arena events would be *significant*. Implementation of Project Mitigation Measure 21 would be applicable to Project Variant 2A. However, even with the implementation of Project Mitigation Measure 21, the Project Variant 2A's impacts to the study roadway network during a sell-out event at the arena would be *significant and unavoidable*.

The transit demand with a sold-out arena event under the Project conditions were approaching, but not above, the amount of available transit capacity. However, since the amount of background transit demand under Variant 2A would be higher, it is possible that the added transit demand associated with a sold-out arena event would create demand for transit service greater than the capacity of the transit supply to the arena.

> ***Project Variant 2A Mitigation Measure 19***: SFMTA shall increase frequency on regularly scheduled Muni routes serving the stadium area prior to large events at the arena. Routes 29-Sunset and 28L-19th Avenue Limited would already be operating near their maximum frequency. Therefore, this mitigation measure primarily applies to Route CPX. If headways on this route were increased to five-minute frequencies in the one to two-hours prior to an event at the arena, the hourly transit capacity toward the arena would increase by 380 passengers per hour, for a total of 2,658. This would likely be adequate capacity, but may still leave some routes over-capacity and others below-capacity. Therefore, additional shuttle service to key regional transit destinations, such as BART, Caltrain, and the T-Third light rail route shall also be provided by the arena operator.

With implementation of Project Variant 2A Mitigation Measure 19, the impacts to transit service during sell-out events at the arena would be reduced, but not to less-than-significant levels. In addition, traffic impacts during secondary events would not be mitigated, and would impact transit operations. Therefore, the impact on transit operations would remain *significant and unavoidable.*

14. MITIGATION MEASURES

Traffic

Project Variant 2A Mitigation Measure 1: Implement Project Mitigation Measure 1 – TDM Plan

Project Variant 2A Mitigation Measure 2: Implement Project Mitigation Measure 6 – Harney Way Widening

Project Variant 2A Mitigation Measure 3: Implement Project Mitigation Measure 2 – Improvements at Tunnel/Blanken

Project Variant 2A Mitigation Measure 4: Implement Project Mitigation Measure 3 – Harney Interchange Project Improvements

Project Variant 2A Mitigation Measure 5: At the intersection of Crisp/Palou/Griffith, restripe the southbound approach to provide a dedicated left-turn lane and a shared through/right-turn lane. On-street parking would be prohibited on Griffith Street between Palou Avenue and Oakdale Avenue. Implementation of this improvement would be the responsibility of SFMTA and DPW, and shall be implemented as part of Hunters Point Shipyard Phase 3 roadway network improvements. The Project Applicant, in collaboration with the City, shall monitor traffic conditions at completion of Phase 2, Phase 3 and Phase 4 to determine whether the intersection operations would warrant reconfiguration and when it should be implemented. Based on the monitoring, if the City determines reconfiguration is warranted, the Project Applicant shall be required to fund the cost of reconfiguration. The SFMTA and DPW shall design and implement the measure as necessary. With implementation of Project Variant 1 Mitigation Measure 5, this intersection would operate at acceptable LOS D or better in the AM and PM peak hours, and therefore with its implementation, project-related impacts at this intersection would be *less than significant*.

Project Variant 2A Mitigation Measure 6: Implement Project Mitigation Measure 4 – Improvements at Amador/Cargo/Illinois

Project Variant 2A Mitigation Measure 7: Implement Project Mitigation Measure 5 – Improvements at Bayshore/Geneva

Transit

Project Variant 2A Mitigation Measure 8: Implement Project Mitigation Measure 7 – Project Transit Operating Plan

Project Variant 2A Mitigation Measure 9: Implement Project Mitigation Measure 8.1 and 8.2 – 9-San Bruno Improvements

Project Variant 2A Mitigation Measure 10: Implement Project Mitigation Measure 9.1 and 9.2 – 23-Monterey, 24-Divisadero, and 44-O'Shaughnessy Improvements

Project Variant 2A Mitigation Measure 11: Implement Project Mitigation Measure 10.1 and 10.2 – 29-Sunset Improvements

Project Variant 2A Mitigation Measure 12: Implement Project Mitigation Measure 11.a and 11.2 – 48-Quintara-24th Street Improvements

Project Variant 2A Mitigation Measure 13: Implement Project Mitigation Measure 12 – 54-Felton Improvements

Project Variant 2A Mitigation Measure 14: Implement Project Mitigation Measure 13.1 and 13.2 – T-Third Improvements

Project Variant 2A Mitigation Measure 15: Implement Project Mitigation Measure 14.1 and 14.2 – 28L-19th Avenue/Geneva Limited Improvements

Bicycle

Project Variant 2A Mitigation Measure 16: Implement Project Mitigation Measure 15 – Bicycle Route #70 and #170 Improvements

Pedestrian

No significant environmental impacts have been identified; no mitigation required.

Parking

No significant environmental impacts have been identified; no mitigation required.

Loading

No significant environmental impacts have been identified; no mitigation required.

Construction

Project Variant 2A Mitigation Measure 17: Implement Project Mitigation Measure 16 – Construction Traffic Management Program

7Stadium

No stadium proposed as part of Project Variant 2A; no mitigation measures required.

Arena

Project Variant 2A Mitigation Measure 18: Implement Project Mitigation Measure 21 – Arena Transportation Management Program

Project Variant 2A Mitigation Measure 19: SFMTA shall increase frequency on regularly scheduled Muni routes serving the stadium area prior to large events at the arena. Routes 29-Sunset and 28L-19th Avenue Limited would already be operating near their maximum frequency. Therefore, this mitigation measure primarily applies to Route CPX. If headways on this route were increased to five-minute frequencies in the one to two-hours prior to an event at the arena, the hourly transit capacity toward the arena would increase by 380 passengers per hour, for a total of 2,658. This would likely be adequate capacity, but may still leave some routes over-capacity and others below-capacity. Therefore, additional shuttle service to key regional transit destinations, such as BART, Caltrain, and the T-Third light rail route shall also be provided by the arena operator.

Appendix Table of Contents

Appendix F: Intersection LOS Calculations

Appendix G: Freeway Mainline and Ramp LOS Calculations

Appendix H: Transit Calculations

Appendix J: Travel Demand Calculations

[Appendices are available for review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA.]

Appendix T7 LCW Consulting, CP-HPS Phase II Development Plan Transportation Study—Subalternative 4A, April 8, 2010

LCW Consulting

Memo

To: Bill Wycko, San Francisco Planning Department, MEA

From: Luba C. Wyznyckyj, LCW Consulting
Chris Mitchell, Eric Womeldorff, Fehr & Peers

Date: April 8, 2010

Re: CP-HPS Phase II Development Plan Transportation Study – Subalternative 4A

This memorandum is a supplement to the *Candlestick Point-Hunters Point Shipyard Phase II Development Plan Transportation Study* (November 2009) that was prepared to address the impacts associated with a new Alternative 4A. Alternative 4 analyzes a reduced-development alternative while preserving the four historic structures on Hunter Point Shipyard. The purpose of Alternative 4A is to analyze the Project's land use program, while preserving the four historic structures.

The development program for Alternative 4A would be the same as the Project, and therefore the travel demand presented for the Project on Draft EIR pages III.D-56 to III.D-63 would be the same for Alternative 4A. In addition, the transportation improvements included as part of the Project, and described on Draft EIR pages III.D-40 to III.D-56 would also apply to Alternative 4A. Based on the same development program and transportation network, the impact assessment presented in Impacts TR-1 through TR-58 for the Project would be the same for Alternative 4A.

In summary, for purposes of the transportation impact analysis, Alternative 4A would the same as the Project, and therefore all impact assessments, conclusions, and mitigation measures would be same as presented in the Draft EIR and Transportation Study (Appendix D of the Draft EIR) for the Project.