Harbor Island West Marina Redevelopment Project

Volume 1 - Draft Mitigated Negative Declaration Appendices

UPD #MND-2013-80

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DRAFT MITIGATED NEGATIVE DECLARATION FOR HARBOR ISLAND WEST MARINA REDEVELOPMENT PROJECT SAN DIEGO, CALIFORNIA

EXECUTIVE SUMMARY

The San Diego Unified Port District (District), as the lead agency under the California Environmental Quality Act (CEQA), has prepared this Draft Mitigated Negative Declaration (MND) for the Harbor Island West Marina Redevelopment Project (Project). The Project site is located at 2040 Harbor Island Drive, San Diego, CA 92101 (see Figure 1 and Figure 2 in Attachment A, Initial Study). The Project site is located within Planning District 2, Harbor Island/Lindbergh Field, of the District's certified Port Master Plan (PMP).

This document has been prepared pursuant to the requirements of CEQA (Public Resources Code Section 21000, et seq.) and the implementing regulations, the "CEQA Guidelines" (California Code of Regulations, Title 14, Division 6, Chapter 3, Section 15000, et seq.), as well as the District's CEQA Guidelines (Clerk Document No. 36294). Specifically, this document meets the requirements of CEQA Guidelines Sections 15070 and 15071 and District CEQA Guidelines Section V., and the attached Initial Study (see Attachment A) meets the requirements of CEQA Guidelines Section 15063 and District CEQA Guidelines Section IV. Together, the Initial Study and MND meet CEQA's content requirements by including a project description; a description of the environmental setting; thresholds of significance; potential environmental impacts and feasible mitigation measures for any significant effects; discussion of consistency with plans and policies; and names of the document preparers.

A. Project Description

The Harbor Island West Marina Redevelopment Project (proposed Project) includes the replacement of several elements comprising the Harbor Island West Marina (HIWM), an existing marina facility that provides services and amenities to the boating community and waterfront access opportunities to the public. The proposed Project would replace the existing aged dock structure and existing landside buildings and infrastructure to accommodate a wider range of recreational vessel sizes, create more slip opportunities for a greater diversity of boaters including entry level boaters, and to ensure the HIWM's long-term operational viability.

The proposed Project includes the following components: (1) demolition of 146,000 square feet of existing docks (providing 620 boat slips); (2) new construction of 140,000 square feet of new docks (providing 603 boat slips); (3) demolition of 23,000 square feet of existing building space and reconstruction of approximately 15,682 square feet of new building space; (4) removal of the 120,000-square-foot existing paved parking lot and installation of a new 116,000-square-foot paved parking lot; (5) removal of 15,000 square feet of existing landscaping with installation of approximately 18,000 square feet of new landscaping; (6) construction of a new 12-foot-wide public promenade and reconstruction of an existing 6,000-square-foot viewing deck for public use; and, (7) modernization of onsite utilities and lighting. The project proponent, HIW Associates, LP, also seeks a new 40-year lease for construction, operation, and maintenance of the proposed Project.

B. Proposed Finding

The Initial Study prepared for the proposed Project (Attachment A) found that the proposed Project would not result in significant impacts in the following areas: aesthetics, agriculture and forestry resources, air quality, cultural resources, energy, greenhouse gas emissions, land use and planning, mineral resources, noise, population and housing, public services, traffic, tribal cultural resources, utilities and service systems, and wildfire.

Impacts that were shown to have a less than significant impact with mitigation were biological resources, geology and soils, hazards and hazardous materials, hydrology and water quality, recreation. Measures to avoid or mitigate the effects would be incorporated into the Project to reduce the impacts to below a level of significance. These measures are identified in Table 4 and discussed below in Section IV. Environmental Analysis.

I. INTRODUCTION

A. Purpose of a Negative Declaration

CEQA Section 21064 defines a Negative Declaration as a well written statement briefly describing the reasons that a proposed project will not have a significant effect on the environment and does not require the preparation of an environmental impact report.

Section 21604.5 defines a Mitigated Negative Declaration as a negative declaration prepared for a project when the initial study has identified potentially significant effects on the environment, but (1) revision in the project plans or proposals made by, or agreed to by, the applicant before the proposed negative declaration is released for public review would avoid the effects or mitigate the effects to a point where clearly no significant effect on the environment would occur; and (2) there is no substantial evidence in light of the whole record before the lead agency that the project, as revised, may have a significant effect on the environment.

CEQA Section 21068 defines a significant effect on the environment as a substantial or potentially substantial adverse change in the environment. CEQA Section 21082.2(a) requires the lead agency to determine whether a project may have a significant effect on the environment based on substantial evidence in light of the whole record.

Accordingly, the District has prepared an Initial Study to address the potential environmental effects associated with the Project pursuant to the requirements of CEQA, the CEQA Guidelines, and the District's CEQA Guidelines. Specifically, the Initial Study meets the requirements of CEQA Guidelines Section 15063 and the District's CEQA Guidelines Section IV. The Initial Study includes a discussion of the Project's effects on the existing environment. Issue areas identified as having potential impacts are discussed further and include mitigation measures that would reduce potential impacts to "Less Than Significant with Mitigation Incorporated." Project-specific information is discussed below.

See Attachment A for the Initial Study.

B. Project Applicant

The Project Proponent is HIW Associates, LP, a California Limited Partnership, and is a tenant of the District.

C. Project Purpose and Need

The HIWM consists of aging infrastructure that is nearing the end of its useful life and needs replacement to ensure the marina's continuation and long-term competitiveness. HIW Associates, LP is proposing a renovation project that includes replacement of the existing aged dock structure with a similarly sized new dock structure within the footprint of the existing dock layout and replacement of the existing landside buildings with a slightly smaller building structure.

Accordingly, the proposed Project would allow the operator to accommodate the needs of the current boating market while improving public access to the waterfront and increasing public safety for the users and their guests. The proposed Project would also allow for a more energy efficient and environmentally conscious marina property, provide facilities that comply with current Americans with Disabilities Act (ADA) standards, maintain facilities that create and promote more slip opportunities for entry level recreational boating while accommodating the evolving needs of recreational boaters, and to ensure the HIWM's long-term operation.

D. Project Location

The project location and regional vicinity is illustrated in Figure 1 (Regional Vicinity) and Figure 2 (Project Location) of Attachment A, respectively. The Project site is located at 2040 Harbor Island Drive, San Diego, CA 92101 within Planning District 2 (Harbor Island/Lindbergh Field), of the certified Port Master Plan (PMP). Existing landside uses on Harbor Island generally consist of hotels, restaurants, public parks, and marine-related services. Water-related uses in the area are predominantly related to recreational boating and include slip rentals, boat rentals, charters, lessons, sailing clubs, and other visitor-serving uses.

Existing adjacent land uses to the Project site include the Hilton San Diego Airport/Harbor Island Hotel to the east; Tom Ham's Lighthouse Restaurant to the west; open water to the north; and Harbor Island Drive, Harbor Island Park, and North San Diego Bay to the south. Major circulation facilities in the area include North Harbor Drive, Rosecrans Street, and Interstate 5 (I-5).

II. PROJECT DESCRIPTION

The proposed Project includes the repair, maintenance, replacement, and redevelopment of the HIWM. Specifically, the Project consists of the following elements as shown in Figure 5 (Proposed Site Plan) and Figure 6 (Conceptual Improvements) of Attachment A.

- Demolition of 23,000 square feet of existing building space and reconstruction of approximately 15,682 square feet of new building space. Existing and new buildings have a maximum elevation of 45 feet above grade;
- Demolition of the existing 120,000-square-foot paved parking lot and construction of a new 116,000-square-foot paved parking lot;
- Removal of 15,000 square feet of existing landscaping with installation of approximately 18,000 square feet of new landscaping with an area for bicycle parking;
- Reconstruction of an existing 6,000-square-foot public viewing deck and construction of a new public 12-foot-wide promenade;
- Reconstruction of a 1,200-square-foot swimming pool and 75-square-foot Jacuzzi. The reconstructed pool remains the same size while the Jacuzzi increases from 75 square feet to 100 square feet.
- Demolition of 146,000 square feet of existing docks providing 620 boat slips and construction of 140,000 square feet of new docks providing 603 boat slips; and,
- Modernization of on-site utilities and lighting.

The Project also involves a proposed new 40-year lease to HIW Associates, LP from the District for construction, operation, and maintenance of the proposed Project.

As part of fulfilling BPC Policy No. 608 (Tenant Percent for Art Program), the proposed Project includes the potential for a public art component on the Project site which may include functional artwork along the proposed promenade and/or a contribution to the Coronado Bridge Lighting Project.

A. Landside Improvements

A comparison of the existing landside conditions and the proposed improvements is presented below in Table 1. Attachment A provides additional details and figures.

Table 1. Existing Conditions and Proposed Landside Improvements Summary

Project Component	Existing Conditions		Proposed Improvements		Change from Existing Conditions
	Quantity	Component Area	Quantity	Component Area	
Buildings	3	23,000 sq. ft.	2	15,682 sq. ft.	Decrease of 7,318 square feet of building area; 1 fewer building
Landscaping	--	15,000 sq. ft.	--	18,000 sq. ft.	Increase of 3,000 square feet of landscaped area
Parking Lot Pavement	--	120,000 sq. ft.	--	116,000 sq. ft.	Decrease in 4,000 square feet of parking lot pavement
Parking Spaces	351	--	380	--	Increase in 29 parking spaces (up to 4 available to public)
Public Promenade	--	N/A	--	900 linear ft.	Increase in 900 linear feet
Public viewing deck	1	6,000 sq. ft.	1	6,000 sq. ft.	Reconstructed, but same amount of area
Swimming Pool	1	1,200 sq. ft.	1	1,200 sq. ft.	Reconstructed, but same amount of area
Jacuzzi	1	75 sq. ft.	1	100 sq. ft.	Increase of 25 square feet
Bicycle Parking	0	--	25	--	Increase in 25 bicycle parking spaces

Source: HIW 2018

B. Waterside Improvements

Table 2 provides a summary comparison of the existing waterside conditions. Attachment A provides additional details and figures.

Table 2. Existing Conditions and Proposed Waterside Improvements Summary

Project Component	Existing Conditions		Proposed Improvements		Change from Existing Conditions
	Quantity	Component Area	Quantity	Component Area	
Docks	11	146,000 sq. ft.	10	140,000 sq. ft.	Decrease of 6,000 square feet of dock area
Piles[1]	326	326 sq. ft.	313[2]	383.55 sq. ft.	Decrease of 13 piles, increase in 57.55 sq. ft. of pile area[3]
Boat Slips	620	--	603	--	Decrease of 17 boat slips
Dedicated Fire Standpipes[4]	0	--	30	--	Increase in 30 fire standpipes
Boater Access Ramps	4	--	4	--	No change
Sanitary Pump Station	1	--	1	--	No change
Fuel Dock	1	--	1	--	No change

Source: HIW 2018

[1] Existing piles are 12-inch square concrete piles (approximately 1 square foot per each pile). New piles would be a combination of 14-inch square concrete piles (approximately 1.36 square feet each) and 18-inch square concrete piles (approximately 2.25 square feet each).

[2] Existing piles consist of 326 12-inch square concrete piles totaling 326 square feet. Proposed piles would consist of 313 piles (189 re-used12-inch square concrete piles, 95 14-inch square concrete piles, and 29 18-inch square concrete piles) totaling 383.55 square feet.

[3] Pile square footage is part of the overall dock system square footage.

[4] Dedicated Fire Standpipes are a type of rigid water piping to which fire hoses can be connected, allowing manual application of water to the fire. A standpipe serves the same purpose as a fire hydrant.

The proposed changes to the dock/headwalk extensions would result in the realignment of the existing slips within the marina. The proposed changes to the dock and slip configuration would result in a reduction in the overall size of the current dock facility from 146,000 square feet to 140,000 square feet (a 6,000 square foot reduction in bay coverage), and approximately 17 fewer slips (from 620 slips to 603 slips). While the reconstruction of the dock system would result in 17 fewer boat slips, the new dock system configuration would provide for a wider range of vessel sizes, including the ability to accommodate smaller vessels down to 12 feet-in-length, which are currently not serviced at the marina. The proposed slip mix would increase the number of tie-ups and slips for smaller vessels, and slips would continue to be available to the general public. Table 3 provides a summary of the proposed slip mix.

Table 3. Proposed Slip Mix Summary

	Existing		**Proposed**	
Slip Range	**Slip Quantity**	**% of Total Slip Inventory**	**Slip Quantity**	**% of Total Slip Inventory**
12 – 20 feet	0	0%	57	9.5%
21 – 25 feet	96	15.5%	106	17.6%
26 – 30 feet	111	17.9%	55	9.1%
31 – 35 feet	231	37.3%	174	28.9%
36 – 40 feet	106	17.1%	73	12.1%
41 – 45 feet	9	1.5%	28	4.6%
46 – 50 feet	44	7%	44	7.3%
Greater than 51 feet	23	3.7%	66	10.9%
Total	**620**	**--**	**603**	**--**

Source: HIW 2018

C. New Lease

The proposed Project includes a new lease between the District and HIW Associates, LP for a term of 40 years. The uses in the lease would allow HIW Associates, LP to construct, operate, and maintain a recreational marina with 603 boat slips along with associated ancillary facilities, including, but not limited to, deli/food service, retail, marine-related offices, and marina support facilities; customer parking; a public promenade and a public lookout deck; and the marina-related operations and businesses.

III. ENVIRONMENTAL SETTING

The HIWM is one of five marinas located on the north side of Harbor Island in San Diego Bay. Within the project vicinity, landside facilities on Harbor Island include hotels, restaurants, public parks and greenways, and marine service facilities. Water use within the project vicinity is characterized by a mix of commercial and recreational uses. The commercial water uses within the project vicinity consist of boat rentals, charters, lessons, sailing clubs, and other similar visitor servicing uses. However, the dominant use of the water area is recreational boating. Vehicular traffic mostly consists of access to the various businesses that reside on Harbor Island.

The existing landside structures include 1 single-story and 2 two-story wood-framed buildings with a total plan footprint area of approximately 23,000 square feet. These buildings currently provide space for offices, lockers/storage, janitor facilities, laundry, a restaurant, snack bar, deli/food service, visitor-serving retail, mechanical maintenance facilities and a chandlery, as well as a club room and locker room for users of the marina. There is a large asphalt parking area with 351 parking stalls on the Project site. The existing waterside improvements include 146,000 square feet of docks with 620 boat slips.

The Project is located within the jurisdiction of the District and is located within Planning District 2 (Harbor Island/Lindbergh Field), of the certified PMP. The specific land and water use designations for the Project site include Commercial Recreation, Recreation Boat Berthing, Fueling Dock, and Sanitary Pump Dock. The Project is compatible with existing land and water use designations.

IV. ENVIRONMENTAL ANALYSIS

A. Environmental Factors Potentially Affected

The Initial Study (Attachment A) evaluated the potential environmental impacts of the proposed Project and determined that the proposed Project would result in impacts that are mitigated to below a level of significance for biological resources, geology and soils, hazards and hazardous materials, hydrology and water quality, and recreation. A full analysis/discussion of these issue areas is provided in the attached Initial Study.

B. Effects Found Not To Be Significant

Based on the Initial Study conducted for the proposed Project (see Attachment A), the following effects were found not to be significant and no mitigation is required: aesthetics, agriculture and forestry resources, air quality, cultural resources, energy, greenhouse gas emissions, land use and planning, mineral resources, noise, population and housing, public services, traffic, tribal cultural resources, utilities and service systems, and wildfire. A full analysis/discussion of these issue areas is provided in the attached Initial Study.

V. MITIGATION MONITORING AND REPORTING PROGRAM

Reporting and documentation of implementation of the following mitigation measures shall be performed in accordance with District Administrative Policy No. 750.

Table 4. Harbor Island West Marina Redevelopment Project MND Mitigation Monitoring and Reporting Plan

Mitigation Measure(s)	Responsible Party	Mitigation Timing
Biological Resources		
MM-BIO-1: Monitoring Program. Prior to construction activities involving in-water pile driving, the project proponent shall prepare and implement a marine mammal and green sea turtle monitoring program. This monitoring program shall be approved by the District and shall include the following requirements: • For a period of 15 minutes prior to the start of in-water construction, a qualified biologist, retained by the project proponent and approved by the District's Director of Development or designee of the District, shall continuously monitor a 74-meter radius (zone of influence) around the active pile driving areas to ensure that special status species are not present. • The construction contractor shall not start work if any observations of special status species are made prior to starting pile driving. No driving will be conducted until the area has been free of marine mammal sightings for 15 minutes. • The qualified biologist shall continually continuously monitor the zone of influence (ZOI - 74 meters from pile driving activity) during pile driving activities to observe any marine mammals or turtles that approach or enter the ZOI. The qualified biologist shall have authority to stop all work on-site and shall do so if a marine mammal or sea turtle enters the ZOI or could otherwise be impacted by construction noise. The qualified biologist must meet the minimum requirements as defined by the National Oceanic Atmospheric Administration's *Guidance for Developing a Marine Mammal Monitoring* Plan (NOAA 2017)**.**	**Implementation**: Project proponent **Monitoring and Reporting**: Qualified marine biologist, approved by the District, Project proponent **Verification:** District	Prior to in-water construction
MM-BIO-2: Soft Start Methodology for Impact Hammer Pile Driving. The contractor shall initiate all impact hammer pile driving techniques with a soft start methodology using an initial three sets of three low energy pile strikes. Low energy strikes are performed by running the impact hammer at reduced energy (typically 50-70 percent of full impact force) followed by a 30-second waiting period to initiate impact driving before ramping up to full hammer energy. The soft-start methodology shall be utilized any time pile driving has ceased for a period in excess of 30 minutes, provided compliance with MM-BIO-1 confirms pile driving activities may commence.	**Implementation**: Project proponent **Monitoring and Reporting**: Qualified marine biologist, approved by the District, Project proponent **Verification:** District	During in-water project construction
MM-BIO-3: Avoid Nesting Season for Birds or Conduct Preconstruction Nesting Surveys. To ensure compliance with the MBTA and similar provisions under Sections 3503 and 3503.5 of the California Fish and Game Code, the Project proponent shall conduct all	**Implementation**: Project proponent	Prior to and during landside vegetation clearing/construction

Mitigation Measure(s)	Responsible Party	Mitigation Timing
vegetation removal (e.g., ornamental trees) during the non-breeding season between September 1 and March 14 or shall implement the following: 1. If landside construction activities are scheduled between March 15 and August 31, the Project proponent shall retain a qualified biologist who shall conduct a focused nesting bird survey within potential nesting habitat prior to the start of vegetation removal. The survey shall be submitted to the District's Environmental Conservation Department prior to the commencement of vegetation removal on the Project site. 2. The nesting bird survey area shall include the entire limits of disturbance plus a 500-foot buffer to ensure indirect impacts would be avoided. The nesting surveys shall be conducted within 1 week prior to initiation of construction activities and shall consist of a thorough inspection of the Project site by a qualified biologist(s). The survey shall occur between sunrise and 12:00 p.m., when birds are most active. If no active nests are detected during these surveys, only a brief letter report documenting the results shall be prepared. 3. If the qualified biologist confirms nesting within 300 feet of the disturbance footprint, a no-disturbance buffer shall be established around each nest site to avoid disturbance or destruction of the nest until after the nesting season or a qualified biologist determines that the nest is no longer active. The size and constraints of the no-disturbance buffer shall be determined by the qualified biologist, but shall not be greater than 300 feet. If there is a delay of more than 7 days between when the nesting bird survey is performed and vegetation removal begins, the qualified biologist shall resurvey to confirm that no new nests have been established.	**Monitoring and Reporting**: Qualified biologist, approved by the District, Project proponent **Verification:** District	
MM-BIO-4: Develop and Implement an Eelgrass Mitigation and Monitoring Plan as Required by the California Eelgrass Mitigation Policy. Prior to the start of any in-water construction, the Project proponent shall retain a qualified biologist to develop and implement an eelgrass mitigation plan in compliance with the California Eelgrass Mitigation Policy. The qualifications of the qualified biologist are subject to approval by the District's Environmental Conservation Department. The mitigation plan shall be submitted to the District's Environmental Conservation Department and resource agencies (NMFS and CDFW) for approval 60 days prior to initiation of waterside project activities. The mitigation plan shall be implemented to (1) develop new eelgrass habitat on the areas of the vessel dock areas that will no longer be shaded and (2) compensate for losses to eelgrass in the event that the surveys described below indicate the project has impacts on eelgrass. The specific eelgrass mitigation plan elements shall, at a minimum, include the following: 1. Prior to the commencement of any in-water construction activities, a qualified marine biologist retained by the Project Applicant and approved by the District shall conduct a pre-construction eelgrass survey. Surveys for eelgrass shall be conducted during the active eelgrass growing season (March–October), and results will be valid for 60 days, unless completed in September or October. If completed in September or October, results will be valid until March (the resumption of the next	**Implementation**: Project proponent **Monitoring and Reporting**: Qualified marine biologist, approved by the District, Project proponent **Verification:** District, NMFS (NOAA Fisheries)	Prior to the start of any in-water construction, during construction, and post-construction

Mitigation Measure(s)	Responsible Party	Mitigation Timing
growing season). The qualified marine biologist shall submit the results of the pre-construction survey to the District and resource agencies within 30 days. 2. Identification of Project areas within the vessel dock area that are no longer shaded and are considered favorable to restore a minimum of 300 square meters (2,700 square feet) of eelgrass habitat. In addition, the mitigation plan shall include: a. Description of harvest and transplantation techniques to satisfy California Department of Fish and Wildlife requirements with regards to ensuring protection of beds used as a source of transplant material. b. A schedule that ensures eelgrass is transplanted as soon as possible following reconfiguration of the eastern portion of the marina where suitable planting sites become un-shaded by dock structures. 3. The Project proponent, through its general contractor shall: a. Provide the pre-construction eelgrass surveys noted above identifying and demarcating the distribution of eelgrass to construction crews to assist tug and barge operations to avoid impacting eelgrass. b. Require all tug and barge operators to locate all anchored and spudded construction barges outside of eelgrass beds when not in use. c. Instruct tugboat operators that propeller wash can damage eelgrass beds and not to direct propeller wash towards eelgrass beds. No anchoring (and other bottom-disturbing activities) shall occur within eelgrass beds. 4. Within 30 days of completion of in-water construction activities, a qualified marine biologist retained by the Project Applicant and approved by the District shall conduct a post construction eelgrass survey during the active eelgrass growing season or within the first 30 days of the next active growth period following construction that occurs outside of active growth period. The post-construction survey shall evaluate potential eelgrass impacts associated with construction. Upon completion of the post-construction survey, the qualified marine biologist shall submit the survey report to the District and resource agencies within 30 days. 5. At least two years of annual post-construction eelgrass surveys shall be conducted during the active eelgrass growing season. The additional annual surveys shall evaluate the potential for operational impacts on eelgrass. 6. In the event that construction impacts on eelgrass are detected in the post-construction survey and/or subsequent surveys, the Project Applicant shall implement the following: a. A qualified marine biologist retained by the Project Applicant and approved by the District shall develop a mitigation plan for in-kind mitigation. The qualified marine biologist shall submit the mitigation plan to the District and resource agencies within 60 days following the post-construction survey.		

Mitigation Measure(s)	Responsible Party	Mitigation Timing
b. The eelgrass mitigation and monitoring plan shall specify that the contractor/entity harvesting eelgrass to implement the required mitigation would need to obtain a Scientific Collecting Permit (SCP) for eelgrass harvest and a letter of authorization (LOA) at least 30–60 days prior to implementation. c. Mitigation for eelgrass impacts shall be at a ratio of no less than 1.2:1, as required by the California Eelgrass Mitigation Policy. d. Mitigation shall commence within 135 days of any noted impacts on eelgrass, such that mitigation commences within the same eelgrass growing season that impacts occur. e. Upon completing mitigation, the qualified biologist shall conduct mitigation performance monitoring at performance milestones of 0, 12, 24, 36, 48, and 60 months. f. The qualified biologist shall conduct all mitigation monitoring during the active eelgrass growing season and shall avoid the low growth season (November–February). Performance standards shall be in accordance with those prescribed in the California Eelgrass Mitigation Policy. g. The qualified biologist shall submit the monitoring reports and spatial data to the District and resource agencies within 30 days after the completion of each monitoring period. The monitoring reports shall include all of the specific requirements identified in the California Eelgrass Mitigation Policy.		
Geology and Soils		
MM-GEO-1: Compliance with Recommendations of the Geotechnical Studies. Implementation of the proposed Project would comply with the recommendations of the Geotechnical Studies (Geotechnical Investigation Landside Improvements Harbor Island West Marina prepared by TerraCosta Consulting Group, Inc. dated January 28, 2015 and Guide Pile and Approach Pier/Gangway Foundation Design Criteria Harbor Island West Marina Letter Report prepared by TerraCosta Consulting Group, Inc. dated December 10, 2012) to ensure seismic ground-shaking does not impact the proposed Project.	**Implementation**: Project proponent **Monitoring and Reporting**: Project proponent **Verification:** City of San Diego/District	Prior to/during construction
Hazards and Hazardous Materials		
MM-HAZ-1: Conduct Sediment Sampling and Implement Remediation Measures. At the conclusion of the pile driving, the Project Applicant shall conduct sediment sampling of representative areas of potential disturbance near the location of piles. Sampling shall be conducted in accordance with the Water Quality Control Plan for Enclosed Bays and Estuaries (SWRCB 2009). Sediment sampling results shall rely on the Effects Range – Low (ER-L) and Effects Range – Medium (ER-M) guideline values of the National Oceanic and	**Implementation**: Project proponent **Monitoring and Reporting**: Sampling and Remediation Report	Conclusion of pile driving

Mitigation Measure(s)	Responsible Party	Mitigation Timing
Atmospheric Association (NOAA) Screening Quick Reference Tables (Buchman 2008). If the sediment samples show concentrations of sediment contamination above the guideline values, the Project Applicant shall delineate the extent of cross-contamination and propose remediation approaches (subject to approval by the District and any other agencies with jurisdiction over site contamination) that may include, but are not limited to, dredging, placement of sand cover, or Enhanced Monitored Natural Recovery (EMNR) sand containing active carbon. The Project Applicant shall implement the approved remediation. The results of the sampling and remediation shall be documented in a report to be reviewed and approved by the District, RWQCB, and any other appropriate regulatory agencies.	**Verification:** District, RWQCB, other regulatory agencies as appropriate	
Hydrology and Water Quality		
MM-HWQ-1: Implementation of Best Management Practices During Hydraulic Jetting and Pile Driving. The following best management practices (BMPs) shall be implemented during the Project's hydraulic jetting and pile driving process: • Pile Jetting: Contractor shall control sediment displacement by reducing the jetting volume and/or velocity where feasible. Prior to pile jetting, the contractor shall first "stab" the pile into the bottom substrate to advance it through the upper layer of soft sediment and then jet the pile to reduce sediment disturbance during jetting operations. • Silt Curtains: Silt curtains shall be in place for the entirety of the Project (i.e., installed before the jetting process begins and not be removed until the pile driving is completed for all piles). The silt curtains shall be placed as close to the construction zone as practical and extend to the bottom but should not rest on the seafloor based on tidal variations. Given the tidal variation at the Harbor Island West Marina, the length of the silt curtains shall be adjusted to accommodate varying water levels (e.g., use of curtains with reefing or furling lines). The maximum water depth in the vicinity of the Harbor Island West Marina is approximately 20 feet at high tide; therefore, a 19 foot deep silt curtain shall likely be sufficient for the deepest areas. Shorter curtains may be used in shallower areas. Silt curtain specifications shall be provided to the District prior to installation. Silt curtain deployment shall be monitored by the construction contractor personnel proficient in all aspects of silt curtains to ensure that turbidity does not escape and tidal currents do not cause deflection, and that the curtain length is properly set. Torn or damaged curtains shall be repaired or replaced immediately. • Debris Handling: Removed pilings, debris, and any adhering sediment shall be disposed of off-site by the contractor. If sediment must be stored at the Project site	**Implementation**: Project proponent **Monitoring and Reporting**: Monthly report to District **Verification:** District	During hydraulic jetting and pile driving

Mitigation Measure(s)	Responsible Party	Mitigation Timing
prior to disposal, it should be placed in containers or lined/covered storage areas constructed to prevent release and spillage. • Surface Boom: A floating surface boom shall be used to capture floating debris. The boom shall be placed at a sufficient distance from the construction area so as to capture all debris. Debris should be removed at the end of every work day, or sooner. In the case of rough waters, debris shall be removed immediately. If there is any reason to believe that there will be any oil, fuel, creosote, or other similar materials released during jetting, absorbent pads shall be required in conjunction with the boom. • Utility Boat: A small boat shall be available throughout the duration of waterside Project construction to manage the silt curtains, booms, and debris. • Equipment Inspection: All jetting equipment, including hoses, lines, and jet pumps, shall be inspected daily and replaced or repaired accordingly. • Navigation Restrictions: Work activities and restrictions to boat navigation shall be scheduled and coordinated ahead of time with the District and Harbor Island West Marina and Sheraton San Diego Hotel and Marina tenants. Sufficient notification shall be provided. In the event that emergency vessel traffic must be accommodated, the contractor shall move the BMPs immediately. • Structure Demolition: To the greatest extent possible, any structures requiring demolition shall be removed whole and dismantled at a location away from the water. • Daily Inspection: All BMPs shall be inspected at least daily. Any faulty/failing equipment shall be repaired/replaced as necessary. Daily visual water quality monitoring shall include monitoring for any visible turbidity plumes, oil or sheens, floating debris, or water discoloration associated with project construction activities and shall be conducted a minimum of one hour after commencement of construction activities with the potential to cause sediment disturbance. A monthly report of the monitoring shall be compiled and submitted to the District's Engineering and Construction Management Department. If a turbidity plume is observed, response actions shall be immediately taken (see MM-HWQ-2).		
MM-HWQ-2: Implementation of Best Management Practices for Turbidity Monitoring During Hydraulic Jetting and Pile Driving. The following best management practices (BMPs) for turbidity monitoring shall be implemented during the Project's hydraulic jetting and pile driving processes:	**Implementation**: Project proponent	During hydraulic jetting and pile driving

Mitigation Measure(s)	Responsible Party	Mitigation Timing
• Turbidity shall be monitored a minimum of once per week at mid-depth of water column. The monitoring shall include the following: ○ Monitoring Stations – During weekly monitoring turbidity shall be measured at the construction site after pile driving activities have been underway for at least one hour and at a reference site. Monitored water quality measurements shall be compared to ambient San Diego Bay reference measurements located outside of the construction area (outside silt curtain) that are not impacted by the construction. ○ Project Compliance Stations – A minimum of three locations shall be established as compliance stations for the collection of water quality monitoring data. Compliance station data shall be compared to reference station data to determine if the construction activities are impacting water quality based on the Performance Standards (see below). Compliance stations shall be located evenly along an arc located 200 feet from the edge of the construction area to capture all tidal and current conditions. The locations may be adjusted in the field to better target a visible turbidity plume, if a visible plume is observed. ○ Reference Station – A minimum of one station shall be established as a reference station to measure ambient San Diego Bay water quality conditions and shall be located in the direction of the mouth of the Bay and 1,000 feet beyond the influence of construction activities. Natural turbidity shall be determined through measurements at the reference station in order to compare the reference station measurements to compliance stations measurements. ○ Global Position System – Monitoring station positions will be located using a Global Position System (GPS) accurate to within ±3 meters. • Performance Standards – The following turbidity standards are based on recent Regional Water Quality Control Board permit requirements (e.g., RWQCB, 2016; RWQCB, 2017) and are required to meet performance standards: ○ If reference station turbidity is between 0 to 50 NTUs, the maximum increase from construction activities must not exceed 20 percent of the measured turbidity at the reference station. If reference station turbidity is between 51 to 100 NTUs, the maximum increase from construction activities must not exceed 10 NTUs. If reference turbidity is greater than 100 NTUs, the	**Monitoring and Reporting**: Monthly Report to District **Verification:** District	

Mitigation Measure(s)	Responsible Party	Mitigation Timing
maximum increase from construction activities must not exceed 10 percent above the reference levels. • Response Actions to Water Quality Monitoring Exceedance - In the event that visual observations (MM-HWQ-1, MM-HWQ-3) or the water quality monitoring described here in MM-HWQ-2, indicate an exceedance of an applicable receiving water Performance Standard, the following actions shall be implemented: o Immediately re-take water measurements at reference and compliance stations in accordance with the procedures in MM-HWQ-2. o Evaluate the measurements at background and compliance monitoring stations and use visual observations to determine whether the exceedance is caused by construction activities or by other ambient conditions in San Diego Bay such as wind waves, boat wakes, barge/ship traffic, and storm inflow. o If the exceedance is confirmed to be a result of the project construction, monitor conducting the water quality monitoring shall coordinate with the District's Engineering and Construction Management Department to immediately notify the contractor to modify or cease operations related to in-water construction activities and/or inspect the BMP's to ensure they are working properly to mitigate the exceedance. Operational modifications may include fixing, adjusting, maintaining, and/or upgrading silt curtains or use of a second silt curtain. o Re-evaluate water measurements at all relevant stations no more than 30 minutes later, after additional BMPs or operational modifications are implemented. o If the receiving water performance standards exceedance continues to persist, even with additional BMPs, determine and implement operational modifications including modifying the rate of jetting, waiting longer to initiate pile driving, or perform more start-stops until the exceedance levels comply with the performance standards. If necessary, corresponding construction activities shall be stopped until performance standards are met. Typically, turbidity is reduced within one hour.		
MM-HWQ-3: Implementation of Best Management Practices for Visual Monitoring During Hydraulic Jetting and Pile Driving. Implement the following response actions to visual plumes observed outside of the silt curtain:	**Implementation**: Project proponent	Immediately by phone and within 24 hours by report

Mitigation Measure(s)	Responsible Party	Mitigation Timing
• If the condition of the silt curtain is observed to be damaged, no longer positioned around the in-water construction area, or has gaps where a visible turbidity plume is forming outside of the silt curtain, the contractor shall act immediately to correct the silt curtain to prevent any turbidity outside the silt curtain. • Actions to ensure the silt curtain is functioning shall include, but are not limited to, work stoppage to inspect the silt curtain; repair the silt curtain; position or reposition the silt curtain around the active work area; ensure the silt curtain has no gaps; implementation of operational modifications (e.g., fixing, adjusting, maintaining, and/or upgrading silt curtains); and/or, implementation of a second silt curtain. • If receiving water quality monitoring indicates an exceedance of the Performance Standards, construction activities shall be halted until measured turbidity has decreased to levels below Performance Standards. • All response actions shall be documented and reported to the District in writing and by phone immediately.	**Monitoring and Reporting**: Report in writing and by Phone **Verification**: District	

VI. FINDINGS

The Project, with the incorporation of mitigation measures and monitoring program, will have no significant impact on the environment with respect to biological resources, geology and soils, hazards and hazardous materials, hydrology and water quality, and recreation, nor would the Project otherwise have potentially significant adverse impacts to aesthetics, agriculture and forestry resources, air quality, cultural resources, energy, greenhouse gas emissions, land use and planning, mineral resources, noise, population and housing, public services, traffic, tribal cultural resources, utilities and service systems, and wildfire.

VII. DOCUMENTATION

The attached Initial Study (Attachment A) and additional appendices document the reasons in support of the above findings.

VIII. CERTIFICATION

The Draft Mitigated Negative Declaration and supporting documents are on file with and may be reviewed during regular District business hours in the Office of the District Clerk of the San Diego Unified Port District, 3165 Pacific Highway, San Diego, CA 92101. The District administration offices are open Monday through Thursday and every other Friday from 8:00 AM to 5:00 PM.

Prepared by: 11·26·2019 MHamilton
Date
Megan Hamilton, Planner

Draft Report 12·5·2019 Wileen A Manaois
Date
Wileen Manaois, Director, Development Services

Final Report ____________ ______________________________
Date
Wileen Manaois, Director, Development Services

Attachment A Initial Study/Environmental Checklist for the Harbor Island West Marina Redevelopment Project

Initial Study/Environmental Checklist for the Harbor Island West Marina Redevelopment Project

Prepared for:

San Diego Unified Port District

December 2019

Contents

Appendices

Appendix A	Air Quality and Greenhouse Gas Calculations
Appendix B	Eelgrass Resources Report
Appendix C	Marine Biological Resources Technical Report
Appendix D	Geotechnical Investigation—Landside
Appendix E	Geotechnical Investigation—Marine
Appendix F	Noise Modeling and Calculations
Appendix G	Traffic Technical Memorandum

Figures

Tables

Acronyms and Abbreviations

12-hour L_{eq}	12-hour Average Noise Level
AB	Assembly Bill
ACMs	asbestos-containing materials
ADT	average daily traffic
AFY	Acre Feet Per Year
AIA	Airport Influence Area
AICUZ	Air Installation Compatible Use Zones
ALUCP	Airport Land Use Compatibility Plan
AP	Alquist-Priolo
AQIA	Air Quality Impact Analysis
ARB	California Air Resources Board
Basin Plan	Water Quality Control Plan for the San Diego Basin
BMPs	best management practices
CAAQS	California ambient air quality standards
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Division of Occupational Safety and Health
CalEEMod™	California Emissions Estimate Model
CalARP	California Accidental Release Prevention
CAL FIRE	California Department of Forestry and Fire
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CARB	California Air Resources Board
CBC	California Building Code
CCA	California Coastal Act
CCC	California Coastal Commission
CCR	California Code of Regulations
CDP	Coastal Development Permit
CEQA	California Environmental Quality Act
CGP	Construction General Permit
CH_4	methane
CHL	California Historic Landmark
CNEL	Community Noise Equivalent Level
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
CRHR	California Register of Historical Resources
CUPA	Certified Unified Program Agency
cy	cubic yards
dB	decibels

dBA	A-weighted decibel
DEH	Department of Environmental Health
DFSP	Defense Fuel Support Point
DOC	California Department of Conservation
DOT	U.S. Department of Transportation
DPM	diesel particulate matter
DTSC	Department of Toxic Substances Control
EFH	Essential Fish Habitat
EI	Expansion Index
EIR	Environmental Impact Report
ELAP	Environmental Laboratory Accreditation Program
EMPS	Embarcadero Marina Park South
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMP	Fishery Management Plan
GHG	greenhouse gases
GSP	Groundwater Sustainability Plan
GWP	global warming potential
HAPC	habitat area of particular concern
HIWM	Harbor Island West Marina
HMD	Hazardous Materials Division
HREA	Health Risk and Exposure Assessment
HSC	Health and Safety Code
HU	hydrologic unit
I-5	Interstate 5
in/s	inches per second
INRMP	Integrated Natural Resource Management Plan
IPCC	Intergovernmental Panel on Climate Change
JRMP	Jurisdictional Runoff Management Program
LE	24-hour accumulation noise levels
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
L_{eq}	average sound level
LOS	level of service
L_{pk}	peak sound levels
LUST	leaking underground storage tank
MBTA	Migratory Bird Treaty Act
mgd	million gallons per day
MLD	most likely descendant
MLLW	mean lower low water

MMPA	Marine Mammal Protection Act
MOU	memorandum of understanding
MRZ-1	Mineral Resource Zone 1
MS4	Municipal Separate Storm Sewer System
MSCP	Multiple Species Conservation Program
msl	mean sea level
MSW	municipal solid waste
MT	metric tons
MWD	Metropolitan Water District of Southern California
N_2O	nitrous oxide
NAAQS	national ambient air quality standards
NAHC	Native American Heritage Commission
NAS	Naval Air Station
NBPL	Naval Base Point Loma
NEVP	North Embarcadero Visionary Plan
NFPA	National Fire Protection Association
NMAWC	Naval Main and Anti-Submarine Warfare Command
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_2	nitrogen dioxide
NO_X	oxides of nitrogen
NTC	Naval Training Center
O_3	ozone
OES	Office of Emergency Services
OSHA	Occupational Safety and Health Administration
Ozone Plan	2016 Ozone Attainment Plan for San Diego County
PAHs	polycyclic aromatic hydrocarbons
Pb	lead
PCBs	polychlorinated biphenyls
PDPs	Priority Development Projects
PLWTP	Point Loma Wastewater Treatment Plant
PM	particulate matter
PM10	particulate matter 10 microns or less in diameter
PM2.5	particulate matter 2.5 microns or less in diameter
PMP	Port Master Plan
PMPA	Port Master Plan Amendment
PPV	peak particle velocity
PRC	Public Resources Code
Project	Harbor Island West Marina Redevelopment Project
PVC	polyvinyl chloride
RAQS	Regional Air Quality Strategy
RCNM	Roadway Construction Noise Model

RCRA	Resource Conservation and Recovery Act
RES	Regional Energy Strategy
RHA	Rivers and Harbors Act
RMS	root mean square
RTP	Regional Transportation Plan
RWQCB	San Diego Regional Water Quality Control Board
SANDAG	San Diego Association of Governments
SB	Senate Bill
SCIC	South Coastal Information Center
Scoping Plan	Climate Change Scoping Plan
SCS	Sustainable Communities Strategy
SDAB	San Diego Air Basin
SDAPCD	San Diego Air Pollution Control District
SDBEP	San Diego Bay Ecosystem Plan
SDCRAA	San Diego Regional Airport Authority
SDCWA	San Diego County Water Authority
SDFRD	City of San Diego's Fire-Rescue Department
SDG&E	San Diego Gas and Electric
SDIA	San Diego International Airport
SDPD	City of San Diego Police Department
SDUSD	San Diego Unified School District
SGMA	Sustainable Groundwater Management Act
SLR	Sea Level Rise
SLTs	screening-level thresholds
SO_2	sulfur dioxide
SO_X	oxides of sulfur
SPCC	Spill Prevention Control and Countermeasure
SR	State Route
SSC	Space and Naval Warfare Systems Center
ST	short-term
SWPPP	Stormwater Pollution Prevention Plan
SWQMP	Storm Water Quality Management Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
TSCA	Toxic Substances Control Act
UBC	Uniform Building Code
USGS	U.S. Geological Survey
USC	United States Code
USTs	underground storage tanks
UWMP	Urban Water Management Plan
V/C	volume to capacity ratio
VOC	Volatile Organic Compounds

Wastewater Branch	City of San Diego's Public Utilities Department Wastewater Branch
ZOI	zone of influence

Section 1 Background

1.1 Summary

Project Title:	Harbor Island West Marina Redevelopment Project
Lead Agency Name and Address:	San Diego Unified Port District 3165 Pacific Highway San Diego, CA 92101
Contact Person and Phone Number:	Megan Hamilton, Associate Planner (619) 686-8113
Project Location:	2040 Harbor Island Drive San Diego, CA 92101
Project Applicant's Name & Address:	HIW Associates, LP 2040 Harbor Island Drive San Diego, CA 92101
Port Master Plan Designations:	Harbor Island/Lindbergh Field: Planning District 2, Subarea West Harbor Island Land Use: Commercial Recreation Water Uses: Recreational Boat Berthing, Fueling Dock, and Sanitary Pump Station

1.2 Introduction

The Harbor Island West Marina Redevelopment Project (Project) includes the replacement and redevelopment of several elements comprising the Harbor Island West Marina (HIWM), an existing marina facility that provides services and amenities to the boating community and waterfront access opportunities to the public. The purpose of the proposed Project is to replace the existing aged dock structure, existing landside buildings, and infrastructure to accommodate a wider range of recreational vessel sizes, to create more slip opportunities for a greater diversity of boaters, and to extend the life of the HIWM to ensure its long-term viability.

As illustrated in Figure 1 (Regional Vicinity) and Figure 2 (Project Location), the Project site is located at 2040 Harbor Island Drive, San Diego, CA 92101 and is within Planning District 2 (Harbor Island/Lindbergh Field) of the certified Port Master Plan (PMP).

The proposed Project includes the following components: (1) demolition of 146,000 square feet of existing docks (providing 620 boat slips); (2) new construction of 140,000 square feet of new docks (providing 603 boat slips); (3) demolition of 23,000 square feet of existing building space and reconstruction of approximately 15,682 square feet of new building space; (4) removal of the 120,000-square-foot existing paved parking lot and installation of a new 116,000-square-foot paved parking lot; (5) removal of 15,000 square feet of existing landscaping with installation of approximately 18,000 square feet of new landscaping; (6) construction of a new 12-foot-wide public promenade and reconstruction of an existing 6,000-square-foot viewing deck for public use; and, (7) modernization of onsite utilities and lighting. The project proponent, HIW Associates, LP, also seeks a new 40-year lease for construction, operation and maintenance of the proposed Project. As part of fulfilling BPC Policy No. 608 (Tenant Percent for Art Program), the proposed Project provides the for a public art component on the Project site which may include functional artwork along the proposed promenade and/or a contribution to the Coronado Bridge Lighting Project, provided that project is approved.

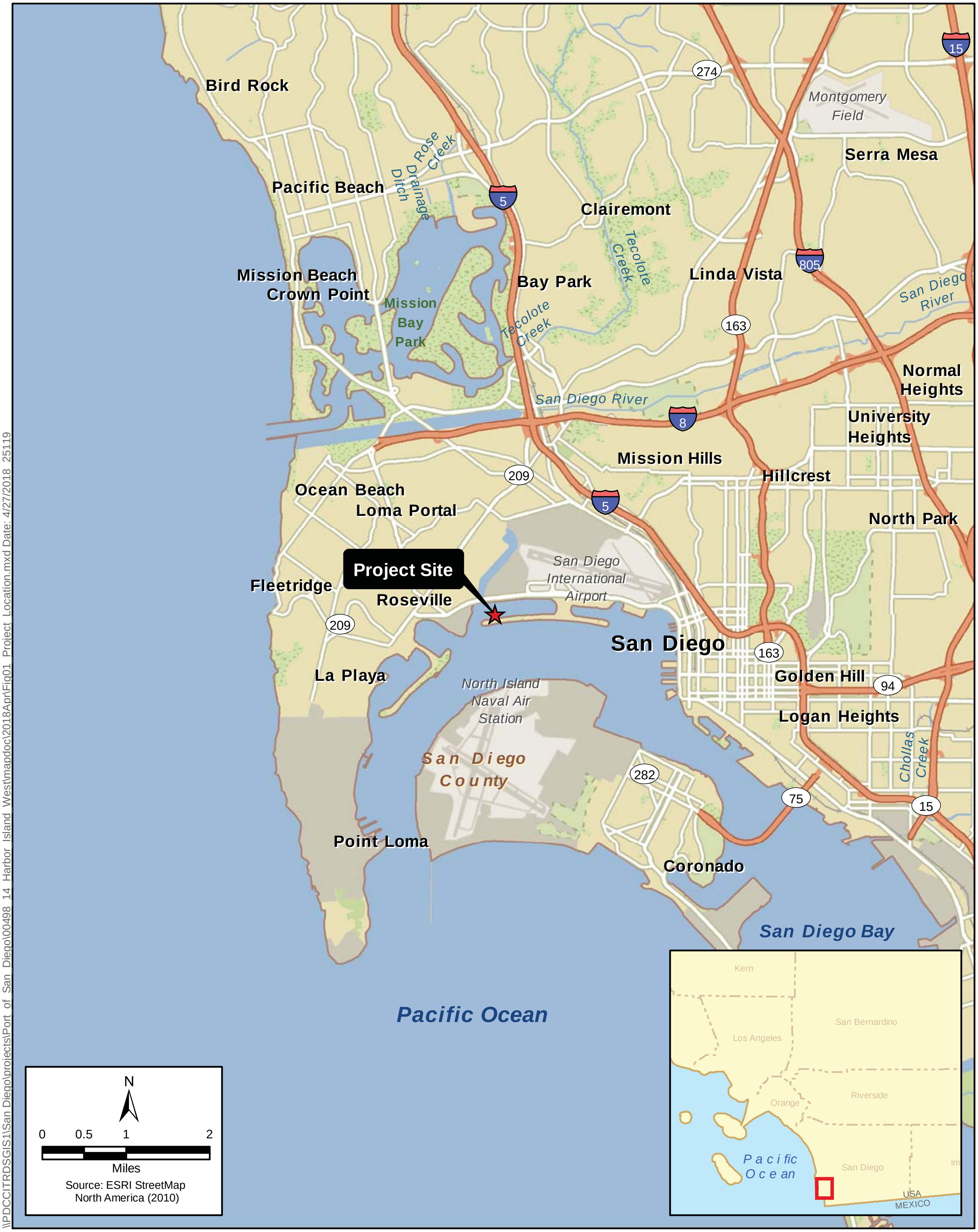

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Figure 1
Regional Vicinity
Harbor Island West Marina Redevelopment Project

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Figure 2
Project Location
Harbor Island West Marina Redevelopment Project

1.3 Project Background and Existing Site Conditions

Harbor Island was constructed in the early 1960s by hydraulically dredging, pumping, and depositing sand in the current configuration of Harbor Island. The HIWM was built between 1970 and 1972 and currently comprises eleven floating docks and landside improvements consisting of several buildings, shops, and paved parking (Figure 3 – Existing Conditions). The existing landside structures include 1 single-story and 2 two-story wood-framed buildings with a total plan footprint area of approximately 23,000 square feet. These buildings currently provide space for offices, lockers/storage, janitor facilities, laundry, a restaurant, snack bar, deli/food service, visitor-serving retail, mechanical maintenance facilities and a chandlery, as well as a club room and locker room for users of the marina. There is a large asphalt parking area with 351 parking stalls on the Project site. The existing waterside improvements include 146,000 square feet of docks with 620 boat slips.

Existing landside uses on Harbor Island generally consist of hotels, restaurants, public parks, and marine-related services. Water-related uses in the area are predominantly related to recreational boating and include slip rentals, boat rentals, charters, lessons, sailing clubs, and other visitor-serving uses (Figure 4 – Site Pictures).

Existing adjacent land uses to the Project site include the Hilton San Diego Airport/Harbor Island Hotel to the east; Tom Ham’s Lighthouse Restaurant to the west; open water to the north; and Harbor Island Drive, Harbor Island Park, and North San Diego Bay to the south. Major circulation facilities in the area include North Harbor Drive, Rosecrans Street and Interstate 5 (I-5).

Figure 3
Existing Conditions
Harbor Island West Marina Redevelopment Project

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Boathouse Front Facade

Back of Boathouse and View of Marina

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Figure 4
Site Pictures
Harbor Island West Marina Redevelopment Project

Section 2 Project Description

2.1 Project Characteristics

The proposed Project includes the repair, maintenance, replacement, and redevelopment of the HIWM. Specifically, the Project consists of the following elements as shown in Figure 5 (Proposed Site Plan) and Figure 6 (Conceptual Improvements).

- Demolition of 23,000 square feet of existing building space and reconstruction of approximately 15,682 square feet of new building space. Existing and new buildings have a maximum elevation of 45 feet above grade;
- Demolition of the existing 120,000-square-foot paved parking lot and construction of a new 116,000-square-foot paved parking lot;
- Removal of 15,000 square feet of existing landscaping with installation of approximately 18,000 square feet of new landscaping with an area for bicycle parking;
- Reconstruction of an existing 6,000-square-foot public viewing deck and construction of a new public 12-foot-wide promenade;
- Reconstruction of a 1,200-square-foot swimming pool and 75-square-foot Jacuzzi. The reconstructed pool remains the same size while the Jacuzzi increases from 75 square feet to 100 square feet.
- Demolition of 146,000 square feet of existing docks providing 620 boat slips and construction of 140,000 square feet of new docks providing 603 boat slips; and,
- Modernization of on-site utilities and lighting.

The Project also involves a proposed new 40-year lease to HIW Associates, LP from the District for construction, operation, and maintenance of the proposed Project.

As part of fulfilling BPC Policy No. 608 (Tenant Percent for Art Program), the proposed Project includes the potential for a public art component on the Project site which may include functional artwork along the proposed promenade and/or a contribution to the Coronado Bridge Lighting Project.

Tables 1 and 2 also provide a summary of the existing conditions alongside improvements associated with the proposed Project.

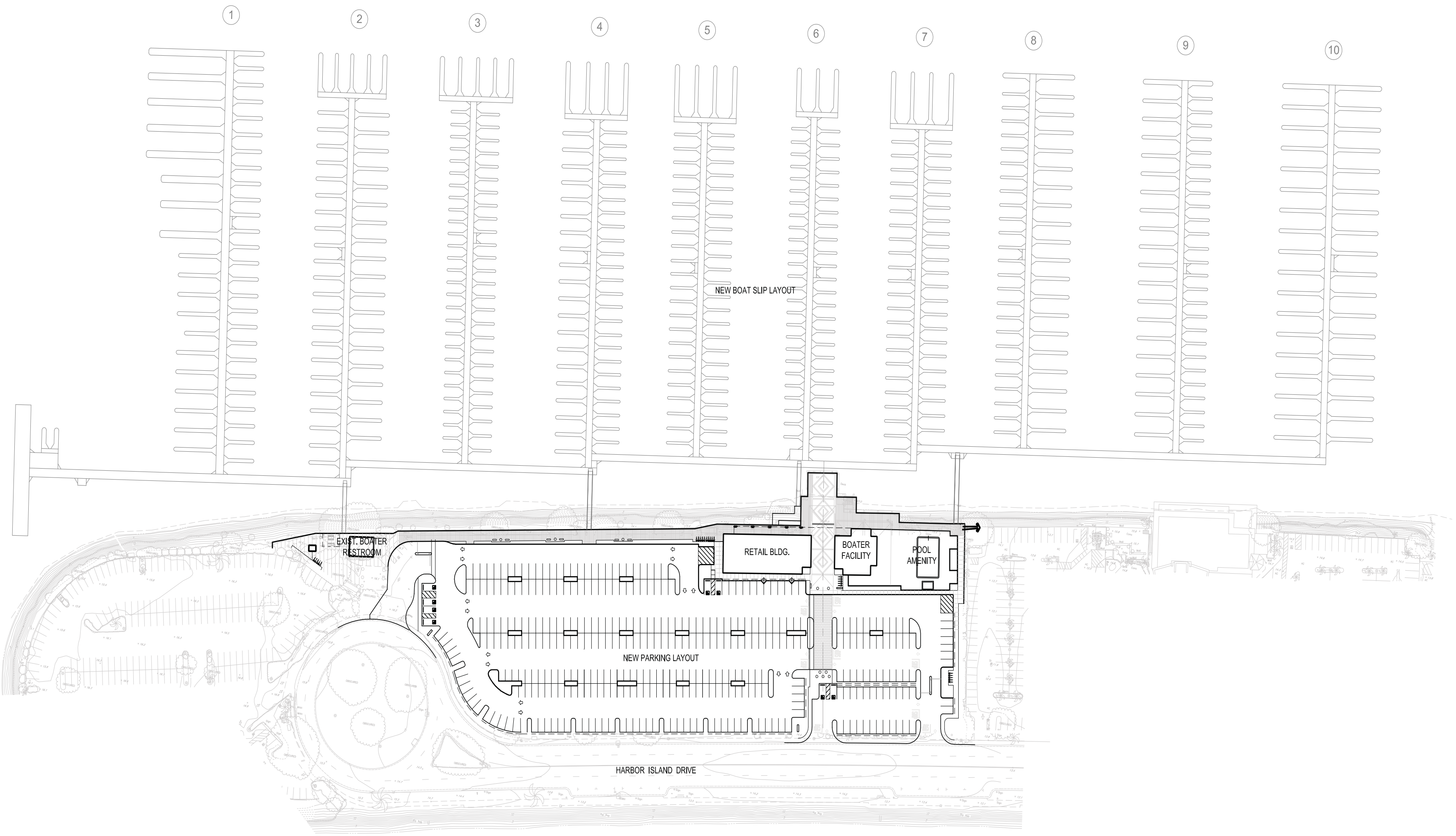

Figure 5
Proposed Site Plan
Harbor Island West Marina Redevelopment Project

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VICINITY MAP N.T.S

BUILDING & PARKING SUMMARY

BUILDING	1ST FLOOR GROSS SF +/-	2ND FLOOR GROSS SF +/-		TOTAL
RETAIL BUILDING	4,990	4,990		9,980
MARINA BUILDING	2,500	2,500		5,000
WEST BOATER RESTROOM BUILDING	702			702
TOTAL	8,192	7,490		15,682

PARKING	PARKING SIZES			TOTAL
CITY STANDARD		STANDARD 8'-3" x 18'	COMPACT 7'-6" x 15'	
PROVIDED	9'x18'	8'-6" x 18'	8'-6" x 16'	
TOTAL	186	88	106	380
	48.9%	23.2%	27.9%	100.0%

KEYS NOTES:

① LANDSCAPE ISLAND
② MONUMENT SIGN
③ EXISTING EDGE OF PAVEMENT
④ EXISTING EDGE OF STRUCTURE & PLATFORM
⑤ EXISTING LOADING AREA
⑥ EXISTING UNDERGROUND TANKS
⑦ EXISTING BOATER RESTROOM TO BE REMODELED
⑧ PROMENADE
⑨ MARINA TERRACE W/ NEW WOOD DECKING
⑩ OPEN COURT
⑪ SEATING & POTTED PLANTER
⑫ BICYCLE PARKING
⑬ ENHANCED PAVING
⑭ BOATER LOADING ZONE
⑮ BOATER ACCESS RAMP
⑯ SLOPED AREA
⑰ LINE OF RIP RAP EDGE
⑱ POOL ENCLOSURE
⑲ CONNECTING WALKWAY
⑳ PLANTER
㉑ EXISTING EMERGENCY UTILITY/GAS SHUT-OFF TO REMAIN
㉒ PICNIC/BBQ AREA W/ SHADE STRUCTURE
㉓ NEW BOAT SLIPS, TYPICAL

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Figure 6
Conceptual Improvements
Harbor Island West Marina Redevelopment Project

2.1.1 Landside Improvements

A comparison of the existing landside conditions and the proposed improvements is presented below in Table 1. Figure 6 (Conceptual Improvements) shows the proposed landside layout while Figures 7 (Conceptual First Floor Plan) and 8 (Conceptual Second Floor Plan) show the 1st and 2nd level floor plans, respectively. Figures 9a through Figure 9e provide conceptual renderings of the proposed landside facilities.

Table 1. Existing Conditions and Proposed Landside Improvements Summary

	Existing Conditions		Proposed Improvements		
Project Component	**Quantity**	**Component Area**	**Quantity**	**Component Area**	**Change from Existing Conditions**
Buildings	3	23,000 sq. ft.	2	15,682 sq. ft.	Decrease of 7,318 square feet of building area; 1 fewer building
Landscaping	--	15,000 sq. ft.	--	18,000 sq. ft.	Increase of 3,000 square feet of landscaped area
Parking Lot Pavement	--	120,000 sq. ft.	--	116,000 sq. ft.	Decrease in 4,000 square feet of parking lot pavement
Parking Spaces	351	--	380	--	Increase in 29 parking spaces
Public Promenade	--	N/A	--	900 linear ft.	Increase in 900 linear feet
Public viewing deck	1	6,000 sq. ft.	1	6,000 sq. ft.	Reconstructed, but same amount of area
Swimming Pool	1	1,200 sq. ft.	1	1,200 sq. ft.	Reconstructed, but same amount of area
Jacuzzi	1	75 sq. ft.	1	100 sq. ft.	Increase of 25 square feet
Bicycle Parking	0	--	25	--	Increase in 25 bicycle parking spaces

Source: HIW 2018

As summarized in Table 1, proposed changes to the landside portion of the Project site would involve the removal of three buildings that total 23,000 square feet and construction of two buildings that amount to approximately 15,682 square feet. The proposed buildings would be linked by a common linear roof plan that would create courtyard areas between the buildings. Existing landscaping would be removed and new drought-resistant landscaping would be installed, increasing the overall landscaped and pervious surface area from 15,000 square feet to 18,000 square feet. The existing asphalt parking lot would be demolished and repaved, resulting in a decrease from 120,000 square feet to 116,000 square feet of pavement area but an increase in 29 parking spaces, from 351 to 380. Up to four spaces would be available to the public.

Renovations to the existing public viewing deck, installation of a 12-foot-wide public promenade along the waterfront from the east end to the west end of the Project site, and an additional 25 bicycle parking spaces are also proposed as part of the landside improvements. No additional fill is required to construct the public viewing deck and public promenade. Figure 10 (Conceptual Site Circulation and Accessibility) illustrates proposed site circulation and accessibility routes on the Project site. Existing amenities (such as public restrooms, sailing clubs, and vessel rental operations) would be maintained and remain available to the public.

RETAIL BUILDING

GROSS AREA:	±4,990 S.F.
RETAIL TENANTS:	±3,525 S.F.
LOCKERS / BIKE RENTAL	±200 S.F.
RENTAL OFFICE	±65 S.F.
RESTROOMS:	±570 S.F.
UTILITY:	±140 S.F.
JANITOR CLOSET	±35 S.F.
TOTAL NET AREA:	±4,535 S.F.

MARINA BUILDING

GROSS AREA:	±2,500 S.F.
BOATER LOUNGE:	±600 S.F.
LOUNGE'S STORAGE:	±40 S.F.
LAUNDRY ROOM:	±300 S.F.
LOCKERS:	±75 S.F.
OUTDOOR SHOWERS:	±100 S.F.
INDOOR SHOWERS:	±215 S.F.
RESTROOMS:	±490 S.F.
JANITOR/UTILLITY	±100 S.F.
TOTAL NET AREA:	±1,920 S.F.

Figure 7
Conceptual First Floor
Harbor Island West Marina Redevelopment Project

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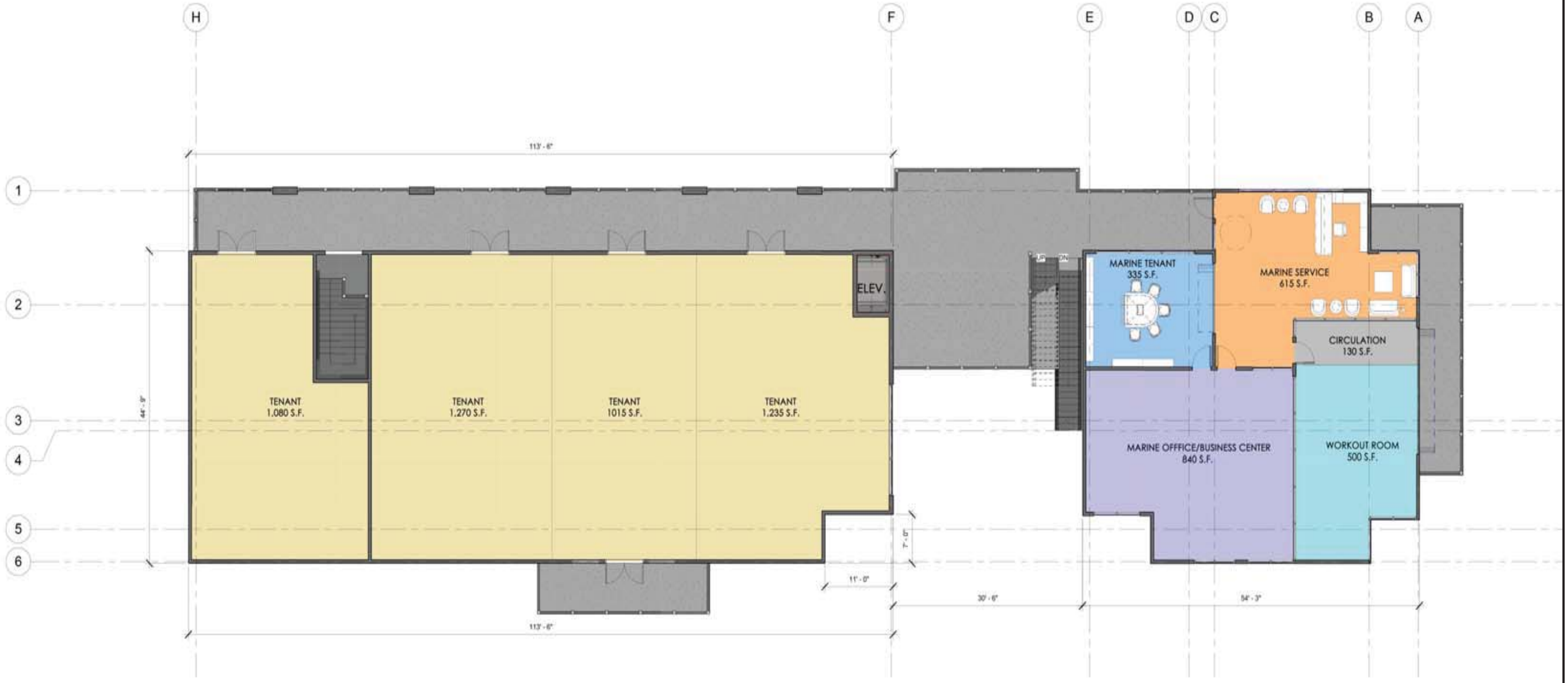

RETAIL BUILDING

GROSS AREA:	±4,990 S.F.
RETAIL TENANTS	±4,600 S.F.
TOTAL NET AREA:	±4,600 S.F.

MARINA BUILDING

GROSS AREA:	±2,500 S.F.
MARINE SERVICE:	±615 S.F.
MARINE TENANT:	±335 S.F
OFFICE/BUSINESS C.:	±840 S.F.
WORKOUT ROOM	±500 S.F.
TOTAL NET AREA:	±2,290 S.F.

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Figure 8
Conceptual Second Floor
Harbor Island West Marina Redevelopment Project

Figure 9a
Conceptual Entrance View
Harbor Island West Marina Redevelopment Project

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Figure 9b
Conceptual Entrance Elevation
Harbor Island West Marina Redevelopment Project

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Figure 9c
Conceptual Harbor View
Harbor Island West Marina Redevelopment Project

Figure 9d
Conceptual Harbor Elevation
Harbor Island West Marina Redevelopment Project

Figure 9e
Conceptual Pool Side Elevation
Harbor Island West Marina Redevelopment Project

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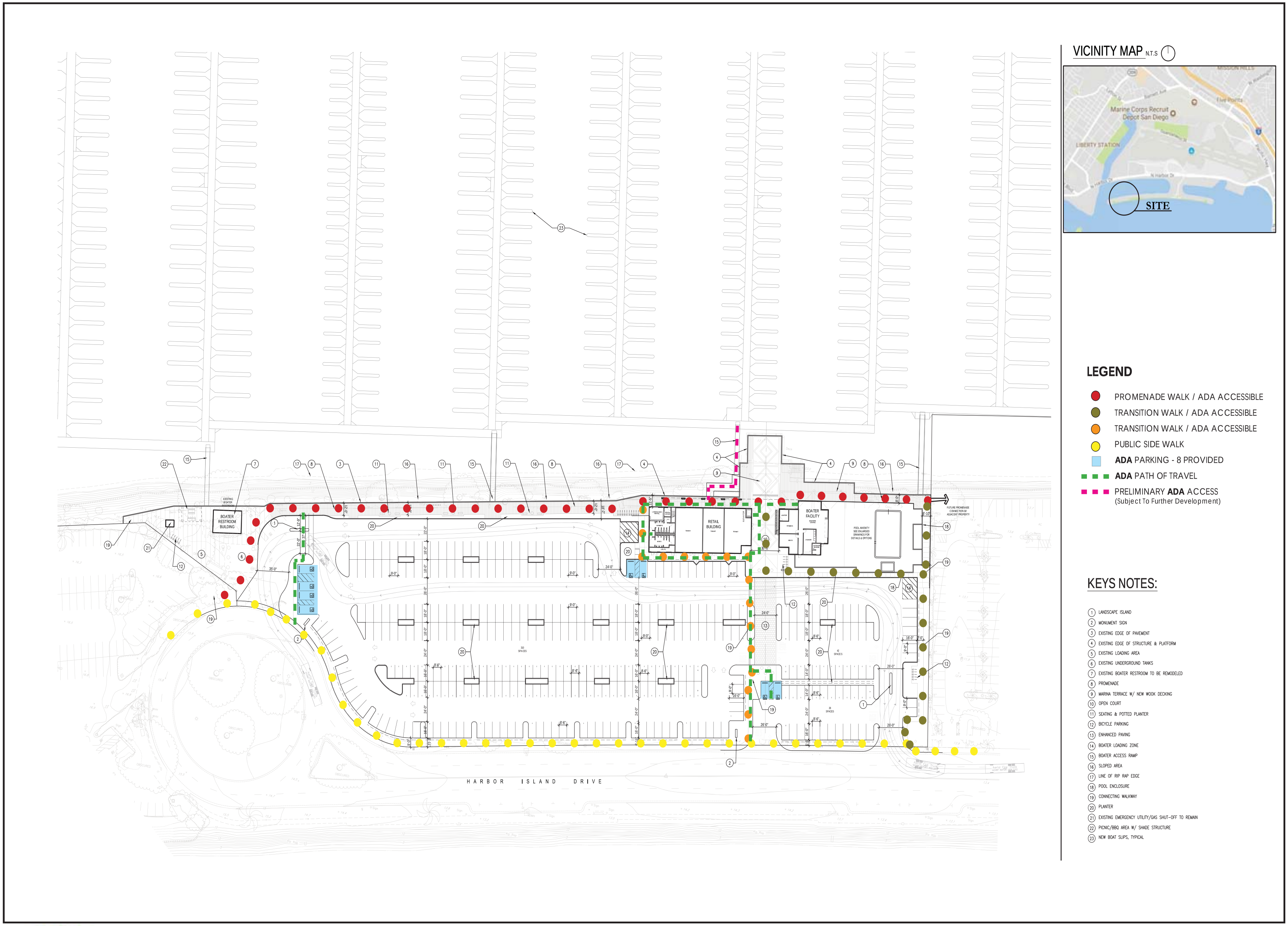

LEGEND

- 🔴 PROMENADE WALK / ADA ACCESSIBLE
- ● TRANSITION WALK / ADA ACCESSIBLE
- 🟠 TRANSITION WALK / ADA ACCESSIBLE
- 🟡 PUBLIC SIDE WALK
- 🟦 **ADA** PARKING - 8 PROVIDED
- 🟩 **ADA** PATH OF TRAVEL
- 🟥 PRELIMINARY **ADA** ACCESS (Subject To Further Development)

KEYS NOTES:

① LANDSCAPE ISLAND
② MONUMENT SIGN
③ EXISTING EDGE OF PAVEMENT
④ EXISTING EDGE OF STRUCTURE & PLATFORM
⑤ EXISTING LOADING AREA
⑥ EXISTING UNDERGROUND TANKS
⑦ EXISTING BOATER RESTROOM TO BE REMODELED
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⑨ MARINA TERRACE W/ NEW WOOK DECKING
⑩ OPEN COURT
⑪ SEATING & POTTED PLANTER
⑫ BICYCLE PARKING
⑬ ENHANCED PAVING
⑭ BOATER LOADING ZONE
⑮ BOATER ACCESS RAMP
⑯ SLOPED AREA
⑰ LINE OF RIP RAP EDGE
⑱ POOL ENCLOSURE
⑲ CONNECTING WALKWAY
⑳ PLANTER
㉑ EXISTING EMERGENCY UTILITY/GAS SHUT-OFF TO REMAIN
㉒ PICNIC/BBQ AREA W/ SHADE STRUCTURE
㉓ NEW BOAT SLIPS, TYPICAL

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Figure 10
Conceptual Site Circulation and Accessibility
Harbor Island West Marina Redevelopment Project

Landside improvements include the upgrade of utilities to current building standards and new light-emitting diode (LED) lighting would be installed throughout the Project site. In addition, the proposed Project would incorporate many features that conserve water and energy use. Increased energy efficiency would result in reduced energy usage by the redeveloped marina facility compared to the existing marina facility. Energy and water efficient features include:

- Use of LEDs throughout the Project site;
- Use of low-flow fixtures and appliances in the renovated buildings;
- Use of Energy-Star qualified appliances in kitchen(s);
- Landscaping would be drought resistant, designed to minimize irrigation and runoff and to promote surface infiltration where appropriate;
- Plants that are tolerant of saturated soil conditions would be used where landscaped areas retain or detain storm water;
- Use of automated irrigation systems; and
- Rain shutoff devices would be employed to prevent irrigation after precipitation.

2.1.2 Waterside Improvements

Table 2 provides a summary comparison of the existing waterside conditions and proposed improvements while Figure 11 (Proposed Slip Configuration) shows the proposed slip reconfiguration.

Table 2. Existing Conditions and Proposed Waterside Improvements Summary

	Existing Conditions		Proposed Improvements		
Project Component	**Quantity**	**Component Area**	**Quantity**	**Component Area**	**Change from Existing Conditions**
Docks	11	146,000 sq. ft.	10	140,000 sq. ft.	Decrease of 6,000 square feet of dock area
Piles[1]	326	326 sq. ft.	313[2]	383.55 sq. ft.	Decrease of 13 piles, increase in 57.55 sq. ft. of pile area[3]
Boat Slips	620	--	603	--	Decrease of 17 boat slips
Dedicated Fire Standpipes[4]	0	--	30	--	Increase in 30 fire standpipes
Boater Access Ramps	4	--	4	--	No change
Sanitary Pump Station	1	--	1	--	No change
Fuel Dock	1	--	1	--	No change

Source: HIW 2018

[1] Existing piles are 12-inch square concrete piles (approximately 1 square foot per each pile). New piles would be a combination of 14-inch square concrete piles (approximately 1.36 square feet each) and 18-inch square concrete piles (approximately 2.25 square feet each).

[2] Existing piles consist of 326 12-inch square concrete piles totaling 326 square feet. Proposed piles would consist of 313 piles (189 re-used12-inch square concrete piles, 95 14-inch square concrete piles, and 29 18-inch square concrete piles) totaling 383.55 square feet.

[3] Pile square footage is part of the overall dock system square footage.

[4] Dedicated Fire Standpipes are a type of rigid water piping to which fire hoses can be connected, allowing manual application of water to the fire. A standpipe serves the same purpose as a fire hydrant.

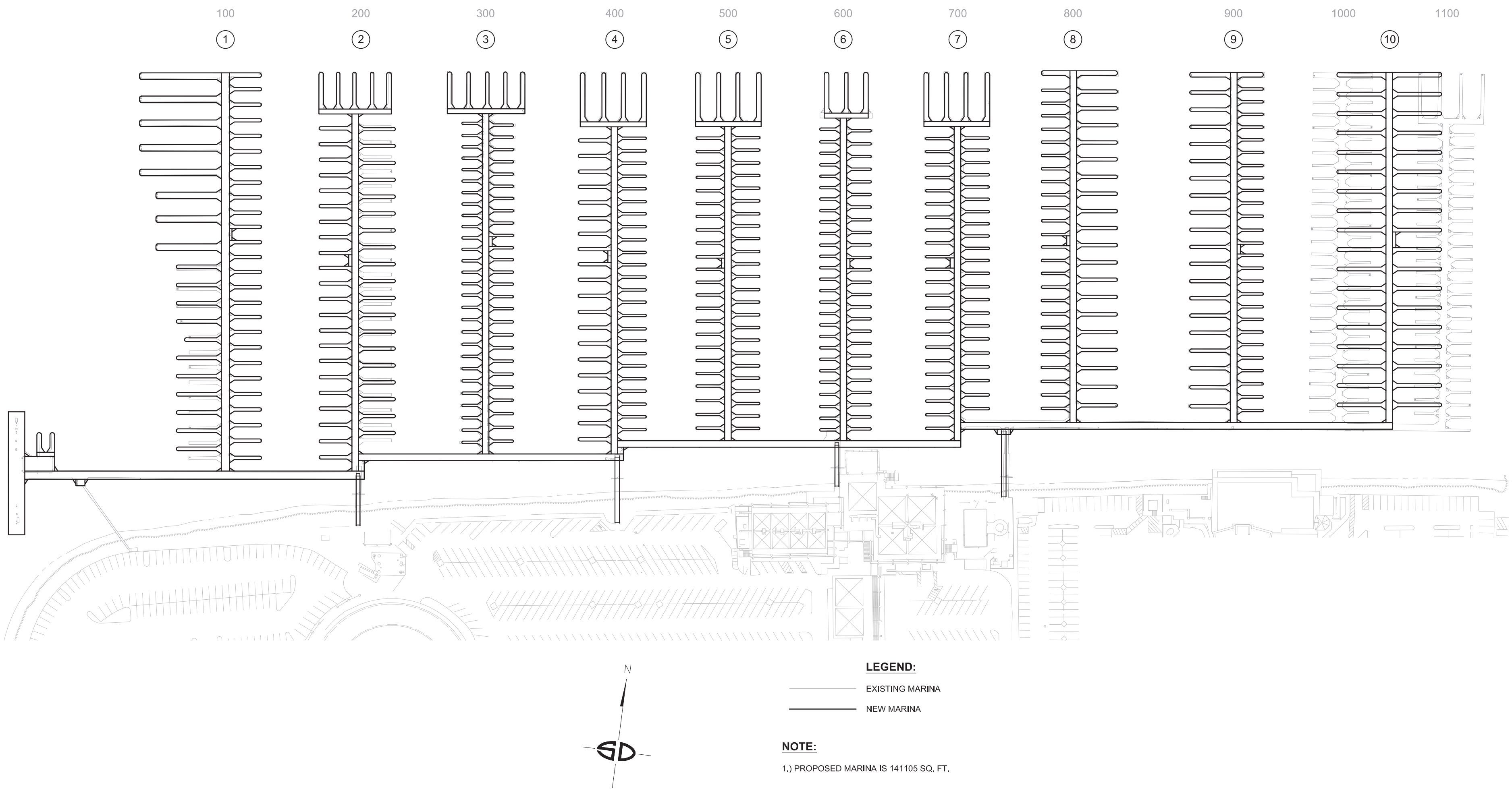

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Figure 11
Proposed Slip Configuration
Harbor Island West Marina Redevelopment Project

As summarized in Table 2, proposed changes to the waterside portion of the Project site include the demolition of the existing docks and construction of new docks. The existing docks are deteriorated and in need of replacement. The docks on site are composed of a main dock/headwalk with 11 dock/headwalk extensions. The proposed replacement docks would result in two of the easternmost dock/headwalk extensions being consolidated into a single dock/headwalk extension. This would result in a total of 10 dock/headwalk extensions that would extend from the main dock/headwalk. The remaining dock configurations would not change.

The proposed changes to the dock/headwalk extensions would result in the realignment of the existing slips within the marina. The proposed changes to the dock and slip configuration would result in a reduction in the overall size of the current dock facility from 146,000 square feet to 140,000 square feet (a 6,000 square foot reduction in bay coverage), and approximately 17 fewer slips (from 620 slips to 603 slips). While the reconstruction of the dock system would result in 17 fewer boat slips, the new dock system configuration would provide for a wider range of vessel sizes, including the ability to accommodate smaller vessels down to 12 feet-in-length, which are currently not serviced at the marina. The proposed slip mix would increase the number of tie-ups and slips for smaller vessels, and slips would continue to be available to the general public. Table 3 provides a summary of the proposed slip mix.

Table 3. Proposed Slip Mix Summary

	Existing		Proposed	
Slip Range	**Slip Quantity**	**% of Total Slip Inventory**	**Slip Quantity**	**% of Total Slip Inventory**
12 – 20 feet	0	0%	57	9.5%
21 – 25 feet	96	15.5%	106	17.6%
26 – 30 feet	111	17.9%	55	9.1%
31 – 35 feet	231	37.3%	174	28.9%
36 – 40 feet	106	17.1%	73	12.1%
41 – 45 feet	9	1.5%	28	4.6%
46 – 50 feet	44	7%	44	7.3%
Greater than 51 feet	23	3.7%	66	10.9%
Total	**620**	**--**	**603**	**--**

Source: HIW 2018

As identified in Table 2, the current marina dock configuration has 326 12-inch square concrete piles and 4 existing abutments for the dockside access ramps. The proposed waterside improvements would reuse 189 piles, which is 58 percent of the existing piles. Approximately 124 new concrete piles would be required for the remainder of dock system installation. The proposed marina dock configuration would have a total of 313 concrete piles and includes both reused and new concrete piles.

The existing four abutments for the dockside access ramps are structurally sound and in stable condition (TerraCosta 2012). All existing abutments would be reused in the proposed waterside improvements. The number of access ramps, pumpouts, and the fuel dock configuration would remain unchanged from existing conditions. In addition, no dredging is needed for the proposed waterside improvements.

The existing marina does not have a dedicated fire protection system and is currently serviced by individual fire extinguishers distributed throughout the docks. As part of the proposed improvements, approximately 30 dedicated fire standpipes would be installed on the new docks along with a dedicated fire protection system. The existing and proposed dock system includes secure gates controlled by an access system on the landside.

2.1.3 New Lease

The proposed Project includes a new lease between the District and HIW Associates, LP for a term of 40 years. The uses in the lease would allow HIW Associates, LP to construct, operate, and maintain a recreational marina with 603 boat slips along with associated ancillary facilities, including, but not limited to, deli/food service, retail, marine-related offices, and marina support facilities; customer parking; a public promenade and a public lookout deck; and the marina-related operations and businesses.

2.1.4 Construction

Construction of the proposed Project is expected to begin in 2020 and require approximately 24 months to complete over two phases. A phased construction schedule is proposed to allow portions of the marina to remain open to the public and businesses, as well as to avoid displacing boaters from the marina during construction. Public access to the waterfront would be available via portions of the promenade and two (of four) access gates that lead to the marina and would be delineated with signage. Phase I of construction is planned to begin in 2020 and last 12 months. It is anticipated that the existing docks would be demolished and rebuilt one dock at a time and that there is enough vacancy within the marina to accommodate marina users during construction. There is also excess capacity at nearby marinas should limited, temporary displacement of boaters occur. Phase II of construction is anticipated to occur between September and February 2021 and would end in the summer of 2022.

Table 4 lists the demolition and construction actions by phase and includes the area on the Project site to be affected, the equipment to be used, the duration, and the number of construction workers that would be employed. Figure 12 (Construction Phasing) provides the boundaries of Phase I and II of construction over an aerial of the Project site.

During demolition and construction of the proposed Project, approximately 16,860 cubic yards of construction debris from the demolished docks, buildings, and surface paving would be exported from the Project site. Excavation activities associated with new building foundations would require less than 1,000 cubic yards of soil to be exported from the Project site. All suitable construction and demolition materials would be recycled, which would include steel, concrete, wood, and glass. A minimum of 65 percent of applicable construction waste generated by the demolition and construction activities for the proposed Project would be diverted from the landfill to be recycled in compliance with the requirements of the City of San Diego’s Construction and Demolition Debris Deposit Ordinance. The demolition of the existing dock system is anticipated to be disassembled by hand tools and a work boat. The disassembled pieces would then be rafted together with rope and floated to an onsite location where docks can be removed out of the water by either a land based crane, forklift, or waterside barge mounted crane. Removed docks and dock modules would then be hauled off to the landfill by truck.

The proposed new dock system would be manufactured off site in a controlled plant environment. The initial assembly of the individual dock modules begins in the plant by assembly of a wood waler system and hardware with each module kept separate for shipping. Once manufactured, the new dock modules are shipped to the Project site by truck. Similarly, new concrete piles are manufactured off site in a controlled plant environment with the manufactured piles shipped to the Project site by truck.

Once the dock and piles are delivered to the Project site, the docks are lowered into the water from truck by land based crane or forklift with the piles transported from truck to floating work barge by either barge mounted crane or land based crane. The dock modules are assembled and connected together by hand tools. A combination of jetting and pile driving are planned for the installation of piles. Specifically, piles are driven through predetermined openings in the dock system. Piles would be driven with the barge mounted crane equipped with a jet tube and either a diesel hammer or a drop hammer. In general, it is anticipated the piles would initially be jetted in place with an internal jet tube installed inside the pile. Piles would be jetted to within 5 feet, approximately, of design tip elevation and the rest would be installed by hammer. Pile jetting would be utilized for 80 to 90 percent of the time and an impact pile hammer would be used for the remaining 10 to 20 percent of the time.

Table 4. Proposed Construction Summary

Construction Activity	Construction Equipment	Duration (months)	# of Construction Workers
Phase I Construction			
Landside Improvements (West Portion of Project Site)			
Landscape Removal	Backhoe (1), wood chipper (1)	1	3
Parking Lot Demolition	Skip loader (1), excavator (1), backhoe (1)	1	4
Parking Lot Repaving	Paver (1), roller (1), grader (1), compactor (1), bobcat (1), striper (1)	1	3*
Restroom Building Demolition	Excavator (1), skip loader (1), grader (1)	1	4*
Restroom Building Construction	Backhoe (1), compressor (2), hand tools (various)	3	6
Waterside Improvements			
Demolition of Dock and Boat Slips	Landside crane (1)[1], work boats (1)[1], hand tools (various)	12	12
Construction of Dock and Boat Slips	Crane barge (1), impact pile driver (1), work boat (1), landside crane (1)[1]	12	12*
Phase II Construction			
Landside Improvements (East Portion of Project Site)			
Landscape Removal	Backhoe (1), wood chipper (1)	1	6
Parking Lot Demolition	Skip loader (2), excavator (1), backhoe (1)	2	4
Parking Lot Repaving	Paver (1), roller (1), grader (1), compactor (1), bobcat (1), striper (1)	1	4*
Building Demolition	Excavator (2), skip loader (2), grader (1), haul trucks (4)	2	10*
Building Construction	Crane, forklift, boom lift, compressor, hand tools	10	16
Landscape Installation	Trucks, hand tools	1	6*
Total		**24**[2]	**37**[3]

Source: HIW 2018

[1] Workboat and landside crane are assumed to be shared between dock demolition and installation

[2] The total construction period for the Project is expected to take approximately 24 months. The duration of specific phases of construction, as identified in the table, may overlap with other phases.

[3] This total represents the maximum number of workers that would be located on site at one time. The peak of construction would occur when Phase I demolition of docks, installation of docks, parking lot demolition, parking lot paving, and building construction overlap. This number does not equate to a sum of the column of the number of construction workers since several construction activities would have duplicate workers.

* Represents duplicate workers

Figure 12
Construction Phasing
Harbor Island West Marina Redevelopment Project

As noted previously, some existing piles are planned to be moved and reused as part of the new dock system. These existing piles are anticipated to be pulled with barge mounted crane with use of rope, chain, and jetting. In areas where existing piles would be used, the new dock would be installed around each existing piling. Once docks are assembled together and piles driven, the final dock assembly would take place and include installation of fendering, cover boards, pile guides, wet and dry utilities, fuel system and dock components including fire standpipes, power centers, and dock boxes. The final dock assembly would be completed by hand tools.

Construction of the proposed Project would be required to adhere to the recommendations of the geotechnical investigation prepared for the proposed Project (Appendices D and E) through the ministerial grading and building permits. Construction staging would occur within the confines of the Project site within a designated construction site, separated by a temporary barrier. During construction, up to 51 workers would be employed, with a maximum of 37 at one time, which would occur during Phase II's building construction.

During construction, the following landside equipment is anticipated to be used intermittently: backhoes, wood chippers, skip loaders, excavators, pavers, rollers, graders, compactors, air compressors, cranes, forklifts, boom lift, haul trucks, and other miscellaneous small equipment. Anticipated marine equipment would include a barge with crane, work boat, landside crane, haul trucks, and pile driving equipment. Not all of this equipment would be used for the entire duration of construction. Construction activities would be limited to 7 a.m. to 7 p.m. Monday through Friday, except for legal holidays (with the exception of Columbus Day or Washington's Birthday) as specified in Chapter 5, Section 59.5.0404 of the San Diego Municipal Code.

Prior to construction activities, the Project proponent would coordinate with the City of San Diego's Development Services Department to obtain the necessary construction-related traffic control permit to address any encroachment into the public right-of-way as a result of planned construction activities. The traffic control permit would ensure that public access through Harbor Island Drive and to the surrounding businesses would be maintained at all times, in a safe and efficient manner.

2.1.5 Operation

Once the proposed Project is operational, existing uses within the leasehold (e.g., recreational boating, sailing academy, yacht brokers, deli/food service, marine services, maritime-related office tenant space, support/mechanical, laundry facilities, restroom/showers, workout room, boater's lounge, marine office/business center, and storage lockers) would continue in a manner similar to existing conditions, with use of marina facilities being driven by boaters in the marina. No new or expanded uses would result or increase the intensity of uses. Given the proposed decrease in the total building square footage and slight reduction in the number of boat slips, both employees and visitors accessing and using the Project site are expected to be similar to the existing condition.

2.2 Compatibility with Port Master Plan

2.2.1 Existing Land Use Designations

The District has a certified PMP that provides official planning policies, consistent with a general statewide purpose, for the physical development of the tide and submerged lands conveyed and granted in trust to the San Diego Unified Port District (District 2017a). The District's PMP governs the lands that the State Legislature has conveyed to the District, as trustee or that the District later acquired. The California Coastal Commission (CCC) certified the original PMP on January 21, 1981. This action resulted in the District having authority to issue coastal development permits for development within the coastal zone that are consistent with the certified PMP.

The proposed Project is located within Planning District 2 (Harbor Island/Lindbergh Field) of the certified PMP. As illustrated in Figure 13 (Existing Land and Water Use Designations), existing landside uses on Harbor Island generally consist of hotels, restaurants, public parks, and marine-related services. Water-related uses in the area are predominantly related to recreational boating and include slip rentals, boat rentals, charters, lessons, sailing clubs, and other visitor-serving uses. The specific land and water use designations for the Project site include Commercial Recreation, Recreation Boat Berthing, Fueling Dock, and Sanitary Pump Dock. The proposed Project is compatible with the existing land and water use designations and does not propose to change any of the use designations.

2.3 Regulatory Requirements, Permits, and Approvals

The District is the primary approval authority for the proposed Project. District authorizations include:

- Adoption of the Mitigated Negative Declaration in compliance with the California Environmental Quality Act (CEQA).
- Issuance of an appealable Coastal Development Permit (CDP) in compliance with the Coastal Act. All regulatory requirements identified in this document will be incorporated as standard conditions of the CDP.
- Approval of the plans and specifications, as well as concept approval for the proposed Project.
- Granting of a new 40-year lease for the proposed Project.

Additional subsequent approvals and other permits that may be required from local, regional, state, and federal agencies include, but are not limited to:

- San Diego Regional Water Quality Control Board – Stormwater Construction General Permit (including the development and implementation of a Storm Water Pollution Prevention Plan) and Clean Water Act Section 401 Water Quality Certification.
- U.S. Army Corps of Engineers – Clean Water Act Section 404 and Rivers and Harbors Act Section 10 permit application for discharge of “fill” materials and structures to waters of the U.S.
- Federal Aviation Administration notification and approval.

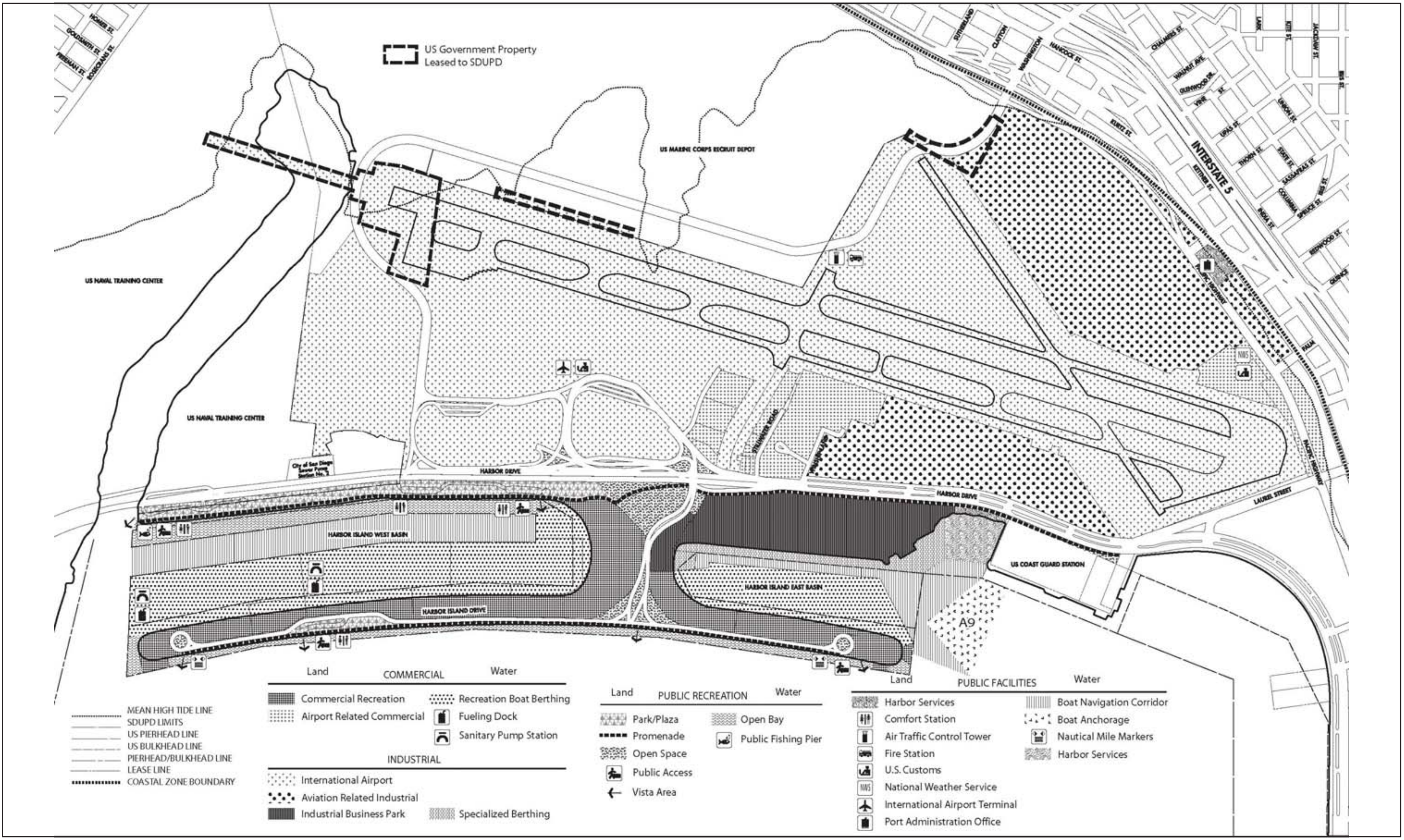

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Figure 13
Existing Land and Water Use Designations
Harbor Island West Marina Redevelopment Project

Section 3 Environmental Factors Potentially Affected

An Initial Study is conducted by a Lead Agency to determine if a project may have a potentially significant effect on the environment. An EIR must be prepared if an Initial Study indicates that further analysis is needed to determine whether a significant impact will occur or if there is substantial evidence in the record that a project may have a significant effect on the environment. The environmental factors checked below would be potentially affected by this project, involving at least one impact that may require mitigation to reduce the impact from "Potential Impact" to "Less than Significant with Mitigation." The potential impacts and mitigation are described in the Initial Study Checklist.

☐ Aesthetics
☒ Biological Resources
☐ Energy
☒ Hydrology/Water Quality
☐ Noise
☒ Recreation
☐ Utilities/Service Systems
☒ Mandatory Findings of Significance
☐ Agriculture & Forestry Resources
☐ Cultural Resources
☐ Greenhouse Gas Emissions
☐ Land Use/Planning
☐ Population/Housing
☐ Transportation
☐ Wildfire
☐ Air Quality
☒ Geology/Soils
☒ Hazards & Hazardous Materials
☐ Mineral Resources
☐ Public Services
☐ Tribal Cultural Resources

On the basis of this initial evaluation:

☐ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a **NEGATIVE DECLARATION** will be prepared.

☒ I find that although the Proposed Project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A **MITIGATED NEGATIVE DECLARATION** will be prepared.

☐ I find that the Proposed Project MAY have a significant effect on the environment, and an **ENVIRONMENTAL IMPACT REPORT** is required.

☐ I find that the Proposed Project may have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An **ENVIRONMENTAL IMPACT REPORT** is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the Proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR, including revisions or mitigation measures that are imposed upon the Proposed Project, nothing further is required.

Signature: ______________________ Date: 12 · 5 · 2019

Wileen Manaois
Director, Development Services

Section 4 Environmental Initial Study Checklist

A. "Potentially Significant Impact" is appropriate if there is substantial evidence that an effect may be significant. If there are one or more "Potentially Significant Impact" entries when the determination is made, an EIR is required.

B. "Less Than Significant with Mitigation" applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less Than Significant Impact." The lead agency must describe the mitigation measures and briefly explain how they reduce the effect to a less than significant level (mitigation measures from other areas of the initial study may be cross-referenced).

C. "Less Than Significant Impact" applies where the project creates no significant impacts, only less than significant impacts.

D. "No Impact" applies where a project does not create an impact in that category. "No Impact" answers do not require an explanation if they are adequately supported by the information sources cited by the lead agency which show that the impact simply does not apply to projects like the one involved (e.g., the project falls outside a fault rupture zone). A "No Impact" answer should be explained where it is based on project-specific factors as well as general standards (e.g., the project would not expose sensitive receptors to pollutants, based on a project specific screening analysis).

I. Aesthetics

Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Have a substantial adverse effect on a scenic vista?	☐	☐	☒	☐
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?	☐	☐	☐	☒
c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

Environmental Setting

The HIWM is located on an approximately 25.77-acre site (3.81 acres of land area and 21.96 acres of water area) on/adjacent to Harbor Island, approximately 2.4 miles west of downtown San Diego, 0.6 mile south of the San Diego International Airport (SDIA), 0.6 mile east of Shelter Island, and 0.9 mile north of Coronado. The Project site is located in an urbanized area surrounded by the Hilton Hotel to the east, Tom Ham's Lighthouse Restaurant to the west, Harbor Island Drive and Harbor Island Park to the south, and Harbor Island Basin to north. The Project site is designated as Commercial Recreation, and Recreational Boat Berthing, Fueling Dock and Sanitary Pump Dock in the District's PMP (District 2017a).

Existing waterside areas on the Project site consist of a marina with a main dock, headwalk, dock, headwalk extensions, access ramps, and boat slips. Existing landside areas on the Project site include one single-story and two two-story buildings containing space for offices, lockers/storage, janitor facilities, laundry facilities, restaurant, snack bar, deli/food service, liquor store, club room, mechanical maintenance facilities, and a chandlery. There is also a large asphalt parking area with 351 parking stalls on the Project site. The Project site is relatively flat with vegetation consisting of ornamental trees and shrubs. Six PMP-designated Vista Areas are located on Harbor Island. No Vista Area is located on the Project site and the closest Vista Area to the proposed Project is located 0.04 mile southwest of the Project site (District 2017a). One officially designated state scenic highway, State Route (SR) 75 (Silver Strand Highway and San Diego - Coronado Bridge) is located approximately 3.7 miles southeast of the Project site (Caltrans 2017).

Analysis of Environmental Impacts

a. Would the project have a substantial adverse effect on a scenic vista?

Less Than Significant Impact. The PMP identifies Vista Areas on District tidelands. Six Vista Areas are located on Harbor Island as identified in Figure 13, (Existing Land and Water Use Designations); however, none of the six Vista Areas are located on the Project site or oriented toward the Project site. Specifically, the nearest PMP-designated Vista Area to the Project site is located approximately 0.04 mile southwest of the site; however, this Vista Area is oriented toward San Diego Bay and not in the direction of the Project site. Similarly, the three other Vista Areas located along Harbor Island Drive are also oriented toward San Diego Bay and not in the direction of the Project site. The remaining two Vista Areas along Harbor Drive are oriented toward the closed end of the Harbor Island West Basin and the United States Naval Training Center (NTC) and not in the direction of the Project site.

Due to the nature of the proposed Project, which proposes to replace an existing marina with similarly sized, oriented, and massed buildings and facilities, the orientation of the Vista Areas, and the distance of the Vista Areas from the Project site, none of the designated Vista Areas would be affected by the proposed Project. During the construction period, views would be temporarily changed from an active boat marina facility to a construction site. However, construction equipment would be moved around the site and removed from the site once it is no longer needed, and the views would return back to an active boat marina facility once construction is complete. The view during operation of the proposed Project would be the same or very similar to the current HIWM. Therefore, there would be a less than significant impact on scenic vistas and no mitigation measures are required.

b. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

No Impact. One state scenic highway, SR-75 (Silver Strand Highway and San Diego-Coronado Bridge) is located approximately 3.7 miles southeast of the Project site (Caltrans 2017). The San Diego-Coronado Bay Bridge spans the bay, connecting the City of San Diego to the City of Coronado. Views from the bridge are expansive and encompass the entire San Diego Bay, downtown San Diego, SDIA, San Diego Naval Base, Coronado/Naval Air Station (NAS), and the Pacific Ocean. Although the Project site is just visible from portions of SR-75, views of the Project site would not be striking or noticeable because of the distance that exists between the site and the scenic highway. Furthermore, motorists traveling on SR-75 would generally be focused on the roadway in front of them. Their southerly views while traveling westbound or eastbound would not be prolonged, and viewer sensitivity to the proposed changes would be very low. Therefore, the proposed Project would not affect any trees, rock outcroppings, or historic buildings within SR-75.

In addition, no designated scenic resources are located on the Project site or in the immediate vicinity. While there are some ornamental trees within the Project site, none would be considered significant scenic resources. No rock outcroppings or historic buildings are located within the Project site. Therefore, due to the distance of the state scenic highway from the Project site and the absence of scenic resources within the Project site, no impact on state scenic highways would occur as a result of Project implementation and no mitigation measures are required.

c. In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Less Than Significant Impact. The Project site is located within an urbanized area that provides public views of the Bay. The PMP governs the scenic quality of the project. The PMP makes provisions for visual access to the shoreline in a manner that is consistent with the activities being conducted on the land and water areas involved as well as the proprietary interests of private land owners, lessees, and the public. The PMP identifies major visual access points. There is an identified vista area south of the project site (from the roundabout at the west end of Harbor Island drive looking toward San Diego Bay). There is also an identified vista area north of the site (south of North Harbor Drive and just east of the North Harbor Drive Bridge, looking southwest toward the West Basin channel). The project would not interfere with any of these identified visual access points. In addition, the project is consistent with the land and water use designations identified in the PMP (see Section XI, *Land Use and Planning*).

A PMP goal related to scenic quality is as follows: “Views should be enhanced through view corridors, the preservation of panoramas, accentuation of vistas, and shielding of the incongruous and inconsistent.” Redevelopment of the HIWM would occur within the existing HIWM footprint and would not cause permanent view changes at the site or in the surrounding area because the proposed Project would not result in a substantial increase in the size or bulk of structures or features on the Project site or damage the visual characteristics of the site. In addition, the proposed improvements would be consistent with the existing use of the site. The improvements would appear to be similar in scale and in character to the existing condition (an existing active marina facility). Therefore, the proposed Project would not conflict with zoning or other regulations governing scenic quality. Impacts would be less than significant, and no mitigation measures would be required.

d. Would the project create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?

Less Than Significant Impact. The Project site and surrounding area are developed with several existing sources of light and glare and also developed with an existing marina that generates light. Primary sources of lighting include street lighting along Harbor Island Drive and building/parking lot lighting from adjacent land uses (e.g., Tom Ham’s Lighthouse and Hilton Hotel). Nearby sources of daytime glare include glass window surfaces at Tom Ham’s Lighthouse Restaurant and the Hilton Hotel. Nighttime lighting sources also include adjacent restaurant and hotel buildings and SDIA.

In order to meet operational and safety requirements, the proposed Project would include energy-efficient replacement lighting on the marina facility, marina docks, and parking lot. The replacement light fixtures would be consistent with the existing fixtures and would provide downcast, directional light to focus illumination and minimize spillover light and glare impacts on the surrounding area, while still providing sufficient operational and safety lighting for the facility. The proposed lighting would not constitute a new source of substantial light or glare that would affect day or nighttime views in the area because it is consistent with existing lighting in the area and on the Project site. The Project site and surrounding area are currently urbanized and developed with several sources of existing light and glare, including street lights, pole lights, hotels, restaurants, and the airport. In addition, the City of San Diego maintains regulations pertaining to outdoor lighting and glare in their Municipal Code (Section 142.0740 for lighting and Section 142.0730 for glare). The Project would be required to comply with the City of San Diego’s light and glare regulations, which include rules for minimizing light spill and limits for reflective materials with a light reflective factor greater than 30 percent. Additionally, construction of the proposed Project would be completed during the day, so construction night lighting would not be required. As a result, the proposed Project would not affect day or nighttime views in the area by creating a new source of substantial light or glare. Impacts would be less than significant and no mitigation measures would be required.

II. Agriculture and Forestry Resources

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model prepared by the California Department of Conservation (1997) as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board.

Would the project:	**Potentially Significant Impact**	**Less than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c. Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	☐	☐	☐	☒
d. Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Environmental Setting

The Project site has operated as a marina facility since 1972. The Project site is designated as commercial with Commercial Recreation (landside) and Recreational Boat Berthing, Fueling Dock, and Sanitary Pump Dock (waterside) uses in the District's PMP (District 2017a). According to the California Department of Conservation (DOC), the Project site is not located on Farmland or forest land (DOC 2016), nor is it under a Williamson Act contract (DOC 2013). There are no local policies for agricultural or forest resources that apply to the Project site.

Analysis of Environmental Impacts

a. Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

No Impact. The Project site is not currently an active agricultural use nor is the site planned or zoned for agricultural uses. The Project site is designated as Commercial with Commercial Recreation (landside) and Recreational Boat Berthing, Fueling Dock, and Sanitary Pump Dock (waterside) uses in the District's PMP. It is currently developed and will remain developed with a marina facility. Additionally, there are no agricultural resources or operations in the vicinity of the Project site that would be affected by the proposed Project. According to Important Farmland maps prepared by the California DOC, the Project site and adjacent land is identified as Urban and Built-Up Land (DOC 2016). Neither construction nor operation of the proposed Project would impact Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. No impacts would occur and no mitigation measures are required.

b. Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

No Impact. According to DOC's San Diego County Williamson Act Lands Map, the entire Project site is designated as Urban and Built-up Land, and no Williamson Act lands occur on the site (DOC 2013). Therefore, construction and operation of the proposed Project would not conflict with existing zoning for agricultural use or a Williamson Act contract. No impacts would occur and no mitigation measures are required.

c. Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?

No Impact. The Project site is not zoned for and does not contain forest land, timberland, or timberland zoned Timberland Production (District 2017a). The Project site is designated as Commercial Recreation (landside) and Recreational Boat Berthing, Fueling Dock, and Sanitary Pump Dock (waterside) in the District's PMP and is currently developed with a marina facility. Therefore, construction and operation of the proposed Project would not conflict with existing zoning for forestland or timberland. No impacts to forest land or timberland would occur and no mitigation measures are required.

d. Would the project result in the loss of forest land or conversion of forest land to non-forest use?

No Impact. No forest land is located within the Project site or the vicinity of the Project site. The operation and construction of the proposed Project would not result in the loss of forest land or convert forest land to non-forest use. No impacts would occur to forest land would occur and no mitigation measures are required.

e. Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

No Impact. The area surrounding the Project site is characterized primarily by commercial recreation uses with a strip of parkland to the south that is used as a grassy area and pedestrian walkway. The surrounding area does not include existing agriculture or forest land. Construction and operation of the proposed Project would not result in changes to land use that would result in the conversion of farmland or forest land to non-agricultural or non-forest use. No impacts would occur and no mitigation measures are required.

III. Air Quality

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations.

Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard?	☐	☐	☒	☐
c. Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☒	☐
d. Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☐	☐	☒	☐

Environmental Setting

Emissions modeling has been prepared for the proposed Project (Appendix A), which was used, along with other information, in this section to evaluate the potential air quality impacts of the proposed Project. Air quality management agencies of direct importance in San Diego County are the United States Environmental Protection Agency (EPA), California Air Resources Board (CARB), and the San Diego Air Pollution Control District (SDAPCD). EPA has established federal air quality standards for which CARB and SDAPCD have primary implementation responsibility. CARB and SDAPCD are also responsible for ensuring the federal and state air quality standards (NAAQS and CAAQS, respectively) are met.

EPA and CARB have established NAAQS and CAAQS, respectively, for six criteria pollutants: ozone, CO, lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter 10 microns or less in diameter (PM10), and particulate matter (PM) 2.5 microns or less in diameter (PM2.5). Ozone is considered a regional pollutant because its precursors affect air quality on a regional scale. Pollutants such as CO, NO_2, SO_2, and Pb are considered local pollutants that tend to accumulate in the air locally. PM is both a local and a regional pollutant. The project includes construction activities and demolition of existing marina uses. The primary emission sources associated with these activities are equipment and vehicle exhaust, as well as earthmoving, demolition, and paving. Criteria pollutants generated by the project emission sources are ozone precursors (ROG and NO_X), CO, and PM. Accordingly, these pollutants are the criteria pollutants of concern associated with the Project.[1]

All criteria pollutants can have human health and environmental effects at certain concentrations. The ambient air quality standards for these pollutants (Table 5) are set to protect public health and the environment with an adequate margin of safety (Clean Air Act Section 109). Epidemiological, controlled human exposure, and toxicology studies evaluate potential health and environmental effects of criteria pollutants and form the scientific basis for new and revised ambient air quality standards.

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[1] As shown in Table 5, there are also ambient air quality standards for sulfur dioxide, lead, sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particulates. However, these pollutants are typically associated with industrial sources, which are not included as part of the project. Accordingly, they are not evaluated further.

Table 5. Federal and State Ambient Air Quality Standards

Criteria Pollutant	Average Time	CAAQS	NAAQS1	
			Primary	Secondary
Ozone	1 hour	0.09 ppm	None[2]	None[2]
	8 hours	0.070 ppm	0.070 ppm	0.070 ppm
Respirable Particulate Matter (PM10)	24 hours	50 µg/m^3	150 µg/m^3	150 µg/m^3
	Annual mean	20 µg/m^3	None	None
Fine Particulate Matter (PM2.5)	24 hours	None	35 µg/m^3	35 µg/m^3
	Annual mean	12 µg/m^3	12.0 µg/m^3	15 µg/m^3
Carbon Monoxide	8 hours	9.0 ppm	9 ppm	None
	1 hour	20 ppm	35 ppm	None
Nitrogen Dioxide	Annual mean	0.030 ppm	0.053 ppm	0.053 ppm
	1 hour	0.18 ppm	0.100 ppm	None
Sulfur Dioxide[3]	Annual mean	None	0.030 ppm	None
	24 hours	0.04 ppm	0.014 ppm	None
	3 hours	None	None	0.5 ppm
	1 hour	0.25 ppm	0.075 ppm	None
Lead	30-day Average	1.5 µg/m^3	None	None
	Calendar quarter	None	1.5 µg/m^3	1.5 µg/m^3
	3-month average	None	0.15 µg/m^3	0.15 µg/m^3
Sulfates	24 hours	25 µg/m^3	None	None
Visibility-reducing Particles	8 hours	--[4]	None	None
Hydrogen Sulfide	1 hour	0.03 ppm	None	None
Vinyl Chloride	24 hours	0.01 ppm	None	None

Source: California Air Resources Board 2016.

[1] National standards are divided into primary and secondary standards. Primary standards are intended to protect public health, whereas secondary standards are intended to protect public welfare and the environment.

[2] The federal 1-hour standard of 12 parts per hundred million was in effect from 1979 through June 15, 2005. The revoked standard is referenced because it was employed for such a long period and is a benchmark for State Implementation Plans.

[3] The annual and 24-hour NAAQS for SO_2 apply only for 1 year after designation of the new 1-hour standard to those areas that were previously in nonattainment for 24-hour and annual NAAQS.

[4] CAAQS for visibility-reducing particles is defined by an extinction coefficient of 0.23 per kilometer – visibility of 10 miles or more due to particles when relative humidity is less than 70%.

ppm= parts per million; µg/m^3 = micrograms per cubic meter; NAAQS = National Ambient Air Quality Standard; CAAQS = California Ambient Air Quality Standard

The Project site is located within the San Diego Air Basin (SDAB). The Project site is in an area designated nonattainment for the following standards:

- The eight-hour NAAQS and CAAQS for ozone;
- The CAAQS for PM10; and
- The CAAQS for PM2.5.

The SDAPCD is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and state air quality laws. Most notably, SDAPCD Rule 20.2 (New Source Review Non-Major Stationary Sources) establishes Air Quality Impact Analysis (AQIA) Trigger Levels, which set emission limits for non-major new or modified stationary sources.

Analysis of Environmental Impacts

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

No Impact. The air quality plans relevant to the proposed Project are the *2016 Ozone Attainment Plan for San Diego County* (Ozone Plan; SDAPCD 2016a) and the Regional Air Quality Strategy (RAQS; SDAPCD 2016b). The Ozone Plan outlines SDAPCD's plans and control measures designed to attain the ozone NAAQS, while the RAQS outlines SDAPCD's plans and control measures designed to attain the ozone CAAQS. Consistency with the Ozone Plan and RAQS is typically determined by two standards. The first standard is whether the proposed Project would exceed growth assumptions contained in the plans. The second standard is whether the proposed Project would increase the frequency or severity of existing air quality violations, contribute to new violations, or delay the timely attainment of air quality standards or interim reductions as specified in the Ozone Plan and RAQS. The Ozone Plan and RAQS rely on information from CARB and the San Diego Association of Governments (SANDAG), including mobile and area source emissions and projected growth in San Diego County, to forecast future emissions and determine strategies necessary for the reduction of emissions through regulatory controls. CARB's mobile source emissions projections and SANDAG's growth projections are based on population and vehicle use trends, local general plans, local coastal programs, and other applicable land management plans such as the PMP. As such, projects that propose development consistent with, or less than, the growth projections anticipated by applicable land management plans would be consistent with the Ozone Plan and RAQS.

For the proposed Project, the PMP is the document governing future land and water use within the Project site. The existing marina, along with the other elements of the PMP, was considered as part of SANDAG's projections and incorporated into SANDAG's 2050 Regional Plan, which provides socioeconomic data for the formulation and development of Ozone Plan and RAQS. Construction of the proposed Project would comply with SDAPCD rules that have been implemented to reduce regional particulate matter and ozone emissions—including Rule 50 (Visible Emissions), Rule 51 (Nuisance), Rule 52 (Particulate Matter), Rule 54 (Dust and Fumes), Rule 55 (Fugitive Dust Control), and Rule 67 (Architectural Coatings).[2] In addition, short-term construction related employment as a result of the proposed Project would not have a significant effect on population levels. Operation of the proposed Project would not result in a change in existing land or water use designations as the proposed improvements would allow for the continuation of marina uses. The proposed Project would also not result in any long-term changes to population, land use, transportation system, or additional stationary sources of air pollutant emissions. As a result, the proposed Project would not result in any changes to demographic forecasts or planned land use development.

Since the proposed Project is consistent with the projections assumed in the PMP, and the Ozone Plan and RAQS, construction and operation of the proposed Project would not conflict with or obstruct implementation of applicable air quality plans. No impacts are anticipated to occur, and no mitigation measures are required.

b. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable Federal or State ambient air quality standard?

Less Than Significant Impact. As noted previously, the Project site is considered a nonattainment area for the PM10, PM2.5, and ozone CAAQS and the ozone NAAQS. Certain individuals residing in areas that do not meet the CAAQS or NAAQS could be exposed to pollutant concentrations that cause or aggravate acute and/or chronic health conditions (e.g., asthmas, lost work days, premature mortality). Due to the regional nature of ozone, and the fact that thresholds take into account past, present, and future projects and set a regional threshold in consideration of current and future projects, regional air quality thresholds (discussed below) serve as thresholds for both direct and indirect project-related impacts and as an indication of whether a project's cumulative contribution would be significant.

Construction

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[2] All Rules listed can be accessed at https://www.sdapcd.org/content/sdc/apcd/en/Rule_Development/Rules_and_Regulations.html

Increases in criteria pollutant emissions are mainly attributable to construction activities associated with the repair, maintenance, and replacement of several elements comprising the HIWM. Emissions generated by construction of the proposed landside and waterside improvements would include the following: fugitive dust from surface disturbance and demolition activities; combustion pollutants from heavy construction equipment, worker vehicles, heavy duty vehicles, and workboats; and evaporative emissions from architectural coatings and paving. Concentrations of these emissions are generally highest near the construction site and dissipate as a function of distance.

Construction emissions were estimated based on information from the Project Applicant and the California Emissions Estimate Model (CalEEMod™) model, an air quality modeling program that estimates air pollution emissions in pounds per day or tons per year for various land use development projects. Project-specific inputs to the CalEEMod™ model include Project land use types, size in acres and square feet, start and end dates of construction phases, heavy-duty equipment types and operating hours, volumes of structures to be demolished, areas to be paved, painted, and graded, and haul, material, and worker trips. Emissions generated by the workboat required to install the new dock were estimated using workboat model year and horsepower from the *Port of San Diego 2016 Maritime Air Emissions Inventory* (District 2018a) and emission factors based on the methodology presented in CARB's commercial harbor craft model (CARB 2010).

Construction of the proposed Project is expected to take a total of approximately 24 months, completed over two phases (Phase I and Phase II). During that time, a variety of construction equipment would be used intermittently, including cranes, excavators, air compressors, pavers, and other miscellaneous small equipment. All equipment would not be used during each construction phase. However, the maximum construction emissions for each phase, assuming concurrent use of applicable equipment for that phase, has been analyzed. Construction emissions for construction worker vehicles traveling to and from the Project site, as well as vendor trips (construction materials delivered to the Project site) would also occur. As noted above, emissions from a workboat would also be generated during dock installation.

Neither the City of San Diego nor the District has developed CEQA thresholds of significance for air quality. The SDAPCD does not provide specific quantitative thresholds for determining the significance of air quality impacts under CEQA. However, the SDAPCD does specify AQIA trigger levels for new or modified stationary sources (SDAPCD Rules 20.2 and 20.3). If these incremental levels for stationary sources are exceeded, an AQIA must be performed for the source. Although these trigger levels do not generally apply to mobile sources or general land development projects, for comparative purposes these levels may be used to evaluate increases in emissions.

SDAPCD Rule 20.2, which outlines these screening level thresholds (SLTs), states that any project "which results in an emissions increase equal to or greater than any of these levels, must (SDAPCD 2016c):

> "demonstrate through an AQIA . . . that the project will not (A) cause a violation of a State or national ambient air quality standard anywhere that does not already exceed such standard, nor (B) cause additional violations of a national ambient air quality standard anywhere the standard is already being exceeded, nor (C) cause additional violations of a State ambient air quality standard anywhere the standard is already being exceeded, nor (D) prevent or interfere with the attainment or maintenance of any State or national ambient air quality standard."

For projects whose stationary-source emissions are below these criteria, no AQIA is typically required, and project level emissions are presumed to be less than significant. For CEQA purposes, these SLTs can be used to demonstrate that a project's total emissions (e.g., stationary and fugitive emissions, as well as emissions from mobile sources) would not result in a significant impact to air quality (Table 6).

Table 6. Air Quality Thresholds

Pollutant	Daily (pounds per day)	Annual (tons/year)
NO_X	250	40
VOC[1]	75	13.7
PM10	100	15
PM2.5	55	10
SO_X	250	40
CO	550	100
Lead	3.2	0.6

Source: SDAPCD Regulation II, Rule 20.2 (SDAPCD 2016c); SCAQMD 2019

1 The terms VOC and ROG are used interchangeably, although ROG is used in this analysis for consistency with CalEEMod. The County of San Diego's 75 pounds per day emissions rate is based on threshold levels from Coachella Valley, which have similar ROG emission sources and ozone attainment status as the SDAB.

VOC = Volatile Organic Compounds

NO_X = oxides of nitrogen

CO = carbon monoxide

SO_X = oxides of sulfur

PM_{10} = particulate matter 10 microns or less in diameter or inhalable particulate matter

$PM_{2.5}$ = particulate matter 2.5 microns or less in diameter or fine particulate matter

Table 7. Summary of Construction Emissions (pounds per day)

Construction Activity	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Phase I (2019)						
Demolition of docks	<1	1	1	<1	1	<1
Installation of docks	3	32	22	<1	2	1
Building Demolition	1	12	10	<1	1	1
Parking Lot Demolition	1	14	13	<1	1	1
Landscape Removal	<1	<1	<1	<1	<1	<1
Building Construction	1	6	6	<1	1	<1
Parking Lot Paving	3	28	17	<1	2	1
Maximum Daily Phase I[1]	**9**	**93**	**69**	**<1**	**7**	**5**
Thresholds	**75**	**250**	**550**	**150**	**100**	**55**

Construction Activity	VOC	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Does Phase I Exceed Thresholds?	**No**	**No**	**No**	**No**	**No**	**No**
Phase II (2020)						
Parking Lot Demolition	1	8	9	<1	3	1
Building Demolition	1	15	15	<1	2	1
Landscape Removal	1	7	7	<1	1	<1
Building Construction	2	17	15	<1	2	1
Landscape Installation	<1	<1	<1	<1	<1	<1
Parking Lot Paving	3	31	20	<1	2	2
Maximum Daily Phase II[2]	**5**	**40**	**38**	**<1**	**6**	**3**
Thresholds	**75**	**250**	**550**	**150**	**100**	**55**
Does Phase II Exceed Thresholds?	**No**	**No**	**No**	**No**	**No**	**No**

Source: Emissions modeling (Appendix A)

[1] Maximum daily emissions for all pollutants would occur during concurrent construction of all phases except landscaping removal.

[2] Maximum daily emissions for all pollutants would occurring parking lot demolition, building demolition, and building construction.

As shown in Table 7, construction emissions from the proposed Project would be below thresholds for all nonattainment criteria pollutants and their precursors. Furthermore, the proposed Project would be required to comply with SDAPCD rules that have been implemented to reduce regional particulate matter and ozone emissions. These rules include Rule 50 (Visible Emissions), Rule 51 (Nuisance), Rule 52 (Particulate Matter), Rule 54 (Dust and Fumes), Rule 55 (Fugitive Dust Control), and Rule 67 (Architectural Coatings). Therefore, construction of the proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment for and would not contribute to significant human health impacts.[3] Impacts associated with construction would be less than significant, and no mitigation measures are required.

<u>Concurrent Construction and Operation</u>

As shown in Appendix A, demolition of the existing docks and installation of the new docks will be completed during Phase I. Use of the new docks could begin immediately thereafter in 2020. Accordingly, concurrent construction and recreational boating activity would occur during 2020. Because the proposed Project would reduce the number of boating slips, emissions of all pollutants except NO_X from recreational boating and onroad visitor trips would decrease under the Project, relative to existing conditions, as shown in Table 8.[4] This operational decrease would overlap with Phase II construction, resulting in lower emissions in 2020 than reported above. Table 9 summarizes combined emissions during Phase II construction with the net change in emissions from recreational boating and onroad visitor trips anticipated in 2020 (Phase I operations). Recreational boating emissions were quantified using emission factors from CARB's Pleasure Craft Inventory Model and slip assignments by boat type based on expected boat length by boat type and size. Emissions from onroad visitor trips were quantified using CalEEMod and vehicle trip information from the traffic engineer (Appendix G). Refer to Appendix A for the modeling outputs.

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[3] The SLTs are determined to be those threshold under which a project's emissions would not contribute to exceedances of applicable air quality standards, which themselves represent the allowable atmospheric concentrations at which the public health and welfare are protected, and include a reasonable margin of safety to protect the more sensitive receptors in the population. Regional air quality thresholds of significance take into consideration existing air quality concentrations and attainment or nonattainment designations under the NAAQS and CAAQS. The NAAQS and CAAQS are informed from the findings of a wide range of scientific evidence that demonstrates that there of known safe concentrations of criteria pollutants.

[4] While fewer total boating slips will be issued under the Project, more slips for larger boats (36 to greater than 51 feet) will be allowed. In general, larger boats have a higher emissions intensity per operating hour than smaller vessels. For some pollutants (e.g., NOx), the increased emissions from additional larger boats offsets emissions reductions from fewer total boating slips, resulting in an overall minor NO_X emission increase relative to existing conditions (see Table 8).

Table 8. Summary of 2020 Phase I Operational Emissions (pounds per day)

Source	VOC	NO_X	CO	SO_2	PM10	PM2.5
Existing Operations						
Recreational Boating	91	6	150	<1	4	3
Vehicle Trips	5	17	45	<1	9	3
Total Existing	96	23	195	<1	13	6
Project Operations						
Recreational Boating	80	9	139	<1	3	3
Vehicle Trips	4	14	37	<1	9	2
Total Project Operation	84	23	176	<1	12	5
Net Phase 1 Operation[1]	**-12**	**<1**	**-19**	**<1**	**-1**	**-1**

Source: Emissions modeling (Appendix A)
[1] Project operations minus existing conditions.

Table 9. Summary of 2020 Concurrent Phase II Construction Emissions and Phase I Operational Emissions (pounds per day)

Source	VOC	NO_X	CO	SO_2	PM10	PM2.5
Phase II Max Daily Construction (see Table 6)	5	40	38	<1	6	3
Phase I Operation[1]	-11	1	-15	<0	-1	<0
Total Emissions	-6	41	23	<1	5	2
Thresholds	**75**	**250**	**550**	**150**	**100**	**55**
Does Concurrent Construction Exceed Thresholds?	**No**	**No**	**No**	**No**	**No**	**No**

Source: Emissions modeling (Appendix A)
[1] Represents the net change in recreational boating emissions with implementation of the proposed Project relative to existing conditions. Because all existing docks would be demolished, and new docks installed prior to 2020, the full reduction in recreational boating activity and associated emissions was assumed to occur in 2020. The entire change in on-road vehicle activity and emissions resulting from the Project were assigned to Phase I operations. This assumption is conservative because some Project vehicle trips would not occur until Phase II is completed. However, most on-road visitor trips are associated with boating activity, which will be fully replaced following Phase I.

As shown in Table 9, concurrent construction and operational emissions in 2020 from the proposed Project are expected to be below thresholds for all nonattainment criteria pollutants and their precursors. However, it is still possible that the proposed Project, when combined with current construction projects, could result in localized air quality impacts such as the effects from particulate matter. The radius for localized PM impacts is typically the immediate vicinity of the project site, or up to 0.25 mile. There are no current projects within 0.25 mile of the proposed Project's construction boundaries. Moreover, any such project would be subject to the same SDAPCD rules and regulations that would reduce construction emissions from the Project, including fugitive dust control in accordance with Rule 55. Therefore, this impact would be less than significant, and no mitigation measures are required.

Long-Term Project Operation

Operational criteria pollutant emission impacts are generally associated with any change in the permanent use of the Project site by area, energy, and mobile sources. Area source emissions are generated by landscaping activities, consumer products (e.g., personal care products), and periodic painting for facility upkeep. Energy sources include emissions from natural gas combustion for heating requirements. Mobile source emissions would result from vehicle and recreational boating trips associated with the HIWM. As discussed above, Project construction would demolish the existing marina uses, including 146,000 square feet of existing docks and 22,000 square feet of building space. Operation of these uses currently generates area, energy, and mobile source emissions, which would be effectively replaced with operational emissions associated with the Project. The difference, or *delta*, in operational emissions between the existing uses and the Project represents the net new impact of the Project analyzed in this analysis.

Criteria pollutant emissions associated with the existing marina uses and the Project were estimated using CalEEMod and emission factors from the 2016 Maritime Air Emissions Inventory (Port of San Diego 2018a; CARB 2010). Vehicle trip information for existing and Project conditions was provided by the traffic analysis (Appendix G). Emissions from area sources, including landscaping activities, consumer products, and architectural coatings, were modeled using CalEEMod default values. Emissions associated with existing natural gas combustion were calculated based on historic utility data. Natural gas consumption by the proposed Project was assumed to be 48 percent less than existing conditions, based on the reduced building space and energy efficient design features described in Chapter 2, *Project Description* (e.g., Energy-Star certified appliances).

Estimated operational emissions under both existing and Project conditions are summarized in Table 10. The Project was assumed to be fully operational in 2021. The difference in operational emissions between the Project and the existing land uses represents the net change associated with Project implementation. Refer to Appendix A for the modeling outputs.

Table 10. Summary of Operational Emissions (pounds per day)

Condition/Source	**VOC**	**NO_X**	**CO**	**SO_2**	**PM_{10}**	**$PM_{2.5}$**
Existing Conditions (2018)						
Area Source	1	<1	<1	<1	<1	<1
Energy Source	<1	1	1	<1	<1	<1
Mobile Source (vehicles)	5	17	45	<1	9	3
Mobile Source (boating)	91	6	150	<1	4	3
Total Existing Conditions	96	24	196	<1	13	6
Project Conditions (2021)						
Area Source	1	<1	<1	<1	<1	<1
Energy Source	<1	<1	<1	<1	<1	<1
Mobile Source (vehicles)	4	13	34	<1	9	2
Mobile Source (boating)	80	9	139	<1	3	3
Total Project Conditions	84	23	174	<1	12	5
Net Emissions						
Project minus Existing	*-12*	*-1*	*-22*	<0	-1	<0
San Diego County AQIAs	**75**	**250**	**550**	**150**	**100**	**55**
Does Net Operation Exceed AQIA Levels?	**No**	**No**	**No**	**No**	**No**	**No**

As shown in Table 10, operation of the proposed Project would result in a reduction in all nonattainment criteria pollutant emissions and their precursors, relative to existing conditions. This is an air quality benefit that will contribute to cumulative improvements in regional and localized air quality. The decrease in emissions is due to the reduction in total building area and number of boating slips. The proposed Project would replace the existing buildings with modern buildings constructed to the most recent California Building Code (CBC) standards (2019).

Regional air quality thresholds of significance taken into consideration existing air quality concentrations and attainment or nonattainment designations under the NAAQS and CAAQS at a regional level. Because the SLTs are reflective of regional emissions levels, projects that generate regional criteria pollutant and ozone precursor emissions below these thresholds to be minor in nature and would not adversely affect air quality such that the NAAQS or CAAQS would be violated. Since the proposed Project would not exceed regional air quality thresholds, the proposed Project would not result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment for and would not contribute to significant human health impacts. A less than significant impact would occur as a result of the proposed Project.

c. Would the project expose sensitive receptors to substantial pollutant concentrations?

Less Than Significant Impact. This analysis discusses criteria pollutants, diesel particulate matter (DPM), and carbon monoxide (CO) impacts as it relates to the sensitive receptors near the proposed Project. The closest sensitive land use is Harbor Island Park, approximately 400 feet southeast of the marina, and the closet residential use is the military housing located approximately 1,650 feet northwest of the Project site.

High levels of criteria pollutants are associated with possible health risk (e.g., asthma, asphyxiation), which is highly dependent on many interconnected variables (e.g., cumulative concentrations, local meteorology and atmospheric conditions, the number and character of exposed individuals [e.g., age, gender]). However, as noted above, with respect to regional criteria pollutants, SLTs are considered appropriate to determine whether a proposed project may increase regional criteria pollutant levels such that NAAQS or other standards would be exceeded, which would trigger health concerns. The EPA develops and considers the quantitative characterizations of exposures as well as the associated risks to human health or the environment in a process known as the Health Risk and Exposure Assessment (HREA). The HREA estimates mortality (e.g., incidents of death) and morbidity (e.g., incidents of reduced lung function) effects associated with a full range of observed pollutant concentrations as part of the analysis (EPA 2014). However, existing models have limited sensitivity to small changes in criteria pollutant concentrations and, as such, translating project-generated criteria pollutants to specific health effects using the regional models would not produce meaningful information.

As shown in Table 7, construction emissions from the proposed Project would be below the regional thresholds. Due to the minor amount of construction emissions, the limited exposure of nearby recreational and residential receptors to these pollutants, and the distance of receptors from the site, health effects associated with these criteria pollutants during construction would not occur. As discussed above, operation of the proposed Project would reduce emissions relative to existing conditions, which is an emissions and public health benefit. Therefore, increased health effects associated with criteria pollutants during operation would not occur.

Similarly, construction activities related to the proposed Project would result in emissions of DPM, which is classified as a carcinogenic toxic air contaminant (TAC) by the CARB, from heavy equipment used on site and truck traffic to and from the site, as well as minor amounts of other TACs from motor vehicles. Health effects from TACs are usually described in terms of cancer risk. An incremental cancer risk threshold of 10 in one million is established by the SDAPCD. “Incremental Cancer Risk” is the likelihood that a person continuously exposed to concentrations of TACs and is typically based on a 30- or 70-year exposure duration. Construction would occur over 2 years, which is considerably shorter than the 30- to 70-year exposure duration associated with chronic cancer health risks. As shown in Table 7, PM10 emissions generated during construction would be minor, with maximum emissions between 6 to 7 pounds per day. Roughly half of these PM10 emissions are the result of fugitive dust, which is not a carcinogenic TAC. Moreover, wind in the project area blows predominately from the northwest in a southeasterly direction (CARB 2019). As such, the nearest residential receptors (military housing) are located up-wind from the project site. Receptors that access the recreational uses to the south of the Project would have infrequent exposure to diesel exhaust, with exposure limited to visitation that coincides with weekday construction activities. Harbor Island Park is also 400 feet from the marina; because DPM emissions decrease dramatically as a function of distance from the source, pollutant concentrations at the park will be substantially lower that at the Project site (CARB 2005). As such, there would be no adverse health effects from construction-generated DPM at the nearest receptor locations.

Once operational, the proposed Project is not expected to in increase visitation or intensity of uses at the Project site because waterside marina usage drives use of landside marina facilities, and the number of marina slips is decreasing; therefore, operation of the proposed Project over the next 40 years would not result in an increase in DPM emissions (refer to Table 8). Therefore, increased health effects associated with DPM during construction and operation would not occur.

Motor vehicle emissions would not be concentrated in any one area but would be dispersed along travel routes and would not be anticipated to cause a significant CO emission. Furthermore, the proposed Project would not expand the existing HIWM use. Rather, the proposed Project would reduce the number of vehicle trips and associated mobile source emissions (refer to Table 8). Therefore, the proposed Project would not expose sensitive receptors to substantial CO concentrations in excess of the health protective CAAQS or NAAQS, and therefore, would not expose sensitive receptors to significant pollutant concentrations that could result in adverse health effects. This impact is considered less than significant, and no mitigation measures are required.

d. Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Less Than Significant Impact*.* According to CARB's *Air Quality and Land Use Handbook*, land uses associated with odor complaints typically include sewage treatment plants, landfills, recycling facilities, petroleum refineries, and livestock operations (CARB 2005). Potential odor emitters during construction activities include diesel exhaust, asphalt paving, and the use of any architectural coatings to paint paved surfaces. Construction-related operations would be temporary in nature, and construction activities would not be likely to result in nuisance odors that would violate SDAPCD Rule 51. Additionally, all construction equipment is required to be maintained in accordance with the manufacturers' specifications, and all construction equipment would be turned off when not in use. Therefore, odors during construction would not adversely affect a substantial number of people and would not be a significant impact.

Potential odor emitters during operations would include occasional gasoline odors from the fueling station and gasoline odors from normal boat and vehicle use. However, odor exposure would be limited to the circulation routes, parking areas, and areas immediately adjacent to fueling and boating activities. It is anticipated that no new odors would be generated during the operation of the proposed Project as it would result in the continuation of an existing use and no new, expanded, or additional uses are proposed. Therefore, impacts would be less than significant, and no mitigation measures would be required.

IV. Biological Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
c. Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☒	☐
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☒	☐
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☒	☐	☐
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?	☐	☒	☐	☐

Environmental Setting

The environmental setting description for biological resources is based on a comprehensive database review, a site visit by an ICF biologist, and the Harbor Island West Marina Marine Updated Baseline Eelgrass Resources Report and Harbor Island West Marina Marine Biological Resources Report, both prepared by Marine Taxonomic Services, Ltd. on April 2, 2018 (Appendix B and C). The landside portion of the Project site consists of approximately 3.81 acres in an urbanized area while the waterside portion of the Project site consists of approximately 21.96 acres within San Diego Bay. A description of vegetation habitat types and species observed on site is provided below.

The proposed landside improvements are located on a site which is completely developed with buildings, pavement, parking lots, and landscaped areas. As identified in the HIWM Marine Biological Resources Report, habitat within the landside portion of the Project site is identified as Urban/Developed. This type of land cover consists of paved areas and developed areas. Vegetation within this type of land cover is limited to ornamental landscaping, situated in planters or medians, to provide visual screening and decoration along local roadways and the Project's site surface parking.

The proposed waterside improvements are located in San Diego Bay which is characterized by a wide range of marine habitats including soft bottom, which predominates in the bay, eelgrass (*Zostera marina*), and artificial hard substrates primarily associated with piers and jetties. Habitat types identified within the waterside portion of the Project site included unvegetated soft bottom, vegetated soft bottom, docks and pilings, riprap, and open water. The majority of the survey area is loosely consolidated soft bottom, ranging in depth from intertidal to -17-feet mean lower low water (MLLW). The intertidal portions are mostly shoreline rip-rap while the soft bottom habitats start at approximately -1-foot MLLW (low intertidal). Shallow shoreline areas typically have a greater content of fine sands that quickly transitions to mud in deeper water. Table 11 provides a summary of the plants and animals observed within the Project survey area during the biological survey.

Table 11. Plant and Animal Species Observed

	Plant and Animal Species Observed	
Habitat	**Plant Species**	**Invertebrates/Animal Species**
Unvegetated Soft Bottom	No plants were observed during survey	Tube-dwelling anemone (*Pachycerianthus fimbriatus*), Sea pens (*Sylatula elongata*), Bivalves, Burrowing anemones, Amphipods, Infaunal polychaetes, Jackknife clam (*Tagelus californianus*), Exotic colonial bryozoan (*Zoobotryon verticillatum*), Spiny lobster (*Panulirus interruptus*), California aglaja (*Navanax inermis*), Cloudy bubble snails (*Bulla gouldiana*), Round stingrays (*Urobatis halleri*), Diamond turbot (*Hypsopsetta guttulata*), California halibut (*Paralichthys californicus*), Barred sand bass (*Paralabrax nebulifer*), Spotted sand bass (*Paralabrax maculatofaciatus*)
Vegetated Soft Bottom	Eelgrass (*Zostera marina*), Gracilarioid red alga (Family Gracilariaceae), green alga (*Ulva lactuca)*	Round stingrays, Barred sand bass, Spotted sand bass, Pacific seahorse (*Hippocampus* ingens), Tube-dwelling Anemone, Bivalves, Burrowing anemones, Amphipods, California aglaja, Cloudy bubble snails
Docks and Piles	Barnacles (*Balanus glandula* and *Chthamalus* sp.), tunicates (*Styela clava, Ciona* sp. *Botrylloides* spp.*,* and others), sponges, oysters (*Ostrea lurida*), Soft bryozoan (*Zoobotryon verticillatum),* Encrusting bryozoans (*Eurystomella* sp.), Hydroids, Green algas (*Enteromorpha* sp. and *Ulva lactuca, Ulva lactuca, Mazzaella splendens*), Exotic kelp (*Undaria pinnatifida)*	Giant kelpfish, Kelp bass (*Paralabrax clathratus*), Barred sand bass, Topsmelt (*Atherinops affinis*)
Riprap	Barnacles, limpets, and green alga (*Ulva intestinalis* [formerly *Enteromorpha intestinalis*], Exotic alga (*Sargassum muticum*	Spiny lobsters
Open Water	No plants were observed during survey	Topsmelt, double-crested cormorants (*Phalacrocorax auritus*), western grebes (*Aechmophorus occidentalis*)

Source: Appendix C

Animal Species with the Potential to Occur within the Project Site

The potential for sensitive species to occur within the Project Site was evaluated in the Project's marine biological assessment (Appendix C) with citations relative to their occurrence included in the sections below. Protected, rare, threatened, or endangered wildlife species that may occur within Harbor Island West Marina include eastern pacific green sea turtle (*Chelonia mydas*) (Federal Threatened), California least tern (*Sternula antillarum browni*) (State Endangered and Federal Endangered), California brown pelican (Fish and Game Code section 3511(b)(2) Fully Protected), and nesting birds. Mammals protected under the Marine Mammal Protection Act and likely to occur within the marina include the harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus californianus*). None of the above species were observed during the survey, though their likelihood of occurrence is as follows.

Reptile Species

Eastern pacific green sea turtle. The eastern pacific green sea turtle is federally threatened throughout its eastern North Pacific range and have been sighted from Baja California to southern Alaska, but most commonly occur from San Diego south. South San Diego Bay supports a population of eastern pacific green sea turtles (*Chelonia mydas*) that primarily remain in the warm waters of south San Diego Bay, though some are believed to leave the bay to nest on the beaches of offshore islands of Mexico. Tracking studies conducted by San Diego State University and National Marine Fisheries Service (NMFS) indicate that the turtles continue to only utilize South San Diego Bay. There is a potential for green sea turtles to transit past the Project site, although they have not been observed in the North Bay in recent years.

Bird Species

California least tern. During its breeding season, April 1 through September 15, the endangered California least tern is observed in San Diego Bay. The California least tern was previously observed nesting at various locations around San Diego Bay, including SDIA, North Island Naval Station, the Naval Amphibious Base Delta Beach, D Street Fill, the Chula Vista Wildlife Reserve, and the South Bay Saltworks in the South San Diego Bay Unit of the San Diego National Wildlife Refuge (USFWS 2006). The HIWM is located approximately 1.5 miles from each of the two nesting sites, as identified above, in north San Diego Bay. The other observed nesting sites are located a greater distance from the HIWM. More recently, the California least tern was observed at Spanish Landing (across the water from the marina) during the 2016-2017 year-long, baywide avian surveys (Port of San Diego, 2018b). Given the occurrence at Spanish Landing and the ecological characteristics of the Project site, it is likely that the California least tern could forage within the marina during nesting season.

California brown pelican. The California brown pelican, identified as a Fully Protected Species under California Fish and Game Code, is commonly observed in the San Diego Bay and is found in small numbers along the shoreline of the bay. During the 2006 and 2009 baywide avian surveys, California brown pelicans were observed a total of 15 and 14 times, respectively (Appendix C). Moderate foraging habitat for the California brown pelican occurs within the waterside portion of the Project site. No large roosting aggregations occur in the Project site. Although temporarily increased turbidity associated with certain construction activities (e.g., during pile driving activities) could potentially reduce the forage efficacy of this species, the available open water habitat within the rest of San Diego Bay and in the nearshore coastal waters would provide ample alternative foraging opportunities. Noise associated with pile driving activities during construction could potentially disturb pelicans foraging immediately adjacent to the Project site; however, if disturbed, they would likely relocate to available loafing and foraging areas available outside the Project site (Appendix C). This species has been delisted from its prior Federal and State endangered species status but remains protected as noted above. Brown pelicans do not breed on the mainland California coast.

Nesting Birds. Vegetation (ornamental trees) on the landside portion of the Project site provides marginal suitable nesting habitat for avian species protected under the Migratory Bird Treaty Act (MBTA) and the California Fish and Game Code.

Mammal Species

Harbor seal (*Phoca vitulina*). The harbor seal, protected under the Marine Mammal Protection Act (MMPA), is commonly observed in temperate coastal habitats and uses rocks, reefs, beach, and drifting glacial ice as haul out and pupping sites. On the exposed ocean side of the Point Loma Peninsula, harbor seals have established one of two mainland hauling and rookery sites in San Diego County. As a result, Pacific harbor seals and their pups have been documented in San Diego Bay, mostly at the northern end of the Bay nearest Ballast Point. The harbor seals use a portion of the docks in a restricted area adjacent to the Naval Base Point Loma Submarine docking station to haul out. In addition, harbor seals have been observed to haul out along the shore south of Ballast Point (NOAA 2017).

Harbor seals do not breed in San Diego Bay, but forage there year round (Appendix C). Harbor seals are occasionally observed hauled out on low lying docks or beaches in the northern portions of San Diego Bay (U.S. Navy 2015). Although harbor seals are likely to occur within and nearby the marina based on observations in north San Diego Bay, their potential for occurrence at the Project site is negligible as there are no suitable haul out sites.

California sea lion (*Zalophus californianus californianus*). The California sea lion, protected under the MMPA, resides in the Eastern North Pacific Ocean in shallow coastal and estuarine waters. Sandy beaches are preferred for haul out sites. In California, they haul out on marina docks as well as jetties and buoys. California sea lions do not breed in San Diego Bay, but forage there year round. They are abundant on the bait barges at Point Loma and the U.S. Navy facilities along Point Loma. California sea lions were the most commonly observed marine mammal identified during a recent large-scale monitoring effort in north San Diego Bay (NAVFAC SW 2018). Although California sea lions are found nearby, their potential for occurrence at Project site is minimal because they do not breed in San Diego Bay but do forage there. Sea lions were not observed during surveys and would be expected to only occasionally enter the marina (Appendix C). Their potential to breed within the marina is negligible given that they do not breed in San Diego Bay (Bartholomew 1967). There have been recent observations of pupping in the large congregations of animals at the bait barges at Point Loma (Mooney 2019). There have been no similar observations elsewhere in San Diego Bay and so the likelihood of pupping within the marina is negligible.

Fish Species

There are 101 marine species managed under both the Pacific Groundfish and Coastal Pelagic Fishery Management Plans (FMPs). Five species out of the 101 species are managed under the Coastal Pelagic FMP, including northern anchovy, Pacific sardine, Pacific mackerel, market squid, and jack mackerel. Of these 5 species, both northern anchovy and Pacific sardine were caught during the 2016 fisheries inventories of San Diego Bay (Williams et al. 2016). The remaining 96 fish species identified are managed under the Pacific Groundfish FMP, and include California scorpionfish and olive rockfish, both of which were caught during the 2016 fisheries inventories of San Diego Bay (Williams et al. 2016). The Coastal pelagic species that both occur, and have the potential to occur in San Diego Bay are generally open water schooling species that would only occasionally be found in a marina environment in San Diego Bay. Fish species managed under the Pacific Coast Groundfish FMP occur in low numbers in San Diego Bay, and are not likely to be common within the Project site.

The Project site contains designated Essential Fish Habitat (EFH) for 100 fish species and a single species of marine invertebrate (market squid) (PFMC 2019, 2016). Of these 100 fish species, 57 have a high potential to occur within the Project site based on habitat requirements (McCain 2003, Appendix C, and PFMC 2005). Four of these 57 species were caught during recent fisheries inventories of San Diego Bay (Williams et al. 2016).

Plant Species with the Potential to Occur within the Project Site

Habitat within the landside portion of the Project site is identified as Urban/Developed. This type of land cover consists of paved areas and developed areas. Vegetation within this type of land cover is limited to ornamental landscaping; therefore, no sensitive plant species are present. The ornamental landscaping could provide marginal suitable nesting habitat for avian species protected under the MBTA) and the California Fish and Game Code (as discussed above).

Eelgrass, which is categorized as EFH and given further designation as a Habitat of Particular Concern, was identified within the Project site; however, impacts related to eelgrass are discussed in Threshold 2 below because it is considered a sensitive natural community.

Analysis of Environmental Impacts

a. Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Less than Significant with Mitigation Incorporated.

Construction – Waterside Improvements

The proposed Project would require in-water construction work associated with the demolition and reconstruction of the proposed dock system and slips. Phase 1 construction is anticipated to take approximately 12 months. The in-water construction work would require the use of a crane barge, work boats, and an impact pile driver to install the dock system. The use of these types of equipment would generate noise, vibration, and turbidity in the immediate construction work area. Species, and the marine habitats on which they rely, that may be directly or indirectly affected by noise levels and/or turbidity produced during waterside Project construction include eastern pacific green sea turtle, bird species such as California least tern, marine mammals, designated EFH for coastal pelagic and pacific coast groundfish species, and designated estuary and seagrass habitat areas of particular concern (HAPC).

Noise-related Impacts

The proposed Project would use jetting followed by impact pile driving to install all of the concrete piles. An impact hammer would be used after jetting the piles in place to set the last 5 to 10 feet of the installed piles to the desired pile depth. Jetting piles as opposed to using vibratory techniques (i.e., pile driving) results in lower sound pressures (Illinworth and Rodkin 2007) and is a more environmentally sensitive method. Additionally, pile driving would be a temporary disturbance and the overall noise from impact pile driving would be minimal because of the low number of strikes needed to set each pile (e.g., the last 5 to 10 feet).

A hydroacoustic impact analysis was conducted as part of the Harbor Island West Marina Marine Biological Resources Report (Appendix C) to identify portions of the proposed Project that could have substantially adverse effects, direct or indirect, on marine species identified as candidates, sensitive, or actively maintain protected species status by the NMFS and CDFW. Thresholds for significant effects on marine mammals are described as Level A and Level B Harassment per the Marine Mammal Protection Act. According to the NMFS, extreme sound levels can cause harassment to marine mammals and other wildlife species (e.g., fish and sea turtles).

Marine Mammals and Green Sea Turtle

The sound level thresholds for Level A Harassment for marine mammals was updated in July 2016 and provides different thresholds based on auditory ranges of different types of marine mammals. Thresholds for Level A and Level B Harassment are provided in Table 12 and Table 13, respectively.

Table 12. Level A Harassment Thresholds

Hearing Group	Low Frequency Cetaceans[1]	Mid Frequency Cetaceans[2]	High Frequency Cetaceans	Phocid Pinnipeds[3]	Otariid Pinnipeds[2]
L_E Threshold[4]	183 dB	185 dB	155 dB	185 dB	203 dB
PTS[5] Isopleth to L_E Threshold	3.3 meters	0.1 meters	3.9 meters	1.8 meters	0.1 meters
L_{PK} Threshold[6]	219 dB	230 dB	202 dB	218 dB	232 dB
PTS Isopleth to L_{PK} Threshold	0.0 meters	0.0 meters	0.0 meters	0.0 meters	0.0 meters

Source: Appendix C

Note: Level A Harassment is defined as any act of pursuit, torment, or annoyance, which has the potential to injure a marine mammal or marine mammal stock in the wild.

[1] Cetacea include whales, dolphins, and porpoises

[2] Based on an assumption of 10 strikes per pile for 18-inch concrete piles, the mid-frequency cetaceans and otariid pinniped isopleths are 0.1 meter from source.

[3] Pinnipeds include seals, sea lions, and walruses

[4] L_E = 24-hour accumulation period

[5] PTS = permanent threshold shift

[6] L_{PK} = peak sound level

Isopleth = A line drawn on a map showing the occurrence of frequency of a phenomenon.

dB = decibels

Table 13. Level B Harassment Thresholds

Pile Size/Type	Driving Method	Level B Influence Isopleth Distances[1]
16” Concrete	Impact	74 meters
18” Concrete	Impact	25 meters

Source: Appendix C

Note: Level B Harassment is defined as having the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Isopleth = A line drawn on a map showing the occurrence of frequency of a phenomenon.

[1] 160 dB_{rms} used as threshold for Level B harassment

Anticipated peak sound levels (L_{PK}) for in water construction of the Project are estimated to generate up to 185 dB (i.e., with use of an impact hammer to drive 18-inch piles)). This is below Level A Harassment thresholds established by NOAA for low-frequency cetaceans (219 dB), mid-frequency cetaceans (230 dB), high frequency cetaceans (202 dB), phocid pinnipeds (218 dB), and otariid pinnipeds (232 dB).

In addition to peak sound thresholds, recent NOAA guidance regarding Level A Harassment of marine mammals includes thresholds for 24-hour accumulation noise levels (L_E) (Appendix C). The Project’s worst case calculated L_E at source is predicted to be above the threshold for all marine mammals (Appendix C). However, the accumulated noise levels are so low that they quickly attenuate (i.e., over a short distance) to the NOAA defined thresholds. This means that marine mammals can be very close to pile driving yet are not predicted to be subject to Level A Harassment. Based on an assumption of 12 strikes per pile for 18-inch concrete piles, the mid-frequency cetaceans and otariid pinniped isopleths (distance from pile driving where injury may occur) are 0.1 meter (0.33 feet) from source. Phocid pinnipeds are 1.8 meters (5.9 feet) from source. The isopleths for low-frequency cetaceans and high-frequency cetaceans are 3.3 meters (10.8 feet) and 3.9 meters (12.8 feet) from source, respectively. Given such narrow isopleths within which noise levels can exceed thresholds for cumulative exposure, the potential for noise level impacts, as measured by L_E, is less than significant. This is because animals would have to remain within the isopleths distances for an entire day of pile driving to be subject to Level A Harassment. This scenario is highly unlikely as animals would essentially have to follow the pile driving from one pile to the next, and assumes that construction activities would not cause animals to temporarily leave the area.

The recent NOAA guidance for noise level impacts on marine mammals addresses only Level A Harassment (Appendix C). A determination of Level B Harassment (behavioral) relies on previous guidance established by NOAA. Level B Harassment could occur if marine mammals are exposed to in-water sound levels greater than 160 dB root mean square (RMS). The Project's proposed impact driving of 18-inch concrete piles is anticipated to produce noise levels of 166 dB RMS. The isopleth where sound is attenuated from 166 dB RMS to 160 dB RMS is 25 meters (82.0 feet), based on the practical spreading loss model. However, there is data showing higher noise levels for driving of smaller (16-inch) piles (e.g., 173 dB RMS at source). The isopleth to attenuate sound from 173 dB RMS to 160 dB RMS is 74 meters (242.8 feet). Level B Harassment (behavioral) could occur if marine mammals move inside the 160 dB RMS isopleths (contour line). While NOAA does not provide specific noise level guidance relative to green sea turtles, NMFS guidelines for marine mammals are currently accepted as also being protective of green sea turtles. Therefore, without mitigation, significant impacts to marine mammals and green sea turtles could occur as a result of Project construction.

An isopleth of 74 meters (242.7 feet) would be sufficient to monitor marine mammals and green sea turtles during construction. This isopleth is the maximum calculated for any of the potential noise related impact zones for wildlife species and therefore is a conservative distance for all noise related monitoring either "in air" or "in water". In air, sound attenuates faster than in water and sound levels are generally lower in air. Therefore, monitoring marine mammals and green sea turtles within 74 meters of source in air or in water is sufficient. The results of noise analyses relative to fish used the same worst-case scenarios and assumptions as those used for marine mammals.

Noise levels produced during proposed waterside construction activities have the potential to cause behavioral modification (Level B Harassment) to marine mammals and green sea turtles. However, these impacts would be mitigated to below a level of significance by **MM-BIO-1**, which requires implementation of a biological monitoring program, and **MM-BIO-2**, which requires use of soft-start techniques.[5] This technique provides a warning and/or gives marine mammals and sea turtles a chance to leave the area prior to any impact hammering. This methodology is recommended by the Joint Nature Conservation Committee (2004) and has been implemented as a common requirement within Incidental Harassment Authorizations for marine mammals issue by NOAA (e.g., NOAA 2017, NOAA 2016) although the efficacy of the method requires further research (David 2006). In the rare instance that marine mammals and turtles are present in the HIWM during in water construction activities, adherence to **MM-BIO-1** and **MM-BIO-2** would reduce construction noise impacts to marine mammals and the green sea turtle to a less than significant level.

MM BIO-1: Monitoring Program. Prior to construction activities involving in-water pile driving, the project proponent shall prepare and implement a marine mammal and green sea turtle monitoring program. This monitoring program shall be approved by the District and shall include the following requirements:

- For a period of 15 minutes prior to the start of in-water construction, a qualified biologist, retained by the project proponent and approved by the District's Director of Development or designee of the District, shall continuously monitor a 74-meter radius (zone of influence) around the active pile driving areas to ensure that special status species are not present.
- The construction contractor shall not start work if any observations of special status species are made prior to starting pile driving. No driving will be conducted until the area has been free of marine mammal sightings for 15 minutes.

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[5] Pile driving activities may begin with a "ramp-up" or "soft start" where lower hammer energy levels are used to start the pile driving process with the force of the pile driving gradually increased

- The qualified biologist shall continually continuously monitor the zone of influence (ZOI - 74 meters from pile driving activity) during pile driving activities to observe any marine mammals or turtles that approach or enter the ZOI. The qualified biologist shall have authority to stop all work on-site and shall do so if a marine mammal or sea turtle enters the ZOI or could otherwise be impacted by construction noise.
- The qualified biologist must meet the minimum requirements as defined by the National Oceanic Atmospheric Administration's *Guidance for Developing a Marine Mammal Monitoring* Plan (NOAA 2017).

MM-BIO-2: Soft Start Methodology for Impact Hammer Pile Driving. The contractor shall initiate all impact hammer pile driving techniques with a soft start methodology using an initial three sets of three low energy pile strikes. Low energy strikes are performed by running the impact hammer at reduced energy (typically 50–75 percent of full impact force) followed by a 30-second waiting period to initiate impact driving before ramping up to full hammer energy. The soft-start methodology shall be utilized any time pile driving has ceased for a period in excess of 30 minutes, provided compliance with MM BIO-1 confirms pile driving activities may commence.

Fish

Applying the NOAA thresholds for physical injury and behavioral modification for fishes allowed calculation of isopleths (distances from pile driving activities) within which injury or behavioral modification may occur. Physical injury is expected to occur to all fish if LPK levels exceed 206 dB. L_E sound levels can injure fish above 187 dB and 183 dB for fish ≥ 2 grams and < 2 grams, respectively. Behavioral modification occurs at 150 dB RMS. Peak sound levels are not anticipated to result in physical injury to fishes given that anticipated LPK sound levels are lower (185 dB) than the threshold for injury. L_E levels are also expected to be too low based on 12 strikes per pile and 10 piles per day to cause physical injury to fishes; L_E is expected to be 155 dB. RMS levels for behavioral modification of fish based on the worst-case scenario (166 dB RMS) are above the 150 dB RMS threshold established by NOAA. Calculation of the behavioral modification isopleth using the practical spreading loss model requires a 117 meter (383.8 feet) isopleth to reduce RMS levels from 166 to 150 dB. Thus, a significant behavioral modification impact may occur for all fish occurring within 117 meters (383.8 feet) of pile driving.

Based on sound energy levels calculated and thresholds established by NMFS, it was determined that Level B (behavioral disruptions) harassment would occur to fish as a result of pile driving activities. A full discussion of potential impacts on fish species associated with pile driving is included in Appendix C and is hereby incorporated by reference. As such, pile driving activities associated with the marina construction would generate a potentially significant noise impact on these species that could result in Level B harassment. **MM BIO-2** would reduce construction noise impacts on fish species to less than significant because the use of soft-start techniques during pile driving will allow fish to flee the work area.

With regard to potential impacts to EFH and the coastal pelagic and pacific coast groundfish species managed under the Coastal Pelagic and Pacific Coast Groundfish FMPs, the coastal pelagic species that both occur, and have the potential to occur in San Diego Bay, are generally open water schooling species that would only occasionally be found in a marina environment in San Diego Bay. Fish species managed under the Pacific Coast Groundfish FMP occur in low numbers in San Diego Bay and are not likely to be common within the Project site. More importantly, none of the proposed Project construction activities are expected to negatively alter the ecological roles and processes currently occurring within the Project site that are characteristic of designated EFH for coastal pelagic species and pacific coast groundfish. As such, potential impacts to the role(s) that waters and substrate within the Project site play for these species regarding habitat for spawning, breeding, feeding, or growth to maturity, are expected to be negligible.

Birds

Pile driving would temporarily increase noise in the surrounding area, which could create a disturbance for the California least tern and affect their foraging. However, any impacts would be short-term, localized, and would not have a substantial adverse effect on bird populations. Marine and migratory birds, including the

California least tern, frequently experience elevated noise and disturbance from boat launching and passing vessels on the bay, as well as the nearby airport and overall industrial setting of the area (Mooney 2019). Therefore, construction noise impacts to migratory birds would be less than significant.

Turbidity-related Impacts

Although the waterside portion of the Project site provides potential foraging habitat for the California least tern and California brown pelican due to the presence of prey fish, these species are much more likely to forage in unobstructed open water habitat in San Diego Bay or the Pacific Ocean instead of local harbors and marinas. Some studies suggest that increased turbidity resulting from in water construction work could potentially decrease foraging success of the California least terns, as a result of decreased visibility (Appendix C). Therefore, overall impacts resulting from visual impairment of foraging California least terns would be potentially significant. To ensure that turbidity in the Project site during construction is minimized, **MM-HWQ-1 through MM-HWQ-3** requires the use of silt curtains and specifies pile driving techniques to minimize and restrict the spread of any generated turbidity that would minimize any potential foraging impacts on protected bird species such as the California least tern and California brown pelican. Implementation of **MM-HWQ-1 through MM-HWQ-3** would minimize any potential foraging impacts on these species and therefore impacts would be less than significant.

Additional details on turbidity and other water quality impacts are provided in Section X, *Hydrology and Water Quality*.

Construction – Landside Improvements

No special status species were observed on the landside portion of the Project site, which is developed with existing marina uses, including structures and a parking lot. Vegetation (ornamental trees) on the landside portion of the Project site provides marginal suitable nesting habitat for avian species protected under the Migratory Bird Treaty Act (MBTA) and the California Fish and Game Code. Native resident or migratory birds using ornamental vegetation in the vicinity of Project site are expected to be acclimated to human disturbance associated with ongoing commercial, recreational, and airport land uses. However, potential impacts on nesting birds may occur if construction activities that disrupt nesting activities occur during the nesting season (generally March through August). Although no nests were observed during surveys of the Project site, a nest could become established in or near the landside portion of the Project site before landside construction begins. Additionally, as previously discussed, California least tern were observed at Spanish Landing (across the water from the marina) during the 2016-2017 year-long baywide avian surveys. However, there are no suitable nesting (sandy substrate) areas onsite or nearby.

Initiation of construction for landside development and removal of any ornamental trees would occur outside of the peak nesting season for MBTA protected nesting birds (March 15–August 31). Phase I of construction is planned to begin in September 2020 and last 12 months. Phase II of construction is anticipated to start between September and February 2021, and would end in the summer of 2022. As such, potential impacts to nesting birds would be avoided and no nests (that contain eggs or young) would be disturbed by construction. In the event that construction activities cannot be avoided during the nesting season for birds, **MM-BIO-3** shall be implemented. Implementation of **MM-BIO-3** would reduce impacts to nesting avian species to a less than significant level.

> **MM-BIO-3: Avoid Nesting Season for Birds or Conduct Pre-construction Nesting Surveys.** To ensure compliance with the MBTA and similar provisions under Sections 3503 and 3503.5 of the California Fish and Game Code, the Project proponent shall conduct all vegetation removal (e.g., ornamental trees) during the non-breeding season between September 1 and March 14 or shall implement the following:
>
> 1. If landside construction activities are scheduled between March 15 and August 31, the Project proponent shall retain a qualified biologist who shall conduct a focused nesting bird survey within potential nesting habitat prior to the start of vegetation removal. The survey shall be submitted to the District's Environmental Conservation Department prior to the commencement of vegetation removal on the Project site.

2. The nesting bird survey area shall include the entire limits of disturbance plus a 500-foot buffer to ensure indirect impacts would be avoided. The nesting surveys shall be conducted within 1 week prior to initiation of construction activities and shall consist of a thorough inspection of the Project site by a qualified biologist(s). The survey shall occur between sunrise and 12:00 p.m., when birds are most active. If no active nests are detected during these surveys, only a brief letter report documenting the results shall be prepared.

3. If the qualified biologist confirms nesting within 300 feet of the disturbance footprint, a no-disturbance buffer shall be established around each nest site to avoid disturbance or destruction of the nest until after the nesting season or a qualified biologist determines that the nest is no longer active. The size and constraints of the no-disturbance buffer shall be determined by the qualified biologist, but shall not be greater than 300 feet. If there is a delay of more than 7 days between when the nesting bird survey is performed and vegetation removal begins, the qualified biologist shall resurvey to confirm that no new nests have been established.

Operation – Waterside and Landside Improvements

Operation of the proposed Project on both the waterside and the landside would not result in increased risks to wildlife because the redevelopment of HIWM would replace existing marina uses with similar marina uses. The redevelopment of the waterside portion of HIWM would result in an overall decrease (6,000 square feet) in over water coverage associated with the new dock system. The reduction in over water coverage would result in an increase of open water for foraging by the California least tern and other foraging birds in the area. The decrease in over water coverage also provides an improved condition for future eelgrass growth. In addition, the boat traffic and other operational uses of the waterside would not increase as a result of the proposed Project. Therefore, the marine mammals, Eastern Pacific green sea turtle, and fish would not be affected.

Proposed landside operations would also be consistent with existing operations as no increase is proposed. Therefore, the ability for birds to nest would not be affected. Therefore, operational impacts would be less than significant.

b. Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?

Less than Significant with Mitigation Incorporated.

Construction - Waterside Improvements

Eelgrass

As identified in the Harbor Island West Marina Marine Updated Baseline Eelgrass Resources Report (Appendix B), the waterside of the Project site has eelgrass habitat present. Eelgrass is recognized as a habitat area of particular concern (HAPC) by NOAA Fisheries.

Eelgrass resources can be impacted both directly and indirectly by project design elements and construction activities. Indirect impacts can occur from increases in turbidity. Direct impacts to eelgrass can result from shading caused by new or increased docks and related structures, as well as shading from support vessels (e.g., barges), bottom scour from propeller wash from construction vessels and impacts to the bay sediment from construction barges including from the use of spuds and anchors.

Turbidity decreases the light available to the eelgrass beds as more light is attenuated through the water column than would be otherwise. Additionally, as particulates settle from the turbid water column they can land on eelgrass blades and reduce the ability of the plant to photosynthesize. The extent of turbidity related impacts is dependent upon the extent and duration of the elevated turbidity.

The planned waterside improvements would result in a reconfiguration of the dock layout. Based on a preliminary assessment prepared for the proposed Project, the reconfiguration of the dock layout would result in the direct coverage of 177 square meters (1,905 square feet) of existing eelgrass beds (Figure 14 through Figure 16). This coverage represents a direct impact on existing eelgrass. This direct impact on eelgrass would be mitigated by implementation of **MM-BIO-4.** This measure requires, among other things, the development of an eelgrass mitigation and monitoring plan prior to project commencement for eelgrass transplantation.

Although the reconfiguration will have a direct impact on eelgrass, it will result in a reduced overall footprint of waterside improvements. Currently, marina facilities and docks cover and shade 146,000 square feet of water area. After construction, this would be reduced to 140,000 square feet, which is a decrease of 6,000 square feet in shaded water area. This reduction of over water coverage was evaluated as part of an eelgrass impact assessment that examined the spatial distribution of eelgrass relative to depths and shading within the marina. That evaluation estimated that 85 square meters (915 square feet) of additional eelgrass beds could be expected within the Project site following the removal of existing docks within the optimum growing range of eelgrass. Those findings are based on the fact that there are docks currently in areas with depths that are suitable to support eelgrass. The removal of these docks would create new potential for eelgrass to grow. However, to ensure rapid eelgrass colonization in the removed dock areas and to ensure that the Project does not result in a reduction of eelgrass, restoration of eelgrass is proposed. Transplantation of approximately 300 square meters (2,700 square feet) of eelgrass adjacent to existing beds would ensure colonization of areas with removed shading in shallow water near existing eelgrass beds such that there is no reduction in eelgrass resources. **MM-BIO-4** is required to mitigate potential temporal losses of eelgrass within the Project site.

Construction activities associated with the proposed Project could also result in temporary shading from support vessels (e.g., barges), bottom scour from propeller wash from construction vessels and impacts to the bay sediment from construction barges including from the use of spuds and anchors. Assessing

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Figure 14
Baseline Eelgrass Diver Transects
Harbor Island West Marina Redevelopment Project

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Figure 15
Eelgrass Distribution
Harbor Island West Marina Redevelopment Project

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Figure 16
Potential Eelgrass Impacts
Harbor Island West Marina Redevelopment Project

effects to eelgrass habitat relies on performing eelgrass surveys prior to and following construction as required by NMFS *California Eelgrass Mitigation Policy and Implementing* Guidelines (NMFS 2014).[6] Pre-construction surveys provide a baseline condition for determining potential project-related impacts. Additionally, the pre-construction data can be used to train contractors relative to the presence of eelgrass resources prior to the start of construction. Post-construction eelgrass surveys provide a means to assess direct impacts immediately following construction or indirect impacts that take time to assess through repeated post-construction surveys. The requirement for pre- and post-construction eelgrass surveys, requirement/training of contractor to protect eelgrass from anchored barges, boat navigation, and propeller wash during construction, and guidelines for actions to be taken in the event that unforeseen impacts to eelgrass occur is outlined in **MM-BIO-4**. **MM-BIO-4** also addresses potential temporal impacts on eelgrass associated with construction activities and/or ensure the amount of restored eelgrass is consistent with California Eelgrass Mitigation Policy mitigation ratio. This mitigation measure requires a plan to restore eelgrass in a suitable area and monitor restoration results.

In addition, construction activities within the waterside portion of the Project site will require authorization from the USACE under Section 10 of the Rivers and Harbors Act (RHA). Implementation of mitigation measures and eelgrass surveys would need to be performed to the satisfaction of USACE, NOAA Fisheries (also known as NMFS), and consistent with the October 2014 *California Eelgrass Mitigation Policy and Implementing Guidelines*. With the implementation of mitigation measures, impacts would be less than significant.

MM-BIO-4 Develop and Implement an Eelgrass Mitigation and Monitoring Plan as Required by the California Eelgrass Mitigation Policy. Prior to the start of any in-water construction, the Project proponent shall retain a qualified biologist to develop and implement an eelgrass mitigation plan in compliance with the California Eelgrass Mitigation Policy. The qualifications of the qualified biologist are subject to approval by the District's Environmental Conservation Department. The mitigation plan shall be submitted to the District's Environmental Conservation Department and resource agencies (NMFS and CDFW) for approval 60 days prior to initiation of waterside project activities. The mitigation plan shall be implemented to (1) develop new eelgrass habitat on the areas of the vessel dock area that will no longer be shaded and (2) compensate for losses to eelgrass in the event that the surveys described below indicate the project has impacts on eelgrass. The specific eelgrass mitigation plan elements shall, at a minimum, include the following:

1 Prior to the commencement of any in-water construction activities, a qualified marine biologist retained by the Project Applicant and approved by the District shall conduct a pre-construction eelgrass survey. Surveys for eelgrass shall be conducted during the active eelgrass growing season (March–October), and results will be valid for 60 days, unless completed in September or October. If completed in September or October, results will be valid until March (the resumption of the next growing season). The qualified marine biologist shall submit the results of the pre-construction survey to the District and resource agencies within 30 days.

2 Identification of Project areas within the vessel dock area that are no longer shaded and are considered favorable to restore a minimum of 300 square meters (2,700 square feet) of eelgrass habitat. In addition, the mitigation plan shall include:

   a. Description of harvest and transplantation techniques to satisfy California Department of Fish and Wildlife requirements with regards to ensuring protection of beds used as a source of transplant material.

   b. A schedule that ensures eelgrass is transplanted as soon as possible following reconfiguration of the eastern portion of the marina where suitable planting sites become un-shaded by dock structures.

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[6] Available at https://archive.fisheries.noaa.gov/wcr/publications/habitat/california_eelgrass_mitigation/Final%20CEMP%20October%202014/cemp_oct_2014_final.pdf.

3 The Project proponent, through its general contractor, shall:

   a. Provide the pre-construction eelgrass surveys noted above identifying and demarcating the distribution of eelgrass to construction crews to assist tug and barge operators to avoid impacting eelgrass.

   b. Require all tug and barge operators to locate all anchored and spudded construction barges outside of eelgrass beds when not in use.

   c. Instruct tug boat operators that propeller wash can damage eelgrass beds and not to direct propeller wash toward eelgrass beds. No anchoring (and other bottom-disturbing activities) shall occur within eelgrass beds.

4 Within 30 days of completion of in-water construction activities, a qualified marine biologist retained by the Project Applicant and approved by the District shall conduct a post construction eelgrass survey during the active eelgrass growing season or within first 30 days of next active growth period following construction that occurs outside of active growth period. The post-construction survey shall evaluate potential eelgrass impacts associated with construction. Upon completion of the post-construction survey, the qualified marine biologist shall submit the survey report to the District and resource agencies within 30 days.

5 At least two years of annual post-construction eelgrass surveys shall be conducted during the active eelgrass growing season. The additional annual surveys shall evaluate the potential for operational impacts on eelgrass.

6 In the event that construction impacts on eelgrass are detected in the post-construction survey and/or subsequent surveys, the Project Applicant shall implement the following:

   a. A qualified marine biologist retained by the Project Applicant and approved by the District shall develop a mitigation plan for in-kind mitigation. The qualified marine biologist shall submit the mitigation plan to the District and resource agencies within 60 days following the post-construction survey.

   b. The eelgrass mitigation and monitoring plan shall specify that the contractor/entity harvesting eelgrass to implement the required mitigation would need to obtain a Scientific Collecting Permit (SCP) for eelgrass harvest and a letter of authorization (LOA) at least 30–60 days prior to implementation.

   c. Mitigation for eelgrass impacts shall be at a ratio of no less than 1.2:1, as required by the California Eelgrass Mitigation Policy.

   d. Mitigation shall commence within 135 days of any noted impacts on eelgrass, such that mitigation commences within the same eelgrass growing season that impacts occur.

   e. Upon completing mitigation, the qualified biologist shall conduct mitigation performance monitoring at performance milestones of 0, 12, 24, 36, 48, and 60 months.

   f. The qualified biologist shall conduct all mitigation monitoring during the active eelgrass growing season and shall avoid the low growth season (November–February). Performance standards shall be in accordance with those prescribed in the California Eelgrass Mitigation Policy.

   g. The qualified biologist shall submit the monitoring reports and spatial data to the District and resource agencies within 30 days after the completion of each monitoring period. The monitoring reports shall include all of the specific requirements identified in the California Eelgrass Mitigation Policy.

Operation – Waterside Improvements

Operation of the proposed Project would not result in increased boat traffic or other increased post-construction risks to sensitive natural communities identified by the CDFW or USFWS because the redevelopment of HIWM would replace existing marina uses with similar marina uses. Because the proposed project would reduce the total number of boat slips, there would be no increase in the number of boats accessing the marina that could impact sensitive communities such as eelgrass.

With regard to potential impacts to seagrass HAPC within the Project site, potential impacts are expected to range from negligible to beneficial. The completed Project would result in the reduction of overwater coverage by 6,000 square feet and would pose a negligible impact to eelgrass beds already present with the implementation of best management practices that are protocol for such dock renovation/replacement projects. As such, the removal of shading and increase in eelgrass habitat is only expected to benefit/improve seagrass HAPCs already present within HIWM, with other potential impacts to seagrass HAPC being negligible, as other ecological roles and processes characteristic of the HAPC will not be altered by the proposed Project. Operational impacts would be less than significant.

Construction and Operation – Landside Improvements

The landside portion of the Project site consists entirely of developed land; there are no sensitive vegetation communities or areas of riparian habitat located within this portion of the Project site. No impacts associated with construction or operation of landside improvements would occur and no mitigation measures are required.

c. Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

Less Than Significant Impact. No state protected wetlands, as defined by the State Water Resources Control Board, or federally protected wetlands, as identified under Sections 401 and 404 of the Clean Water Act, are located within or immediately adjacent to the Project site. The waterside Project site and surrounding bay is considered a water of the United States (Section 10 waters) and is a 303(d) impaired water body pursuant to the Clean Water Act. The proposed Project activities are regulated under Section 10 of the Rivers and Harbors Act of 1899, Section 401 of the Clean Water Act, and the Coastal Act. A Water Quality Certification from the San Diego Regional Water Quality Control Board (RWQCB), Section 404 permit, and a Coastal Development Permit (CDP) from the District are required for the proposed Project. Permanent best management practices (BMPs) would be required to ensure water runoff during project operations does not adversely impact the bay. (See Section X, *Hydrology and Water Quality*, for a complete discussion on the proposed Project's water quality requirements.) There are no federally or state protected wetlands on the Project site. Impacts would be less than significant.

d. Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Less than Significant Impact. The Project site is currently developed with landside and waterside improvements. Due to the existing developed nature of the landside portion of the project and the surrounding urbanized area, native resident or migratory wildlife are not expected to occur. The waterside improvements do not propose any barriers or impediments that could interfere with the movement of native resident or migratory fish. Therefore, the project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species. Additionally, the project site and surrounding area is not located within a native resident or migratory wildlife corridor nor within the boundaries of a native wildlife nursery. Therefore, the project would not interfere with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. Impacts would be less than significant, and no mitigation measures would be required.

e. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Less Than Significant Impact with Mitigation Incorporated. Local biological resource policies and ordinances relevant to the proposed Project include the PMP and the California Eelgrass Mitigation Policy. The proposed Project would be consistent with the PMP conservation land use objective to encourage the protection and restoration of functional areas which have a high ecological value because the project is not within an area included in the conservation group scheduled for little or no development or an area of extraordinary biological significance. Additionally, biological impacts have been minimized (also refer to discussion in response XI.b). The proposed project is consistent with the California Eelgrass Mitigation Policy through implementation of **MM-BIO-4** (see discussion in response IV.b). There are no other local policies or ordinances that apply to the proposed Project, including a tree preservation policy or ordinance. Therefore, the proposed Project would not conflict with any local policies or ordinances protecting biological resources. Impacts would be less than significant with implementation of the above identified mitigation measure.

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?

Less Than Significant Impact with Mitigation Incorporated. The Project site is within the jurisdiction of the District. The District does not have an adopted Habitat Conservation Plan or other approved local, regional, or State habitat conservation plan. Although the Project site is within the City of San Diego Multiple Species Conservation Program (MSCP) boundaries, the District's jurisdiction is not included as part of the MSCP; thus, the proposed Project is not part of the Multi-Habitat Planning Area preserve system and would not conflict with the MSCP. However, the Project site is within an area (known as the Functional Planning Zone) in the San Diego Bay Integrated Natural Resource Management Plan (INRMP), which is a San Diego Bay Ecosystem Plan (SDBEP) (U.S. Navy and District 2013). The INRMP is a long-term strategy sponsored by two of the major managers of the San Diego Bay – the U.S. Navy and the District. The most recent version of the INRMP was approved in September 2013. The intent of the INRMP is to provide direction for the good stewardship that natural resources require, while also supporting the ability of the Navy and the District to meet their missions and continue functioning within the bay. The stated goal of the INRMP is to ensure the long-term health, recovery, and protection of San Diego Bay's ecosystem in concert with the bay's economic, Naval, recreational, navigational, and fishery needs.

Project construction activities such as pile driving and jetting are addressed in Section 5.2.3 of the INRMP. In particular, the INRMP provides that project construction should seek to avoid, minimize, or mitigate impacts from activities that result in turbidity, vibration and noise. The proposed Project would be conducted in a manner that is compatible with all of these objectives, as further detailed below.

Project activities would be compliant with INRMP and water quality monitoring and silt curtains would be in place during activities that generate turbidity (see **MM-HWQ-1** through **MM-HWQ-3**). In addition, all pile installation activities shall be conducted in a manner that reduces noise to the greatest extent feasible, including soft starting and maximized jetting to minimize the need for pile driving and its resultant noise and vibration effects (see **MM-BIO-2**). Overall, it is anticipated that the proposed Project would improve habitat quality by reducing the area of shaded water surface from 146,000 to 140,000 square feet, thus creating an opportunity for eelgrass colonization. The proposed Project does not conflict with provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan, as none exist that covers the Project site or surrounding area. The proposed Project is consistent with the goals and objectives of the INRMP. Implementation of the identified mitigation measures would reduce impacts to less than significant.

V. Cultural Resources

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	☐	☐	☒	☐
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☒	☐
c. Disturb any human remains, including those interred outside of dedicated cemeteries?	☐	☐	☒	☐

Environmental Setting

A review of the U.S. Geological Survey (USGS) Point Loma 7.5-minute quadrangle map shows that prior to the early 1960s the Project site consisted of open waters of the San Diego Bay (USGS 1953). Beginning in the early 1960s, Harbor Island was created out of material dredged to deepen the channel between the outer San Diego Bay and the aircraft carrier docks at North Island (Appendix E). The HIWM was originally constructed between 1970 and 1972.

On December 9, 2014, the South Coastal Information Center (SCIC) of the California Historical Resources Information System at San Diego State University conducted a cultural resources record search of the Project site. The record search area, which included a quarter-mile buffer zone around the Project site, included all relevant site records on file with the South Coastal Information Center, the National Register of Historic Places, the California Register of Historical Resources, and the City of San Diego Historical Resources Register. No prehistoric or historic sites were identified within the Project site or adjacent to the Project site.

Analysis of Environmental Impacts

a. Would the project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Less Than Significant Impact. Under CEQA, historical resources include intact buildings or structures listed in or eligible for listing in the California Register of Historical Resources (CRHR), locally designated by a municipality, or included in a local survey that meets the requirements of PRC 5024.1(g). California Historic Landmarks (CHLs) No. 770 and all consecutively numbered CHLs following CHL No. 770 also qualify as historical resources. The Project site contains no buildings, structures, or other resources previously listed in or determined eligible for listing in the CRHR, no locally designated resources, no resources included in a survey that meets the requirements PRC 5024.1(g), and no CHLs. Fifty (50) years is the age threshold at which a built resource should be considered a potential historical resource under CEQA and evaluated for CRHR eligibility if subject to potential impacts from a project requiring CEQA compliance. Some exceptional built resources can achieve significance justifying CRHR listing prior to reaching the 50-year threshold, when the existing historical record clearly indicates their significance. No such built resources are present at the Project site. Construction on Harbor Island began in the early 1960s. The HIWM and associated vessel fueling facility and other buildings, as well as other adjacent to the Project site, were built between 1970 and 1972 (USGS 1970, NETR 1972). These buildings do not meet the age threshold requiring evaluation for listing in the California Register of Historical Resources. Therefore, less than significant impacts on historical resources would occur from construction and operation of the proposed Project and no mitigation measures are required.

b. ***Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?***

Less Than Significant Impact. A record search performed at the South Coastal Information Center on December 9, 2014, indicated that no archaeological resources have been identified in the Project area. A review of historic maps shows that the Project site is situated on an artificial landform area created by bay infill and is within a highly developed environment that has been severely disturbed by development; thus, the potential for any buried resources to exist on the Project site is low. Therefore, the sensitivity of the Project site for archaeological resources is low. In addition, there is a low likelihood of underwater resources at the Project site. The in-water construction would occur within a highly active recreational boating area that has operated as an active boat marina since 1972 and has been subject to ongoing maintenance. There is no evidence based on current and past activities that there are shipwrecks or other underwater archaeological resources at or near the HIWM (California State Lands Commission 2015). Therefore, construction and operation of the proposed Project would not result in a significant adverse change in the significance of an archaeological resource. Impacts would be less than significant and no mitigation measures would be required.

c. ***Would the project disturb any human remains, including those interred outside of dedicated cemeteries?***

Less Than Significant Impact. The Project site is a part of Harbor Island which is a manmade island constructed during the early 1960s using dredged material from San Diego Bay. In addition, the Project site was developed between 1970 and 1972, which included soil disturbance to pave the site for surface parking, install utilities (including an underground storage tank), and install the foundations for the existing structures now on-site. No evidence in the historical record indicates that the Project site has been used for human burials and there is a very low potential for human remains to be located within the Project site.

The California Health and Safety Code (HSC) (Section 7050.5) states that if human remains are discovered on site, no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code (PRC) Section 5097.98, including coordination with the Native American Heritage Commission (NAHC), which will identify the “most likely descendant” (MLD) should the remains be identified as being of Native American origin. As further stated in Section 7050.5, “... with the permission of the owner of the land or his/her authorized representative, the descendant may inspect the site of the discovery. The descendant shall complete the inspection within 24 hours of notification of the NAHC. The MLD may recommend scientific removal and nondestructive analysis of human remains and items associated with Native American burials.” As adherence to above-identified State regulation is required for all development, including the proposed Project, no mitigation is required in the unlikely event human remains are discovered on site. Adherence to applicable HSC and PRC requirements is standard for all projects; therefore, impacts associated with this issue would be less than significant and no mitigation measures are required.

VI. Energy

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☐	☐	☒	☐
b. Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☐	☐	☐	☒

a. Would the project result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Less than Significant Impact. Project construction would primarily consume diesel fuel through operation of construction and demolition equipment, work boat, barge, and truck trips for debris hauling and construction material delivery; gasoline associated with worker commutes; and minor amounts of electricity associated with operation of electrically powered construction equipment. Construction-related energy use would represent a small demand on local and regional fuel and electricity supplies that could be easily accommodated by fuel suppliers. This demand for fuel and electricity would have no noticeable effect on peak or baseline demands for energy.

Project operation of the replaced landside buildings would reduce energy demands from current usage as all light fixtures would be replaced with LED lights, low-flow fixtures and appliances would be used and all new appliances would be Energy-Star qualified and irrigation of new drought-tolerant landscaped areas would be efficient. The proposed Project would result in a 30 percent decrease in energy demand compared with existing conditions (Appendix A). Therefore, impacts are less than significant since construction or operation of the project would not result in wasteful, inefficient or unnecessary consumption of energy resources.

b. Would the project conflict with or obstruct a state or local plan for renewable energy or energy efficiency?

No Impact. The applicable renewable energy standard for the proposed Project include the Advanced Clean Cars Program, California Title 24 energy efficiency standards, EO B-16-12, SB 350, and SB 100. Each of these contain required standards related to energy efficiency and renewable energy development.

The proposed Project is therefore obligated to comply with these plans and regulations, and will benefit from the resulting increases in energy efficiency and renewable energy development. Vehicles are expected to become increasingly more efficient as a result of the regulations included in the Advanced Clean Cars Program and EO B-16-12, which address average fuel economy and commercialization of zero-emission vehicles, respectively. Building energy efficiency is also expected to increase as a result of (1) compliance with Title 24 Building Codes, which are expected to move toward zero net energy for newly constructed buildings, and, (2) under SB 350 and SB 100 regulations, the shift toward 100 percent of retail sales of electricity to California end-users and electricity procured to serve state agencies to be provided by zero-carbon resources. Local plans that address energy efficiency include San Diego Gas & Electric (SDG&E) energy procurement plans, SANDAG's Regional Energy Strategy (RES), as well as various Port plans and regulations, including the Climate Action Plan (CAP).

SANDAG's RES established long-term goals related to energy efficiency, renewable energy, distributed generation, transportation fuel, among others. The strategies and goals found in the RES were used as guidance for development of the energy components of the 2050 Regional Transportation

Plan(RTP)/Sustainable Communities Strategy (SCS). The proposed Project would not result in any long-term changes to population. As a result, the proposed Project would not result in any changes to demographic forecasts. Therefore, the proposed Project is consistent with the demographic projections included in the 2050 RTP/SCS, and the applied RES goals and guidance accurately portray energy solutions to accommodate future growth. Therefore, the proposed project is consistent with the 2050 RTP/SCS and the technical strategies to address energy efficiency from SANDAG's RES. Furthermore, the proposed Project would improve an existing facility with efficient lighting, low flow fixtures and appliances, Energy-Star appliances, and drought-tolerant landscaping that would require less irrigation. These improvements would reduce energy demand at the Project site compared to existing conditions, and would not conflict with the electricity provider's ability to provide renewable energy sources. Therefore, the proposed Project would not interfere with the implementation of the standards related to energy efficiency and renewable energy development, and there would be no impact.

VII. Geology and Soils

Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
ii. Strong seismic groundshaking?	☐	☒	☐	☐
iii. Seismic-related ground failure, including liquefaction?	☐	☒	☐	☐
iv. Landslides?	☐	☐	☐	☒
b. Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐
c. Be located on geologic units or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☒	☐
d. Be located on expansive soil, as defined in Section 1803.5.3 of the California Building Code (2010), creating substantial direct or indirect risks to life or property?*	☐	☐	☒	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒
f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☒	☐

*Geology and Soils question (d) reflects the current 2019 California Building Code (CBC), effective January 1, 2020, which is based on the International Building Code (2009).

Environmental Setting

The geology and soils environmental setting is summarized from the *Geotechnical Investigation Landside Improvements, Harbor Island West Marina* (TerraCosta 2015, Appendix D), the *Guide Pile and Approach Pier/Gangway Foundation Design Criteria, Harbor Island West* (TerraCosta 2012, Appendix E). These documents, along with other information, are incorporated in this section. The Project site is located in the San Diego Bay at the western edge of the terraced coastal plain, which bounds the Peninsular Ranges province of California. More specifically, the Project site lies within an area of reclaimed estuarine and low-lying tidelands located south and east of Loma Portal at the northern end of San Diego Bay.

Prior to the early 1900s, the San Diego River periodically overflowed its banks and reestablished a new course southerly into San Diego Bay. In the early 1900s, the USACE created a levee system to prevent flooding and to direct the San Diego River to the west into Mission Bay. Over the next decades, the low-lying lands in the general San Diego Bay area were developed into what is currently the SDIA, Harbor Island, Shelter Island, and a few remaining tidelands. In 1961, the Harbor Department of San Diego began a major dredging operation of the bay, and dredged material from this operation was used to create Harbor Island. Most of the fill material are of hydraulic origin and generally consist of relatively clean sands placed over granular bay deposits.

For landside subsurface conditions, over the entire Harbor Island, previous studies show an average subsurface soil profile of fill soils that extended from surface grades down to an elevation of -9 feet, bay deposits that extended to an elevation of -19 feet MLLW, and the Bay Point Formation that extended to the depths explored. Subsurface conditions encountered by onshore borings at the Project site showed both mechanically and hydraulically placed fill soils underlain by bay deposits. Bay deposits were underlain by the Bay Point Formation. The contact between fill and bay deposits ranged from -7 to -20 feet MLLW, and the contact between the bay deposits and the Bay Point Formation ranged between elevations -13.5 feet and -27.5 feet MLLW.

For waterside subsurface conditions, the subsurface soil conditions encountered by offshore borings and vane shear tests typically showed 6 to 12 inches of near-surface, fine-grained, colloidal flock exhibiting essentially no shear strength. The bay-floor colloidal flock is underlain by variable thickness (typically 1 to 2 feet thick) bay deposits consisting of very loose to medium dense fine sands, and locally very soft to soft silts and clays. Weathered Bay Point formational terrace deposits were generally encountered below elevation -13 feet MLLW and the less weathered (more competent) Bay Point Formation below -20 feet MLLW.

There are no active faults or Alquist-Priolo (AP) Earthquake Fault Zones on the Project site (City of San Diego 2008). The Spanish Bight segment of the Rose Canyon fault zone, approximately 1.2 miles to the east, is the closest active fault to the Project site (DOC 2015).

Analysis of Environmental Impacts

a. ***Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:***

   i) ***Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.***

   Less Than Significant Impact. In 1972, the AP Earthquake Fault Zoning Act was passed by the California Legislature. The primary purpose of the AP Earthquake Fault Zoning Act is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The law requires the state geologist to establish regulatory zones (known as Earthquake Fault Zones or Alquist-Priolo Zones) around the surface traces of active faults and issue locational maps to all affected cities, counties, and state agencies for their use in safe construction. Before a project may be permitted, a geologic investigation is required to demonstrate that proposed buildings would not be constructed across active faults. An evaluation and written report of a specific site must be prepared by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (generally 50 feet).

   The City of San Diego Safety Study, Geologic Hazards and Faults, Sheet 16, does not identify the Project site as being within Hazard Category 11 (Active, Alquist-Priolo Earthquake Fault Zone) (City of San Diego 2008). The nearest AP Zone to the Project site is located approximately 1.2 miles east of the Project site and is associated with the Spanish Bight segment of the Rose Canyon fault (DOC 2015). Ground rupture due to faulting is not a hazard for the proposed Project because no active faults or AP Zones traverse the site. Therefore, it is not anticipated that people or structures would be exposed to substantial adverse effects from a rupture of a known earthquake fault. A less than significant impact would occur.

ii) Strong seismic groundshaking?

Less Than Significant Impact with Mitigation Incorporated. As with most southern California regions, the Project site's landside and waterside features would be subject to strong ground shaking in the event of a major earthquake. There are many active fault zones throughout the Southern California region, but the two closest fault zones that are most likely to result in a seismic event that would cause ground shaking include the Rose Canyon fault zone and the Coronado Banks fault zone. The Rose Canyon fault zone is located approximately 1.2 mile east of the site, and the Coronado Banks fault is approximately 11.9 miles west of the site. Additionally, the Harbor Island area is located in Seismic Zone 4, which is a designation previously used in the Uniform Building Code (UBC) to denote the areas of the highest risk to earthquake ground motion (California Seismic Safety Commission 2005).

The proposed Project would involve the redevelopment of the existing marina, including both waterside and landside infrastructure. Both the waterside and landside improvements would involve removing existing structures (e.g., docks, piles) and buildings, upgrading their existing foundations, installing concrete piles for the new dock system reconfiguration, and construction of new buildings. As noted above, the San Diego region is subject to earthquakes, which can result in strong seismic ground-shaking. As such, the project site could be exposed to strong seismic ground-shaking in the future. Construction of the proposed Project would be subject to the most recent California Building Code (California Code of Regulations [CCR] Title 24) as well as the recommendations contained in the Project-specific geotechnical studies, which would help ensure the structural and foundational integrity of the buildings. Compliance with the recommendations of Section 7 of the Geotechnical Study (Appendix D) would be required as part of implementation of the proposed Project (**MM-GEO-1**) to ensure seismic ground shaking does not impact the Project. The Geotechnical Study and its recommendations will be reviewed by the City of San Diego during the building permit process to determine conformity with City and State standards, which are designed to reduce potential impacts resulting from seismic conditions.[7] Through compliance with the California Building Code (Title 24) and implementation of **MM-GEO-1**, the Project's impact associated with strong seismic ground shaking would be less than significant.

MM-GEO-1: Compliance with Recommendations of the Geotechnical Studies. Implementation of the proposed Project would comply with the recommendations of the geotechnical studies (Appendix D and Appendix E) to ensure seismic ground-shaking does not impact the proposed Project.

iii) Seismic-related ground failure, including liquefaction?

Less Than Significant Impact with Mitigation Incorporated. Liquefaction is the phenomena associated with ground shaking that results in the increase of pore pressures within the soil. As the pore pressure increases, the shear strength of the soil is reduced. If the pore pressure is sufficiently increased, the soil takes on a "liquid like" behavior. Three key characteristics are required for liquefaction to occur: liquefaction-susceptible soils, sufficiently high groundwater, and strong shaking. Consequences commonly associated with soil liquefaction include ground settlements, surface manifestations (sand boils), loss of strength, possible lateral ground movement typically referred to as lateral spreading, ground oscillations and lurching, and possible ground failure.

Soils susceptible to liquefaction generally consist of loose to medium dense sands and nonplastic silt deposits below the groundwater table. The soil deposits underlying the Project site are composed of loose to medium dense fills, including hydraulically placed fills composed of sands with varying amounts of silts, bay deposits, and Quaternary-age deposits, all of which exist below the water table. Results of a liquefaction assessment for the Project site indicate that the fill soils below the groundwater table and bay deposits are liquefiable, whereas the denser and more clayish weathered strata of the terrace deposits and Bay Point Formation soils are not liquefiable (TerraCosta 2015).

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[7] https://www.sandiego.gov/sites/default/files/legacy/development-services/pdf/industry/geoguidelines.pdf.

Lateral displacements at the Project site are estimated to be on the order of 6 to 22 feet near the top of the bayfront descending slope. In addition, lateral displacements are expected to extend landward from the bayfront slope in a diminishing manner. Given that Harbor Island is approximately 320 feet wide at the location of the Project site, it is anticipated that lateral spreading could affect the majority of Harbor Island, with ground cracking associated with differential lateral displacements occurring across Harbor Island.

The bayfront descending slope located along the northern shore of Harbor Island, which is composed of fill soils, is underlain by both bay deposits and the Bay Point Formation. From approximate elevation +3 feet to elevation -13 feet (locally -22 feet), the slope is composed and underlain by liquefiable fill and bay deposit soils, which are anticipated to lose significant strength as the result of liquefaction. Consequently, this slope is prone to seismic instability. Given the relatively slender width of Harbor Island at 320 feet, under a severe earthquake event (i.e., 2,000-year design event), the majority of the Project site would experience significant ground damage.

The proposed improvements to the HIWM are still in preliminary planning stages (i.e., no building plans are currently available) but will be designed according to the recommendations in the geotechnical studies (**MM-GEO-1**; Appendices D and E) to account for seismic concerns, including strong ground shaking, liquefaction, and lateral displacement, and in accordance with the current California Building Code. The recommendations in Appendix D for landside improvements include measures for: site preparation and earthwork; ground improvements and/or foundation design. Final design measures would be selected through evaluation of potentially viable methods when more detailed plans are available. The recommendations in Appendix E for waterside improvement include: options for foundations (gravity mat or pile-supported) for the two new approach piers, embedment depth for piles; and, pile jetting and driving recommendations. Because the proposed project would be engineered to eliminate the liquefaction hazard and would not exacerbate the potential for liquefaction to occur, impacts associated with liquefaction or other seismic-related ground failure would be less than significant.

iv) Landslides?

No Impact. Landslide activity generally occurs in areas that lack vegetation and have steep slopes (typically, with grades of 30 percent or more). The City of San Diego Safety Study, Geologic Hazards and Faults, Sheet 16, does not identify the Project site as being within Hazard Category 21 (Confirmed, known, or highly suspected landslide) or Hazard Category 22 (Possible or conjectured landslide) (City of San Diego 2008). In addition, no existing landslide areas are located adjacent to the Project site. Based on the relatively flat topography of the Project site, landslides would not be anticipated to occur. Therefore, no impacts would occur with the construction or operation of the proposed Project and no mitigation measures are required.

b. Would the project result in substantial soil erosion or the loss of topsoil?

Less Than Significant Impact. The proposed Project would involve landside and waterside earthwork that would include grading, excavation, pile driving, and other standard construction practices. During construction, the proposed Project would be required to comply with the BMPs contained within its SWPPP, a regulatory requirement of the NPDES permit issued by the San Diego RWQCB, which would identify the BMPs required to properly control erosion and siltation impacts during construction of the proposed Project. The site-specific SWPPP and BMPs would be designed to minimize erosion and runoff during construction activities. For a complete analysis discussion on the required stormwater measures, see Section X, *Hydrology and Water Quality*. Erosion-related impacts during the construction phase would be less than significant.

Once construction is completed, only landscaped areas may have exposed soils, while the rest of the Project site would be developed with structures or paved with asphalt or concrete. In the landscaped areas, soils would be contained within planters and medians and would not be susceptible to erosion. In addition, permanent BMPs identified in the Project's Storm Water Quality Management Plan (SWQMP) would be installed to prevent loss of on-site soils (see Section X, *Hydrology and Water Quality*, for more information on the SWQMP). With implementation of the BMPs identified in the SWPPP and SWQMP and requirements identified by the Project's NPDES permit, soil erosion-related impacts during operation of the proposed Project would be less than significant.

c. Would the project be located on geologic units or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Less Than Significant Impact. Refer to responses VI. a) ii – iv above. Landslides are not considered to be hazards at the Project site, but the Project site is located on fill soils that would be subject to lateral spreading, liquefaction, and collapse. However, the proposed Project will adhere to the recommendations in the geotechnical studies to account for seismic concerns, including strong ground shaking, liquefaction, and lateral displacement, in accordance with the current California Building Code. Because the proposed project would be engineered to eliminate the liquefaction hazard and would not exacerbate the potential for liquefaction to occur, impacts associated with liquefaction or other seismic-related ground failure would be less than significant. Due to these onsite conditions and compliance with the applicable regulations, the proposed project would not exacerbate existing unstable conditions.

d. Would the project be located on expansive soil, as defined in Section 1803.5.3 of the California Building Code (2010), creating substantial direct or indirect risks to life or property?

Less Than Significant Impact. Expansive soils are fine-grained soils (generally, high-plasticity clays) that can undergo a significant increase in volume with an increase in water content or, conversely, a significant decrease in volume with a decrease in water content. Changes in the water content of an expansive soil can result in severe distress to structures that have been built on the soil. The proposed Project site is underlain by fill materials and bay deposits. These materials are anticipated to be sandy in nature and possess a low Expansion Index (EI). Expansive soils are not considered to be a geotechnical hazard at the Project site according to the site-specific soil sampling effort (TerraCosta 2015). A less than significant impact is anticipated to occur and no mitigation measures would be required.

e. Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

No Impact. The proposed Project does not include the construction and operation of septic tanks or alternative wastewater disposal systems. The existing pump-out facility on the Project site is plumbed through the HIWM sewer lines and then flows directly into the City sewer system. The replacement pump-out facility is anticipated to be designed similarly to the existing facility. As such, the proposed Project would not result in any impacts regarding inadequate soils to support septic systems. With the Project site's use of a pump-out facility and existing sewer lines for disposal of wastewater, the Project would not use septic tanks or alternative wastewater disposal systems. No impacts would occur and no mitigation measures are required.

f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less Than Significant Impact. A geotechnical study of the Project site (Appendix D and Appendix E) indicates that the Project site rests on artificial fill underlain by the Bay Point Formation, which is a near-shore marine sedimentary deposit that dates from the middle to late Pleistocene, roughly 600,000 to 10,000 years ago. In the Project site, Bay Point Formation was encountered below -13 feet MLLW and -27.5 feet MLLW. The Bay Point Formation is assigned high resource sensitivity by the City of San Diego due to a variety of invertebrate and vertebrate fossils that have been previously found in this deposit, including both marine and terrestrial animals, with mammoth and whale remains being some of the most significant. The City of San Diego's CEQA Significance Determination Thresholds state that potential significant impacts on the Bay Point Formation could occur if Project-related activities reach depths greater than 10 feet and remove more than 1,000 cubic yards (cy) of soil (City of San Diego 2016). However, based on the Paleontological Monitoring Determination Matrix, monitoring is not required when grading on documented or undocumented artificial fill.

The proposed Project would require construction on both the landside and waterside portions of the Project site. For landside improvements, it is anticipated that digging and trenching activities would not go deeper than 6 feet, which is 4 feet above the depth at which high sensitivity begins. The proposed Project would also involve excavation activities for landside improvements which would require the exportation of less than 1,000 cubic yards of soil from the Project site. This is less than the threshold identified by the City. In addition, Harbor Island is created from documented artificial fill. Therefore, construction of the proposed landside improvements are not anticipated to impact fossil sensitive soil deposits and no paleontological monitoring would be required.

For waterside improvements, the demolition of the existing dock system would require the removal of the existing concrete piles, which would result in disturbance of the bay floor. Installation of the concrete piles to support the new dock system configuration would require driving piles in new locations within the marina and approximately 25 feet deep in the bay floor. However, the driven concrete piles would not expose deposits from the Bay Point Formation because soil would not be removed during installation. Therefore, the proposed Project would result in less than significant impacts to paleontological resources and no mitigation measures are required.

VIII. Greenhouse Gas Emissions

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐
b. Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☒	☐

Environmental Setting

Emissions modeling has been prepared for the proposed Project (Appendix A), which was used, along with other information, in this section to evaluate the potential greenhouse gas (GHG) impacts of the proposed Project. GHGs are gases that absorb infrared radiation in the atmosphere. This absorption traps heat, maintaining the earth's surface temperature at a level higher than would be the case in the absence of GHGs, leading to many disruptions to natural earth processes. GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons, hydrofluorocarbons, and halogenated chlorofluorocarbons. The primary GHGs associated with the proposed Project are CO_2, CH_4, and N_2O. To simplify reporting and analysis, GHGs are commonly defined in terms of a global warming potential (GWP). The Intergovernmental Panel on Climate Change (IPCC) defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of carbon dioxide equivalent (CO_2e).

A variety of legislation has been enacted at the state level related to climate change and achieving statewide GHG emissions reductions from all sectors of the economy. Assembly Bill (AB) 32 (2006) codified the state's GHG emissions targets and requires CARB to implement emission limits, regulations, and other measures to reduce statewide GHG emissions to 1990 levels by 2020. CARB adopted the Climate Change Scoping Plan (Scoping Plan) in December 2008, which outlines measures for meeting the 2020 GHG emissions reduction limits. Senate Bill (SB) 32 was signed in 2016 and expands on AB 32, requiring CARB to ensure statewide emissions are reduced to at least 40 percent below 1990 levels by 2030. The most recent Scoping Plan update was released in 2016, and outlines policies and actions for the state's 2030 GHG emissions target, as outlined in SB 32.

The State CEQA Guidelines require lead agencies to describe, calculate, or estimate the amount of GHG emissions that would result from a project, and emphasize the necessity to determine potential climate change effects of a project and propose mitigation as necessary. They do not recommend a specific analysis methodology or quantitative criteria for determining the significance of GHG emissions. However, the Guidelines do confirm the discretion of lead agencies to determine appropriate significance thresholds. Moreover, State CEQA Guideline Section 15183.5(a) provides that a lead agency may analyze and mitigate significant effects of GHG emissions at a programmatic level, such as in a plan targeted to reduce GHG emissions, and that future projects that fit within this reduction plan may tier off and incorporate by reference the environmental analysis done for such plans.

CARB encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community emissions that parallel the State's commitment to reducing GHG emissions. In December 2013, the Board of Port Commissioners approved a Climate Action Plan (CAP) to reduce GHG emissions on District tidelands (District 2013a). The CAP includes a variety of potential GHG reduction policies and measures selected to help meet the District's GHG reduction goals of 10 percent less than 2006 levels by 2020, and 25 percent less than 2006 levels by 2035. A critical aspect of having a CAP that fits the criteria within State CEQA Guidelines Section 15183.5 is to have reduction targets that align with statewide goals. The CAP meets the requirements of State CEQA Guidelines Section 15183.5 as specified in Appendix A of the CAP for 2020, but does not meet the requirements under 15183.5 for 2035. Moreover, the CAP does not cover construction activities.

Several agencies throughout the state, including multiple air districts, have drafted and/or adopted varying threshold approaches and guidelines for analyzing GHG emissions and climate change in CEQA documents. Some commonly used threshold approaches include (1) consistency with a qualified GHG reduction strategy, (2) performance-based reductions, (3) numeric "bright-line" thresholds, and (4) efficiency-based thresholds. No threshold applicable to a construction project at the District has been formally adopted.

Analysis of Environmental Impacts

a. Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Less Than Significant Impact.

Consistent with established protocols, GHG emissions resulting from construction of the proposed Project are summed and amortized over the expected life of the proposed Project.[8] Temporary construction emissions would be generated by heavy equipment, heavy duty and passenger vehicle trips, and a workboat. Emissions from these sources were estimated using the CalEEMod™ Model and emission factors from the Port of San Diego (2018) and CARB (2010). Total GHG emissions associated with construction of the proposed Project are summarized in Table 14.

Table 14. Summary of Estimated Construction GHG Emissions (metric tons per year)

Construction Activity	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Phase I (2019)				
Demolition of docks	35	<1	<1	36
Installation of docks	518	<1	<1	526
Building Demolition	15	<1	<1	15
Parking Lot Demolition	78	<1	<1	80
Landscape Removal	1	<1	<1	1
Building Construction	10	<1	<1	10
Parking Lot Paving	91	<1	<1	93
Phase II (2020)				
Parking Lot Demolition	16	<1	<1	16
Building Demolition	44	<1	<1	44
Landscape Removal	10	<1	<1	10
Building Construction	51	<1	<1	51
Landscape Installation	11	<1	<1	12
Parking Lot Paving	37	<1	<1	37
Total Construction Emissions (2019 + 2020)	**917**	**<1**	**<1**	**931**
Annual Amortized Construction Emissions (30 Years)	**--**	**--**	**--**	**31**

Source: Emissions modeling (Appendix A)
CO_2e = carbon dioxide equivalent, CO_2 – carbon dioxide, CH_4 = methane, N_2O = nitrous oxide, MT = metric tons

Once constructed, the types of operational uses are not expected to change under the proposed Project. Emissions would be generated by area (e.g., landscaping equipment), energy (e.g., electricity and natural

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[8] Consistent with established protocols and published guidance from other lead agencies and air districts, construction emissions are amortized over the typical operational life of a project and added to annual operational emissions. In this case, the operational life of the Project is the duration of that lease, which is 40 years. The majority of guidance and protocols has suggested a 20- or 30-year project life for typical development projects, and while the operational life of the proposed project is longer, assuming a shorter operational duration allows for a more conservative analysis in that construction emissions are divided by a smaller number. In this case, construction GHG emissions are amortized over a 30-year project life to ensure a conservative analysis consistent with guidance and protocols.

gas consumption), mobile (e.g., visitor trips, recreational boating), water consumption, and waste generation. As discussed in Section III, *Air Quality*, operation of the existing HIMW uses currently generates GHG emissions, which would be effectively replaced with operational emissions associated with the Project. The difference, or *delta*, in operational emissions between the existing uses and the Project represents the net new impact of the Project analyzed in this analysis. Estimated operational emissions under both existing and Project conditions are summarized in Table 15. The Project was assumed to be fully operational in 2021. Refer to Appendix A for the modeling outputs.

Table 15. Summary of Existing and Project Operational GHG Emissions (metric tons per year)

Condition/Source	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Existing Conditions (2018)				
Area Source	<1	<1	<1	<1
Energy Source	384	<1	<1	385
Mobile Source (vehicles)	1,954	<1	<1	1,957
Mobile Source (boating)	108	<1	<1	109
Waste Generation	25	2	<1	63
Water Consumption	7	<1	<1	8
Total Existing Conditions	2,478	2	<1	2,522
Project Conditions (2021)				
Area Source	<1	<1	<1	<1
Energy Source	161	<1	<1	162
Mobile Source (vehicles)	1,750	<1	<1	1,753
Mobile Source (boating)	128	<1	<1	130
Waste Generation	18	1	<1	45
Waste Generation	5	<1	<1	6
Amortized Construction (see Table 14)	31	<1	<1	31
Total Project Conditions	2,063	1	<1	2,095
Net Emissions				
Project minus Existing	*-415*	*<1*	*<1*	*-427*

Source: Emissions modeling (Appendix A)
CO_2e = carbon dioxide equivalent
CO_2 – carbon dioxide
CH_4 = methane
N_2O = nitrous oxide
MT = metric tons

As shown in Tables 14 and 15, the amount of Project-related $MTCO_2e$ construction emissions would be 31 $MTCO_2e$ per year. After construction, the proposed Project would result in a decrease in operational emissions at HIWM relative to existing conditions. As shown in Table 15, the proposed Project would result in a 427 $MTCO_2e$/year reduction in GHG emissions relative to existing conditions, which is equivalent to removing 91 passenger vehicles from the road for a single year (EPA 2018). As such, the proposed Project would result in a net emissions benefit over the life of the Project.

The proposed Project is also consistent with the District's CAP, which accounts for continued growth of District operations in an efficient and sustainable manner. The proposed Project would not increase the size nor capacity of the HIWM due to the reduction in total building area and number of slips on the site. Thus, net operational emissions would decrease as a result of the proposed Project. While the CAP does not assign percent reductions to individual businesses or operations, the proposed Project would be consistent with the goals of the CAP because it would reduce emissions associated with building electricity and natural gas use due to the reduction in building size and inclusion of water and energy conservation measures. Therefore, the proposed Project would result in a less than significant impact associated with the generation of GHG emissions and contribution to global climate change from both its construction and its 40-year operation.

b. Would the project conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases?

Less Than Significant Impact. At the state level, AB 32 codified the state's GHG emissions reduction targets for 2020 and identified the acceptable level of GHG emissions in California, while SB 32 codified the state's GHG emissions reduction targets for 2030 and identified the acceptable level of GHG emissions in California. To reach the target level, there will have to be widespread reductions in GHG emissions across California. Some reductions will need to come in the form of changes pertaining to vehicle emissions and mileage standards. Some will come from changes pertaining to sources of electricity and increased energy efficiency at existing facilities. The remainder will need to come from plans, policies, or regulations that will require new facilities to have lower carbon intensities than they have under BAU conditions. At the local level, the District adopted their CAP in December 2013. The CAP identified the District's reduction goals and measures to be implemented to achieve the reduction goals set forth in AB 32 and long-term goals beyond 2020. Therefore, AB 32, SB 32, and the District's CAP represent the most applicable plans, policies, or regulations adopted for the purpose of reducing GHG emissions.

The proposed Project is consistent with the District's CAP. Although the CAP accounts for continued growth of District operations in an efficient and sustainable manner (meaning it is not a "net zero" GHG emission plan), the proposed Project would not increase the size or capacity of the HIWM because it proposes to maintain the facility with a similarly sized marina and associated buildings. Thus, net operational emissions would not increase as a result of the proposed Project.

While the CAP does not assign percent reductions to individual businesses or operations (although it does by sector), the proposed Project would be consistent with the goals of the CAP because it would reduce emissions associated with building electricity and natural gas use due to the reduction in building size and inclusion of water and energy conservation measures. The proposed Project is further consistent with the CAP because it would replace light fixtures in a non-District facility with lower energy bulbs, consistent with CAP reduction measure EB6.[9] The proposed Project would also include the replacement of existing landscaping with drought-tolerant landscaping and increase the area of landscaping on the site consistent with CAP reduction measure EH3.[10] In addition, the proposed Project would be required to recycle at least 65 percent of all construction debris per the requirements of the City of San Diego's Construction consistent with CAP reduction measure SW1.[11] Therefore, the construction and operation of the proposed Project would not conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing emissions of GHGs, and the impact would be less than significant.

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[9] CAP Reduction Measure EB6: Replace light fixtures in non-Port facilities with lower energy bulbs such as fluorescent, LEDs, or CFLs.

[10] CAP Reduction Measure EH3: Evaluate existing landscaping and options to convert reflective and impervious surfaces to landscaping, and install or replace vegetation with drought-tolerant, low-maintenance native species that can also provide shade and reduce heat island effects.

[11] CAP Reduction Measure SW1: Increase the diversion of solid waste from landfill disposal.

IX. Hazards and Hazardous Materials

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☒	☐	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☒	☐
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	☐	☐	☒	☐
f. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
g. Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

Environmental Setting

The Project site is located on the San Diego Bay with the HIWM sited at the location since 1972. An ICF hazardous materials specialist visited the Project site on November 17, 2014, and interviewed the Director of Marina Operations, who has worked at the Project site for 25 years and is knowledgeable about existing operations and the history of the Project site. The results of the site visit, the interview, and record searches conducted through the databases maintained by the Department of Toxic Substances Control (DTSC), the State Water Resources Control Board (SWRCB), and the County of San Diego Department of Environmental Health are summarized below.

Gasoline and diesel are currently stored at the Project site as part of normal operations. There are three 12,000-gallon underground storage tanks (USTs) in the western portion of the site (two for diesel and one for gasoline). Fuel lines are piped from the landside area of the site, where the USTs are located, then through the Tom Ham's Lighthouse leasehold via a long-term easement, then on to the fueling dock's dispenser in the marina at the northwestern boundary of the site.

In addition to gasoline and diesel, small quantities of other hazardous materials are also stored at the site for use in regular dock maintenance activities. The on-site maintenance shop (west of the restaurant/office building) is used principally for storage. Contained inside are a number items related to maintaining marine facilities, including polyvinyl chloride (PVC) piping, glue, paints, paint brushes, cleaning solvents, petroleum products, filters, absorbent pads, and batteries. All paints and cleaning solvents observed during site reconnaissance were in 1-gallon (or smaller) containers. No strong odors were noticed, and no spills or other indications of significant releases were observed.

A small maintenance shed on the western landside end of the property also contains hazardous materials. The maintenance shed houses pallets of mortar, which are used for patching dock surfaces. It also contains paints for the exterior and interior surfaces of the building. The paints were stored in 1-gallon containers. Three 55-gallon drums of engine oil as well as approximately eight empty 55-gallon oil drums were also in the shed. No strong odors were noticed, and no spills or other indications of significant releases were observed. The on-site buildings were constructed prior to 1980. Therefore, the potential exists for the structures to contain asbestos-containing materials (ACMs) and lead-based paints.

Research conducted on the SWRCB GeoTracker and DTSC EnviroStor websites identified the Project site as being part of a leaking underground storage tank (LUST) cleanup program (DTSC 2018; SWRCB 1989, 1993). Two separate LUST incidents were reported. The first release was in 1989, consisting of waste motor/hydraulic/lubricating oil being released to soil and groundwater. The second incident occurred in 1993 and consisted of a diesel fuel release to soil and groundwater. Closure was granted for both incidents in 2004 by the County of San Diego Department of Environmental Health.

Analysis of Environmental Impacts

a. *Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?*

Less Than Significant Impact. The proposed Project involves redevelopment of several improvements at HIWM. Construction of the proposed Project would require landside and waterside demolition and installation activities that would include grading, excavation, pile driving, and other standard construction practices. Heavy equipment that would be used during construction of the proposed Project would use substances such as oil, diesel fuel, gasoline, hydraulic fluid, and other liquid materials that would be considered hazardous if improperly stored or handled. In addition, materials such as paints, roofing materials, solvents, and other substances typically used in building construction would be located on the Project site during construction and used to construct the Project. The use and storage of hazardous substances are governed by a series of regulations summarized below:

- **Spill Prevention, Control, and Countermeasure Plans (40 CFR 112.7).** Spill Prevention, Control, and Countermeasure (SPCC) plans are required for facilities in which construction and operations involve oil in the vicinity of navigable waters or shorelines. SPCC plans ensure that facilities implement containment plans and other countermeasures to prevent oil spills from reaching navigable waters. SPCC plans are regulations administered by the EPA. Preparation of an SPCC plan is required for projects that meet three criteria: (1) the facility must be non-transportation related or construction must involve storing, using, transferring, or otherwise handling oil; (2) the project must have an aggregate aboveground storage capacity greater than 1,320 gallons or completely buried storage capacity greater than 42,000 gallons; and (3) there must be a reasonable expectation of a discharge into or upon navigable waters of the United States or adjoining shorelines. For construction projects (criterion 1), 40 CFR 112 describes the requirements for implementing SPCC plans.

- **Resource Conservation and Recovery Act (RCRA) (42 United States Code [USC] 6901 et seq.).** Hazardous waste in California is regulated primarily under the authority of the Federal Resource Conservation and Recovery Act (RCRA) (42 United States Code [USC] 6901 et seq.). Under the authority of RCRA, the regulatory framework for managing hazardous waste, including requirements for entities that generate, store, transport, treat, and dispose of hazardous waste, is found in 40 CFR 260–299.
- **49 CFR 172 and 173.** These regulations establish standards for the transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping hazardous materials and hazardous wastes as well as training requirements for personnel who complete shipping papers and manifests.
- **40 CFR Subchapter I—Solid Wastes.** These regulations implement the provisions of the Solid Waste Act and RCRA. They also establish criteria for the classification of solid waste disposal facilities (landfills), hazardous waste characteristics and regulatory thresholds, and hazardous waste generator requirements. They also establish requirements for managing used oil and universal wastes.
- **Department of Transportation Hazardous Materials Regulations (49 CFR 100–185).** U.S. Department of Transportation (DOT) Hazardous Materials Regulations cover all aspects of hazardous materials packaging, handling, and transportation. Parts 107 (Hazardous Materials Program), 130 (Oil Spill Prevention and Response), 172 (Emergency Response), 173 (Packaging Requirements), 177 (Highway Transportation), 178 (Packaging Specifications), and 180 (Packaging Maintenance) would all apply to goods movement to and from the project site and/or surrounding areas.
- **California Health and Safety Code.** DTSC, a department of the California Environmental Protection Agency (Cal/EPA), is the primary agency in California for regulating hazardous waste, cleaning up existing contamination, and finding ways to reduce the amount of hazardous waste produced in California. DTSC regulates hazardous waste primarily under the authority of the federal RCRA and the California Health and Safety Code (primarily Division 20, Chapters 6.5 through 10.6, and Title 22, Division 4.5). Division 20, Chapter 6.5, of the California Health and Safety Code deals with hazardous waste control through regulations pertaining to transportation, treatment, recycling, disposal, enforcement, and the permitting of hazardous waste. Division 20, Chapter 6.10, contains regulations applicable to the cleanup of hazardous materials releases. Title 22, Division 4.5, contains environmental health standards for the management of hazardous waste. This includes standards for the identification of hazardous waste (Chapter 11) as well as standards that are applicable to transporters of hazardous waste (Chapter 13).
- **Hazardous Waste Control Act (Health and Safety Code Section 25100 et seq.).** DTSC is responsible for the enforcement of the Hazardous Waste Control Act (California Health and Safety Code Section 25100 et seq.), which creates the framework under which hazardous wastes are managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA for a cradle-to-grave waste management system in California. It also provides for the designation of California-only hazardous waste and development of standards that are equal to or, in some cases, more stringent than federal requirements. The regulations below help the state enforce the Hazardous Waste Control Act.
- **Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (California Health and Safety Code Chapter 6.11, Sections 25404–25404.9).** This program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of environmental and emergency response programs and provides authority to the Certified Unified Program Agency (CUPA). The CUPA for San Diego County is the Department of Environmental Health's Hazardous Materials Division (HMD), which has responsibility and authority for implementing and enforcing the requirements for Aboveground Petroleum Storage Act Requirements for SPCC Plans, the California Accidental Release Prevention (CalARP) Program, the Hazardous

Materials Business Plan/Hazardous Materials Inventory Statements, Hazardous Waste Generator Program, and the Underground Storage Tank Program.

- **California Code of Regulations, Title 8—Industrial Relations.** The federal Occupational Safety and Health Administration (OSHA) and the California Division of Occupational Safety and Health (Cal/OSHA) are responsible for ensuring worker safety in the workplace. Cal/OSHA assumes primary responsibility for developing and enforcing standards for safe workplaces and work practices. These standards would be applicable to both construction and operation of the proposed Project. Included in Title 8 are regulations pertaining to hazard control (including administrative and engineering controls), hazardous chemical labeling and training requirements, hazardous exposure prevention, hazardous material management, and hazardous waste operations.

  Title 8 also specifies requirements for the removal and disposal of ACMs. In addition to providing information regarding how to remove ACMs, specific regulations limit the time of exposure, regulate access to work areas, require demarcation of work areas, prohibit certain activities in the presence of ACM removal activities, require the use of respirators, require monitoring of work conditions, require appropriate ventilation, and require qualified persons for ACM removal.

  Title 8 also covers the removal of lead-based paint. Specific regulations cover the demolition of structures that contain lead-based paint, the process associated with its removal or encapsulation, remediation of lead contamination, the transportation/disposal/storage/containment of lead or materials containing lead, and maintenance operations associated with construction activities involving lead, such as lead-based paints. Similar to ACM removal, lead-based paint removal requires proper ventilation, respiratory protection, and qualified personnel.

- **California Labor Code (Division 5, Parts 1 and 7).** California Labor Code regulations ensure appropriate training regarding the use and handling of hazardous materials and the operation of equipment and machines that use, store, transport, or dispose of hazardous materials. Division 5, Part 1, Chapter 2.5, ensures that employees who handle hazardous materials are appropriately trained and informed about the materials. Division 5, Part 7, ensures that employees who work with volatile flammable liquids are outfitted with appropriate safety gear and clothing.

- **Standard UL 2248, Marina Fuel Storage, Piping, and Dispensing Systems.** Standard UL 2248 applies to marina fueling systems intended for temporary storage (tank system), transporting (piping from tank to dispensing system), and the dispensing of flammable or combustible liquids, such as gasoline or diesel fuel, on waterways serviced by land-based marinas that service floating vessels. UL 2248 addresses potential risks to public safety, including fire, electrical, environmental, and mechanical hazards. UL 2248 requires secondary containment to prevent leaks from entering the surrounding environment, continuous monitoring for leakage, and both audible and visual alarms. USTs must comply with UL 58 (Standard for Steel Underground Tanks for Flammable and Combustible Liquids), UL1316 (Glass-Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products, Alcohols, and Alcohol-Gasoline Mixtures), and API Specification 12B (Specification for Bolted Tanks for Storage of Production Liquids). Aboveground piping must comply with UL 2405 (Aboveground Secondarily Contained Piping for Flammable Liquids), which requires secondary containment to prevent any leaks to the environment.

The hazardous substances that would be utilized during the construction and operation of the proposed Project would continue to be compliant with applicable regulations, such as the RCRA, DOT Hazardous Materials Regulations, and local CUPA regulations. As hazardous substances would be stored and used in accordance with applicable regulations that are designed to protect the public and the environment, a less than significant impact would occur. In addition, because the existing buildings were constructed prior to the general ban on the application of ACMs and lead-based paints in construction that occurred during the 1970s, ACM or lead-based paints may be present in existing buildings. ACM or lead based paint would be removed in accordance with existing regulations which require that testing, removal, and disposal be conducted by a qualified and licensed professional as required by CCR, Title 8—Industrial Relations. Moreover, development and demolition projects within San Diego County, regardless of whether ACM is suspected on-site, must conform with SDAPCD Rule 1206. SDAPCD Rule 1206 ensures proper documentation, removal, and disposal procedures are enforced during renovation and/or demolition activities of existing buildings. In addition, SDAPCD Rule 1206 requires that SDAPCD is notified in writing at least 10 days in advance of any renovation or demolition activity. As discussed in the Project Description compliance with all regulatory requirements and laws is a standard condition of the proposed CDP. Therefore, the demolition of the existing facilities related to ACM or lead-based paint would result in less than significant impacts.

Operation of the proposed Project may include the transportation and storage of hazardous materials, such as fuels, cleaning solvents, or pesticides. Similar to the use of hazardous materials, the transportation and storage of hazardous materials would continue to be compliant with applicable regulations, such as the RCRA, DOT Hazardous Materials Regulations, and local CUPA regulations. As such, the storage, use, and disposal of hazardous materials during project operations would continue, with quantities similar to existing conditions, and compliance with regulations and laws related to such uses would remain in effect. In addition, the HIWM has historically been certified in the Clean Marine Program, which develops BMPs for hazardous materials and water quality associated with various marina activities. The HIWM has previously had two 5-year certifications and is currently awaiting certification for the next 5-year period. HIWM has not proposed any change to these BMPs as part of the Project and hence, they would continue to be implemented.

Gasoline and diesel would continue to be stored in three 12,000-gallon USTs (two for diesel and one for gasoline). Fuel dispensed during 2017 consisted of approximately 506,000 gallons of gasoline and 1,225,595 gallons of diesel. As a preventative measure, the fuel dispenser nozzles are wrapped with absorbent cloth to minimize spillage. Spill response materials are located on-site, consisting of absorbent swaddles that remove fuel sheen from the surface of the water. The storage of fuel and the UST maintenance would continue to be compliant with applicable regulations, such as the DOT Hazardous Materials Regulations and local CUPA regulations.

Small quantities of other hazardous materials are stored on-site for use in regular dock maintenance activities, as described in the Environmental Setting section. However, the types and quantities of hazardous materials stored on-site would not change under the proposed Project. Hazardous materials stored on-site would continue to be compliant with applicable regulations described above.

The fuel dispenser and piping, located on the HIWM dock, would be the only components of the fuel tank system modified during construction. Pipes would be capped off so that the fuel tanks would no longer be operational during replacement of piping and dispensers. Once the dock is assembled, the fuel dispensers would be reconnected to the fuel tank. The UST is not placed on the dock and would not be modified or replaced during construction. While not proposed, any future modifications to the system would comply with the requirements of Standard UL 2248 which regulates marina fuel storage, piping, and dispensing systems. UL 2248 requires secondary containment to prevent leaks from entering the surrounding environmental, continuous monitoring for leakage, and requires audible and visual alarms and addresses potential risks to public safety, including fire, electrical, environmental, and mechanical hazards.

Hazardous materials and wastes produced on site during construction and operation are subject to requirements associated with accumulation time limits, proper storage locations and containers, and proper labeling. Such transport, use, and disposal would be compliant with applicable regulations described above, such as the RCRA and U.S. DOT Hazardous Materials Regulations. Furthermore, as described in Title 49 of the Code of Federal Regulations and implemented by Title 13 of the CCR, the U.S. Department of Transportation Office of Hazardous Materials Safety has established strict regulations for the safe transportation of hazardous materials. Compliance with applicable regulations would reduce impacts associated with the use, transport, and storage of hazardous materials during construction and operation of the proposed Project to a less than significant level.

b. *Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?*

Less Than Significant Impact with Mitigation Incorporated. As discussed and analyzed under response IX.a., typical construction-related hazardous materials would be used during construction of the proposed Project, including fuels, solvents, paints, oils, grease, and caulking, as well as the removal of ACM and lead-based paint that was used in the original construction. It is possible that these substances could be released during construction activities. However, compliance with federal, state, and local regulations, in combination with construction BMPs that are part of the SWPPP and designed to regulate runoff, discussed in more detail in *Section X, Hydrology and Water Quality*, would ensure that all hazardous materials would be used, stored, and disposed of properly. Testing, removal, and disposal of ACM and lead-based paints would be conducted in accordance with existing regulations (e.g., CCR, Title 8—Industrial Relations).

During landside construction activities, the demolition of existing buildings and the parking lot, landscape removal, construction of new buildings and parking, and landscape installation would occur. A site visit, interview, and records search were conducted through the databases maintained by the Department of Toxic Substances Control (DTSC), the SWRCB, and the County of San Diego Department of Environmental Health. As noted in the Environmental Setting, the Project site was identified as being part of a LUST cleanup program, with two separate LUST incidents (Case #H10538-001 and #H10538-002). Both LUST incidents were deemed remediated from the County of San Diego Department of Environmental Health (DEH) in 2004. The Project site has been remediated to the satisfaction of the County of San Diego DEH and construction of landside improvements would not excavate soils around the fuel tanks.

During demolition and construction of the proposed Project, approximately 16,860 cubic yards of construction debris from the demolished docks, buildings, and surface paving would be exported from the Project site. The construction debris would be recycled or disposed of at a licensed landfill (West Miramar Landfill), which has controls in place to prevent the leaching of hazardous materials into the environment.

During waterside construction activities, the existing dock system would be disassembled, existing concrete piles removed, a new dock system and concrete piles would be installed. The demolition of the existing dock system is anticipated to be disassembled by hand tools and work boat with the disassembled pieces rafted together with rope and floated where docks can be removed out of the water by either a land based crane, forklift, or waterside barge. Removed docks would then be hauled off to the landfill by truck. Landfills have controls in place to prevent the leaching of hazardous materials into the environment. Therefore, the removal and disposal of the existing dock system would not result in significant impacts associated with the use, transport, or storage of hazardous materials.

The removal and installation of concrete piles would use a hydraulic jetting process with the last 5 to 10 feet utilizing pile driving equipment for final pile placement. The hydraulic jetting process utilizes a carefully directed and pressurized flow of water to assist in pile placement. The removal and installation of concrete piles supporting the dock system would disturb sediments contained within the bottom of the marina through the impact hammer pile driving or jetting process. The impact hammer pile driving or jetting process would result in sediments being suspended in the affected water column during removal and installation. However, the removal and installation of the concrete piles would occur intermittently as the demolition and reconstruction of the dock system would occur one dock at a time.

The suspension of sediments in the water could result in turbidity impacts as well as the release of potentially contaminated sediments. Turbidity impacts and mitigation measures are discussed in more detail in Section X, *Hydrology and Water Quality.* **MM-HWQ-1** requires the implementation of a silt curtain around pile driving activities, which would restrict the sediment turbidity plume to the area within the curtain and would prevent sediment from spreading out through the Bay. However, the silt curtain would not restrict potential sub-surface contamination from being brought to the surface. As such, **MM-HAZ-1** would be implemented to avoid hazards to the public and environment associated with any disturbed, impaired sediments. The measure would involve sediment sampling following pile driving and applicable remediation activities, if necessary. Through implementation of **MM-HWQ-1** and **MM-HAZ-1**, the Project would not create a significant hazard to the public or the environment through the release of hazardous materials, and impacts would be less than significant.

> **MM-HAZ-1: Conduct Sediment Sampling and Implement Remediation Measures.** At the conclusion of the pile driving, the Project Applicant shall conduct sediment sampling of representative areas of potential disturbance near the location of piles. Sampling shall be conducted in accordance with the Water Quality Control Plan for Enclosed Bays and Estuaries (SWRCB 2009). Sediment sampling results shall rely on the Effects Range – Low (ER-L) and Effects Range – Medium (ER-M) guideline values of the National Oceanic and Atmospheric Association (NOAA) Screening Quick Reference Tables (Buchman 2008). If the sediment samples show concentrations of sediment contamination above the guideline values, the Project Applicant shall delineate the extent of cross-contamination and propose remediation approaches (subject to approval by the District and any other agencies with jurisdiction over site contamination) that may include, but are not limited to, dredging, placement of sand cover, or Enhanced Monitored Natural Recovery (EMNR) sand containing active carbon. The Project Applicant shall implement the approved remediation. The results of the sampling and remediation shall be documented in a report to be reviewed and approved by the District, RWQCB, and any other appropriate regulatory agencies.

The HIWM is currently operating and would continue to operate as an active marina facility. Therefore, operational activities under the proposed Project would be similar to existing conditions. As such, the storage, use, and disposal of hazardous materials during Project operations would continue, with quantities similar to existing conditions. As mentioned above, the delivery, handling, and disposal of these hazardous materials would continue to be subject to applicable regulations, such as the RCRA, DOT, and local CUPA regulations. Operation of the proposed Project is not expected to create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment. Therefore, with compliance with federal, state, and local regulations less than significant impacts would occur from construction or operation of the proposed Project and no mitigation measures would be required.

c. *Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?*

No Impact. No existing or proposed schools are located within a 0.25 mile radius of the Project site. Baypoint Preschool, located at 2850 Wasp Way, is the nearest school to the Project site. This school is located approximately 0.50 mile northwest of the Project site. Because there are no schools located within 0.25 mile of the Project site, no impact would occur from construction or operation of the proposed Project and no mitigation measures would be required.

d. *Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?*

Less Than Significant Impact. As discussed above, research conducted with GeoTracker and EnviroStor during an online records review identified two separate LUST incidents (Case #H10538-001 and #H10538-002) within the Project site (DTSC 2018; SWRCB 1989, 1993). The first release was reported in 1989, consisting of waste motor/hydraulic/lubricating oils being released to soil and groundwater. The second incident occurred in 1993, consisting of a diesel fuel release to soil and groundwater. The 1993 release was discovered when the steel single-walled USTs were being replaced with fiberglass double-walled USTs. The accessible hydrocarbon-affected soil was excavated before the new USTs were installed. Residual affected soil was remediated through soil vapor extraction. Both LUST incidents were deemed remediated and the incidents closed from the County of San Diego DEH in 2004. There are no other hazardous materials sites within 0.25 mile of the Project site.

Because the Project site has been remediated to the satisfaction of the County of San Diego DEH and because the proposed Project would not excavate soils around the fuel tanks, implementation of the proposed Project would not create a significant hazard to the public or the environment associated with being located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. Therefore, impacts associated with this issue would be less than significant and no mitigation measures would be required.

e. *For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?*

Less Than Significant Impact. The closest public use airport to the Project site is SDIA, located approximately 0.5 mile north of the Project site. Airport Influence Area boundaries around the SDIA have been adopted by San Diego County Regional Airport Authority in its Airport Land Use Compatibility Plan (ALUCP). Based on the ALUCP, the Project site is located within Review Area 1 of the Airport Influence Area for SDIA (SDCRAA 2014).

Airport Land Use Commission review is required for land use plans and regulations within Review Area 1 proposing increases in height limits and for land use projects that:

- Have received from the Federal Aviation Administration (FAA) a Notice of Presumed Hazard, a Determination of Hazard or a Determination of No Hazard subject to conditions, limitations or marking and lighting requirements; and/or
- Would create any of the following hazards:
  - Glare
  - Lighting
  - Electromagnetic interference
  - Dust, water vapor, and smoke
  - Thermal plumes
  - Bird attractants

During project construction, the tallest feature would be the construction cranes, which would have a maximum height of 40 feet above ground level. The tallest feature associated with the proposed Project during operation would be the marina buildings, which would have a maximum height of 42 feet above grade.

The proposed Project was submitted to ALUC staff for preliminary project review on March 26, 2018 and August 14, 2018. Based on the preliminary project review and location of the Project site outside of the ALUCP noise contours and safety zones, the proposed Project would not require ALUC review. However, an FAA determination would be needed for the proposed building and the construction crane.

Structures developed under the proposed Project would be similar in height to existing structures, and operational activities would be similar to existing conditions. Consequently, the proposed Project does not include project design features that would create safety hazards for people residing or working in the area. Furthermore, the FAA would be notified at least 45 days prior to construction because of the proximity of the site to a navigational facility. Although the FAA has not made a final determination, this impact is anticipated to be less than significant given the distance from the airport, the low profile of the proposed Project, and the fact that it would simply replace existing structures. In the event that the FAA requires changes to the proposed Project, the changes would be reflected in the *Project Description* section of the MND through the addendum process or, if the changes could result in a new significant impact, recirculation of the Draft IS/MND for public comment may occur, or a new supplemental analysis would be prepared if the Final IS/MND has already been adopted. There are no other airports or ALUCPs in the vicinity of the proposed Project.

Potential noise impacts are discussed in Section XIII. Impacts would be less than significant.

f. *Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?*

No Impact. Emergency response and evacuation is the responsibility of the San Diego Harbor Police Department, under direction of County of San Diego Office of Emergency Services (OES). Redevelopment of the Project site would include both waterside and landside infrastructure demolition and construction. During construction, the proposed Project would be required to comply with applicable requirements set forth by the OES Operational Area Emergency Operations Plan[12] (OA EOP), the San Diego Harbor Police Department, and the San Diego Fire-Rescue Department. OES coordinates emergency response at the local level in the event of a disaster, including fires. This emergency response coordination is facilitated by the OAEOP and responding agencies that service the Project site.

Existing access to the Project site is from Harbor Island Drive at the southern Project boundary. Construction-related traffic activity would consist material delivery and truck haul use as well as construction worker commute trips. Although the proposed Project would generate traffic trips during construction, the amount of trips anticipated would not interfere with emergency access. During construction, portions of the parking lot would be utilized for a staging and laydown area. However, ingress and egress from Harbor Island Drive would not be impeded. In addition, site-specific activities, including temporary construction activities, are reviewed and approved on a project-by-project basis by the District when development plans are submitted. The District ensures that emergency access is maintained during construction through its project review and approval process. Thus, emergency access would be maintained during construction of the proposed Project and no impacts associated with interference with an adopted emergency response plan would occur. After construction, the equipment would be removed and access to the entire parking lot would be restored.

Operation of the proposed Project would not include any characteristics (e.g., permanent road closures, long-term obstruction of road access) that would physically impair or otherwise interfere with emergency response or evacuation in the Project vicinity. No impacts associated with interference with an adopted emergency response plan would occur during operation of the proposed Project.

g. Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

No Impact. The Project site is located on Harbor Island, near downtown San Diego and adjacent to San Diego Bay. Based on the City of San Diego Official Very High Fire Hazard Severity Zone Map, Sheet 14, the Project site is not within as area identified as a high fire hazard severity zone (City of San Diego 2009). In addition, there are no wildlands or heavily vegetated areas in the vicinity of the proposed Project site. Construction and operation of the proposed Project would not expose people or structures to a significant risk of loss, injury, or death involving wildland fires. Therefore, no impacts would occur and no mitigation measures are required.

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[12] https://www.sandiegocounty.gov/content/dam/sdc/oes/emergency_management/plans/op-area-plan/2018/2018-EOP-Complete-Plan.pdf

X. Hydrology and Water Quality

Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Violate Regional Water Quality Control Board water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☐	☒	☐	☐
b. Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☐	☐	☐	☒
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
i. Result in substantial erosion or siltation on- or off site;	☐	☐	☒	☐
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☒	☐
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or	☐	☐	☐	☒
iv. Impede or redirect flood flows?	☐	☐	☒	☐
d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☒	☐
e. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☒	☐	☐

Environmental Setting

The Project site is located on and adjacent to the San Diego Bay. The Project site is subject to wave forces from tides, winds, boats and ships, and sea-level rise. The Project site is also located within the jurisdiction of the San Diego RWQCB and therefore must comply with the Water Quality Control Plan (Basin Plan). The Project site is within the Pueblo San Diego hydrologic unit (HU) (Figure 17). Basin Plans are the regional water quality control plans required by both the CWA and Porter-Cologne Water Quality Control Act in which beneficial uses, water quality objectives, and implementation programs are established in order to maintain water quality. San Diego falls under the San Diego Region Hydrologic Basin Planning Area. Beneficial uses of inland surface waters in the Pueblo HU are limited to contact (potential use) and non-contact recreation, warm freshwater habitat, and wildlife habitat, whereas San Diego Bay receiving waters support an extensive array of beneficial uses related to industrial uses, navigation, contact recreation, non-contact recreation, commercial and sport fishing, preservation of biological habitats of special significance, estuarine habitat, wildlife habitat, preservation of rare and endangered species, marine habitat, fish migration, fish spawning, and shellfish harvesting. No potable water supply is currently taken from sources within the Pueblo HU (Project Clean Water 2016).

San Diego Bay is listed under CWA Section 303(d) as impaired for mercury (year 2027), polycyclic aromatic hydrocarbons (PAHs) (year 2025), and polychlorinated biphenyls (PCBs) (year 2019). San Diego Bay Shoreline at Harbor Island (West Basin) is impaired for copper (year 2019). The 303(d)-listed impairments are based on the *2014/2016 California Integrated Report* (SWRCB 2018). TMDLs have not yet been established for these water bodies. Other major impacts on the Pueblo HU include surface water quality degradation, habitat degradation, sediment toxicity in San Diego Bay, and sewer overflows. The principal constituents of concern include trace metals, toxic substances, and coliform bacteria, primarily resulting from urban runoff. Runoff would discharge from the Project's bay frontage and toward Harbor Island Drive. Stormwater runoff is collected in storm drains located within the Project site parking lot and conveyed to the bay. The San Diego Bay is the receiving water body for surface water runoff from the Project site, which occurs either directly from sheet flow, or indirectly via storm drains. The closest dam to the Project site is Chollas Dam, located 8.5 miles to the east.

Groundwater at the site is directly tied to the San Diego Bay. The water has a high salt content from being directly associated with the bay and is not suitable for consumption. Borings were taken to estimate groundwater depth within the Project site as part of the proposed Project's geotechnical analysis (Appendix C). On the landside portion of the Project site, groundwater was encountered at a depth of approximately 12 feet (elevation +4 feet MLLW). The depth to groundwater is directly related to the level of water within the bay and, as such, expected to vary with the tides.

Construction activities that disturb 1 acre or more of land must obtain coverage under the SWRCB Construction General Permit (Order 2009-0009-DWQ as amended by Order 2010-0014-DWQ and Order 2012-006-DWQ). Under the terms of the permit, applicants must file complete and accurate Notice of Intent and Permit Registration Documents with the SWRCB. Applicants must also demonstrate conformance with applicable construction best management practices (BMPs) and prepare a construction Storm Water Pollution Prevention Plan (SWPPP) containing a site map that shows the construction site perimeter, existing and proposed buildings, lots, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project site.

The Municipal Stormwater Permit (Order No. R9-2013-0001 as amended by Order Nos. R9-2015-001 and R9-2015-0100) is an NPDES permit issued that requires the owners and operators of Municipal Separate Storm Sewer System (MS4s) within the San Diego Region to implement management programs to limit discharges of pollutants and non-stormwater discharges to and from their MS4 from all phases of development.

In compliance with the Municipal Stormwater Permit, the District developed a Jurisdictional Runoff Management Program (JRMP) that addresses issues related to construction activities and issues related to existing development. The District also adopted a jurisdiction-specific local BMP Design Manual in accordance with the Municipal Stormwater Permit that includes post-construction stormwater requirements for development projects under District jurisdiction. All new development and redevelopment projects are required to implement standard source control and site design BMPs to eliminate or reduce stormwater runoff pollutants. The JRMP requires that project applicants submit a Stormwater Quality Management Plan (SWQMP) accurately describing how the project will meet source control site design and pollutant control BMP requirements. The BMP Design Manual is intended to help a project applicant develop a SWQMP that complies with local and MS4 Permit requirements.

General requirements for the BMPs to be included in the SWQMP include the following.

- Onsite BMPs must be located so as to remove pollutants from runoff prior to its discharge to any receiving waters, and as close to the source as possible.
- Structural BMPs must not be constructed within waters of the United States.
- Onsite BMPs must be designed and implemented with measures to avoid the creation of nuisance or pollution associated with vectors (e.g., mosquitos, rodents, flies).

Source control BMPs must be implemented at all development projects where applicable and feasible. Source control BMP requirements include the following.

- Prevention of illicit discharges into the MS4.
- Storm drain system stenciling or signage.
- Protection of outdoor material storage areas from rainfall, run-on, runoff, and wind dispersal
- Protection of materials stored in outdoor work areas from rainfall, run-on, runoff, and wind dispersal.
- Protection of trash storage areas from rainfall, run-on, runoff, and wind dispersal.
- Use of any additional BMPs determined to be necessary by the District to minimize pollutant generation at each project.

Site Design BMPs must be implemented at all development projects where applicable and feasible. Site Design BMP requirements include the following.

- Maintenance or restoration of natural storage reservoirs and drainage corridors (including topographic depressions, areas of permeable soils, natural swales, and ephemeral and intermittent streams).
- Buffer zones for natural water bodies (where buffer zones are technically infeasible, project applicant is required to include other buffers such as trees, access restrictions, etc.).
- Conservation of natural areas within the project footprint including existing trees, other vegetation, and soils.
- Construction of streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided public safety is not compromised.
- Minimization of the impervious footprint of the project.
- Minimization of soil compaction to landscaped areas.
- Disconnection of impervious surfaces through distributed pervious areas.
- Landscaped or other pervious areas designed and constructed to effectively receive and infiltrate, retain, and/or treat runoff from impervious areas, prior to discharging to the MS4.
- Small collection strategies located at, or as close as possible to, the source (i.e., the point where stormwater initially meets the ground) to minimize the transport of runoff and pollutants to the municipal and receiving waters.
- Use of permeable materials for projects with low traffic areas and appropriate soil conditions.
- Landscaping with native or drought-tolerant species.
- Collecting and using precipitation.

In addition to the site design and source control BMPs discussed above, Priority Development Projects (PDPs) are required to implement stormwater pollutant control BMPs to reduce the quantity of pollutants in stormwater discharges. Stormwater pollutant control BMPs are engineered facilities that are designed to retain (i.e., intercept, store, infiltrate, evaporate, and evapotranspire), biofilter, and/or provide flow-through treatment of stormwater runoff produced from a 24-hour, 85th percentile storm event (Design Capture Volume) on the project site.

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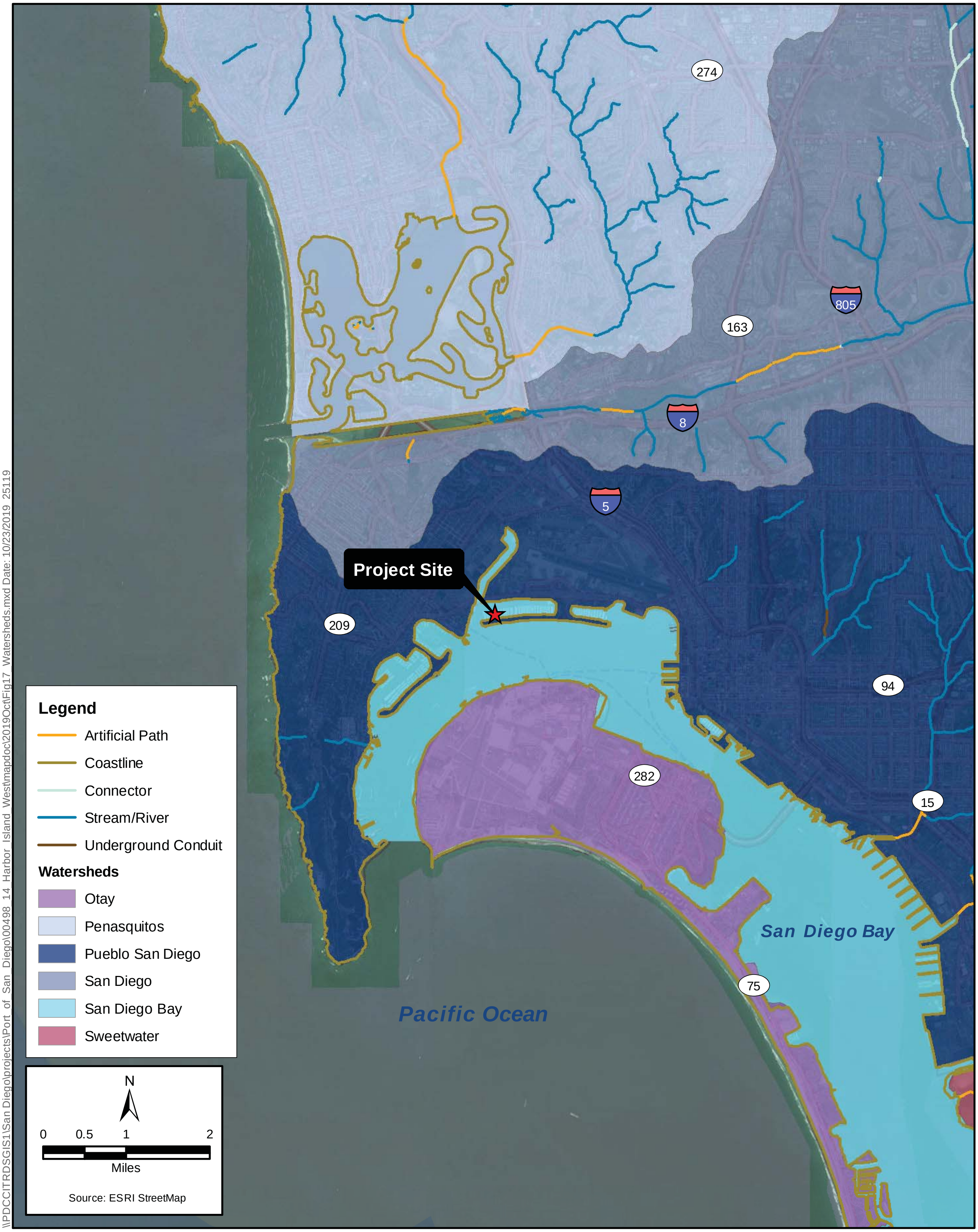

Figure 17
Regional Watersheds and Nearby Tributaries
Harbor Island West Marina Redevelopment Project

Analysis of Environmental Impacts

a. *Would the project violate Regional Water Quality Control Board water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?*

Less Than Significant with Mitigation Incorporated.

Construction – Waterside Improvements

In-water construction activities have the potential to affect water quality standards or waste discharge requirements. Water quality concerns associated with in-water construction activities typically include disturbed sediments, turbidity, and pollutants associated with ground disturbance, spills, and polluted runoff. In addition, the delivery, handling, and storage of construction materials and wastes (e.g., concrete debris), as well as the use of heavy construction equipment, could also result in stormwater contamination, thereby affecting water quality. Construction activities that involve the use of chemicals and operation of heavy equipment could also result in accidental spills of hazardous materials (e.g., fuel and oil) during construction activities, which are discussed in Section IX, *Hazards and Hazardous Materials*.

Waterside construction activities associated with the proposed Project would include in-water work, such as demolition and installation of docks, pile removal and pile driving, and operation of heavy equipment in and near the marina, such as a crane barge, workboat, and landside crane. Construction materials involved in these improvements would include concrete, wood, glass, sheetrock, insulating materials, bonding chemicals, foam, plastics, rubber, steel, and other metals. Waterside improvements would involve sediment disturbance along the marina floor and increases in turbidity within the water column from the removal and reinstallation of piles for the dock.

Temporary water quality impacts would occur during removal and construction activities associated with the waterside development because of resuspension of sediments that contain organic compounds and the debris that could be produced during removal. As is typical for marina projects, disruption of sediments could adversely affect water quality by temporarily resuspending sediments, thereby increasing turbidity. Therefore, these in-water construction activities would result in short-term disturbance of localized Bay sediments and temporary impacts on water quality.

To ensure that no nuisance turbidity affects water quality, **MM-HWQ-1** through **MM-HWQ-3** shall be implemented. These mitigation measures are based on the District best management practices (BMPs) and Environmental Standards (collectively, “Standards”) for any and all routine repairs and maintenance activities that involve existing overwater structures (District 2019). The Standards address how to conduct and monitor in-water construction activities that may increase turbidity, including, without limitation, pile removal and installation via jetting, impact hammer and various vibratory methods, to ensure water quality standards are not exceeded.

> **MM-HWQ-1: Implementation of Best Management Practices During Hydraulic Jetting and Pile Driving**. The following best management practices (BMPs) shall be implemented during the Project’s hydraulic jetting process:
>
> - Pile Jetting: Contractor shall control sediment displacement by reducing the jetting volume and/or velocity where feasible. Prior to pile jetting, the contractor shall first “stab” the pile into the bottom substrate to advance it through the upper layer of soft sediment and then jet the pile to reduce sediment disturbance during jetting operations.
> - Silt Curtains: Silt curtains shall be in place for the entirety of the Project (i.e., installed before the jetting process begins and not be removed until the pile driving is completed for all piles). The silt curtains shall be placed as close to the construction zone as practical and extend to the bottom but should not rest on the seafloor based on tidal variations. Given the tidal variation at the Harbor Island West Marina, the length of the silt curtains shall be adjusted to accommodate varying water levels (e.g., use of curtains with reefing or furling lines). The maximum water depth in the vicinity of the Harbor Island West Marina is approximately 20 feet at high tide; therefore, a 19 foot deep silt curtain shall likely be sufficient for the deepest areas. Shorter curtains may

be used in shallower areas. Silt curtain specifications shall be provided to the District prior to installation. Silt curtain deployment shall be monitored by the construction contractor personnel proficient in all aspects of silt curtains to ensure that turbidity does not escape and tidal currents do not cause deflection, and that the curtain length is properly set. Torn or damaged curtains shall be repaired or replaced immediately.

- Debris Handling: Removed pilings, debris, and any adhering sediment shall be disposed of off-site by the contractor. If sediment must be stored at the Project site prior to disposal, it should be placed in containers or lined/covered storage areas constructed to prevent release and spillage.
- Surface Boom: A floating surface boom shall be used to capture floating debris. The boom shall be placed at a sufficient distance from the construction area so as to capture all debris. Debris should be removed at the end of every work day, or sooner. In the case of rough waters, debris shall be removed immediately. If there is any reason to believe that there will be any oil, fuel, creosote, or other similar materials released during jetting, absorbent pads shall be required in conjunction with the boom.
- Utility Boat: A small boat shall be available throughout the duration of waterside Project construction to manage the silt curtains, booms, and debris.
- Equipment Inspection: All jetting equipment, including hoses, lines, and jet pumps, shall be inspected daily and replaced or repaired accordingly.
- Navigation Restrictions: Work activities and restrictions to boat navigation shall be scheduled and coordinated ahead of time with the District and Harbor Island West Marina and Sheraton San Diego Hotel and Marina tenants. Sufficient notification shall be provided. In the event that emergency vessel traffic must be accommodated, the contractor shall move the BMPs immediately.
- Structure Demolition: To the greatest extent possible, any structures requiring demolition shall be removed whole and dismantled at a location away from the water.
- Daily Inspection: All BMPs shall be inspected at least daily. Any faulty/failing equipment shall be repaired/replaced as necessary. Daily visual water quality monitoring shall include monitoring for any visible turbidity plumes, oil or sheens, floating debris, or water discoloration associated with project construction activities and shall be conducted a minimum of one hour after commencement of construction activities with the potential to cause sediment disturbance. A monthly report of the monitoring shall be compiled and submitted to the District's Engineering and Construction Management Department. If a turbidity plume is observed, response actions shall be immediately taken (see MM-HWQ-2).

MM-HWQ-2: Implementation of Best Management Practices for Turbidity Monitoring During Hydraulic Jetting and Pile Driving. The following best management practices (BMPs) for turbidity monitoring shall be implemented during the Project's hydraulic jetting and pile driving processes:

- Turbidity shall be monitored a minimum of once per week at mid-depth of water column. The monitoring shall include the following:
    - Monitoring Stations – During weekly monitoring turbidity shall be measured at the construction site after pile driving activities have been underway for at least one hour and at a reference site. Monitored water quality measurements shall be compared to ambient San Diego Bay reference measurements located outside of the construction area (outside silt curtain) that are not impacted by the construction.

  - Project Compliance Stations – A minimum of three locations shall be established as compliance stations for the collection of water quality monitoring data. Compliance station data shall be compared to reference station data to determine if the construction activities are impacting water quality based on the Performance Standards (see below). Compliance stations shall be located evenly along an arc located 200 feet from the edge of the construction area to capture all tidal and current conditions. The locations may be adjusted in the field to better target a visible turbidity plume, if a visible plume is observed.
  - Reference Station – A minimum of one station shall be established as a reference station to measure ambient San Diego Bay water quality conditions and shall be located in the direction of the mouth of the Bay and 1,000 feet beyond the influence of construction activities. Natural turbidity shall be determined through measurements at the reference station in order to compare the reference station measurements to compliance stations measurements.
  - Global Position System – Monitoring station positions will be located using a Global Position System (GPS) accurate to within ±3 meters.

- Performance Standards – The following turbidity standards are based on recent Regional Water Quality Control Board permit requirements (e.g., RWQCB, 2016; RWQCB, 2017) and are required to meet performance standards:
  - If reference station turbidity is between 0 to 50 NTUs, the maximum increase from construction activities must not exceed 20 percent of the measured turbidity at the reference station. If reference station turbidity is between 51 to 100 NTUs, the maximum increase from construction activities must not exceed 10 NTUs. If reference turbidity is greater than 100 NTUs, the maximum increase from construction activities must not exceed 10 percent above the reference levels.
- Response Actions to Water Quality Monitoring Exceedance - In the event that visual observations or the water quality monitoring described above in MM-HWQ-2, indicate an exceedance of an applicable receiving water Performance Standard, the following actions shall be implemented:
  - Immediately re-take water measurements at reference and compliance stations in accordance with the procedures in MM-HWQ-2.
  - Evaluate the measurements at background and compliance monitoring stations and use visual observations to determine whether the exceedance is caused by construction activities or by other ambient conditions in San Diego Bay such as wind waves, boat wakes, barge/ship traffic, and storm inflow.
  - If the exceedance is confirmed to be a result of the project construction, monitor conducting the water quality monitoring shall coordinate with the District's Engineering and Construction Management Department to immediately notify the contractor to modify or cease operations related to in-water construction activities and/or inspect the BMP's to ensure they are working properly to mitigate the exceedance. Operational modifications may include fixing, adjusting, maintaining, and/or upgrading silt curtains or use of a second silt curtain.
  - Re-evaluate water measurements at all relevant stations no more than 30 minutes later, after additional BMPs or operational modifications are implemented.
  - If the receiving water performance standards exceedance continues to persist, even with additional BMPs, determine and implement operational modifications including modifying the rate of jetting, waiting longer to initiate pile driving, or perform more start-stops until the

exceedance levels comply with the performance standards. If necessary, corresponding construction activities shall be stopped until performance standards are met. Typically, turbidity is reduced within one hour.

MM-HWQ-3: Implementation of Best Management Practices for Visual Monitoring During Hydraulic Jetting and Pile Driving. Implement the following response actions to visual plumes observed outside of the silt curtain:

- If the condition of the silt curtain is observed to be damaged, no longer positioned around the in-water construction area, or has gaps where a visible turbidity plume is forming outside of the silt curtain, the contractor shall act immediately to correct the silt curtain to prevent any turbidity outside the silt curtain.
- Actions to ensure the silt curtain is functioning shall include, but are not limited to, work stoppage to inspect the silt curtain; repair the silt curtain; position or reposition the silt curtain around the active work area; ensure the silt curtain has no gaps; implementation of operational modifications (e.g., fixing, adjusting, maintaining, and/or upgrading silt curtains); and/or, implementation of a second silt curtain.
- If receiving water quality monitoring indicates an exceedance of the Performance Standards, construction activities shall be halted until measured turbidity has decreased to levels below Performance Standards.
- All response actions shall be documented and reported to the District in writing and by phone immediately.

In addition, the proposed Project would be required to obtain from USACE a Section 10 permit for the placement of piles and docks and breakwater in navigable waters. Section 10 of the Rivers and Harbors Act of 1899 requires authorization from USACE for the construction of any structure in or over any navigable water of the United States. A Section 10 permit would be required to be obtained prior to initiating construction activities for the marina. USACE would issue a public notice to interested parties to solicit comments on the project, and, after evaluating the comments and information received, USACE would make a decision to issue or deny a permit based on compliance with its regulations and other laws. In addition, the proposed Project would be required to obtain a corresponding Water Quality Certification (Section 401 permit) from the RWQCB for the federal permits from USACE. A Section 401 permit is required by USACE for Section 10 Permit issuance. Once the RWQCB deems a 401 application is complete, a public notice and 21-day comment period follow. Following the public comment period, additional information may be required or a public hearing with the RWQCB would be scheduled. The RWQCB-issued Water Quality Certification would specify methods for ensuring the protection of water quality during construction activities in the Bay, including water quality monitoring requirements in order to meet the Basin Plan water quality objectives; also, beneficial uses may require mitigation for impacts on waters of the U.S. In addition, the 401 permit would list specific conditions for the use of in-water construction BMPs to minimize the discharge of construction materials from construction activities, control floating debris, and provide spill containment and cleanup equipment to control potential accidental spills in order to meet the Basin Plan water quality objectives and beneficial uses.

The Construction General Permit requires the development of a Storm Water Pollution Prevention Plan (SWPPP) by a certified Qualified SWPPP Developer (QSD), which identifies several types of construction BMPs to reduce the discharge of pollutants into surface waters. This is discussed further under the landside construction section.

With implementation of **MM-HWQ-1** through **MM-HWQ-3**, as well as **MM HAZ-1**, in water construction of the proposed Project would result in less than significant impacts on water quality.

Construction – Landside Improvements

Landside construction activities would include soil disturbance from concrete removal, grading, and repaving related to building demolition and construction; utility improvements; vegetation removal and planting; construction staging; and operation of heavy equipment for excavation and grading operations. Demolition would include abatement activities associated with hazardous materials on-site, removal of existing structures, removal of any concrete slabs, removal of any utilities, and repaving the Project site with asphalt or concrete pavement.

The impact of landside construction-related materials on water quality would vary, depending on the duration and timing of activities. Water quality would be temporarily affected if disturbed sediments or other construction-related pollutants were discharged to nearby storm drains and/or the marina. In addition, construction activities could result in the erosion of disturbed soil by wind and rain. They could also increase the amount of suspended solids contained in stormflows, resulting from the erosion of exposed soil during construction. Other pollutants of concern are chemicals from heavy equipment or construction-related materials. Other contaminants that could enter runoff from the construction site include metals, petroleum products, and trash. Concrete, soap, trash, and sanitary wastes are other common sources of potentially harmful materials on construction sites. Wash water from equipment and tools and other waste dumped or spilled on the construction site can lead to the seepage of pollutants into watercourses. Also, construction chemicals may be accidentally spilled into watercourses. All of these potential construction contaminants could contribute to the degradation of water quality in the bay during construction of the proposed Project.

The proposed project would disturb more than 1 acre of land. Therefore, compliance with the Construction General Permit would require development and implementation of a SWPPP by a Qualified SWPPP Developer. The SWPPP would identify which construction BMPs would be implemented in order to protect stormwater runoff, and include a monitoring plan for measuring BMP effectiveness. BMPs are required to be inspected regularly by a Qualified SWPPP Practitioner. The Qualified SWPPP Practitioner monitors the construction activities to ensure the BMPs listed in the SWPPP are implemented and performing as anticipated.

A variety of construction BMPs would be required to be implemented throughout construction in order to protect water quality. Several of the minimum construction BMPs are listed in Table 16. At a minimum, BMPs would include practices to minimize the contact of construction materials, equipment, and maintenance supplies (e.g., fuels, lubricants, paints, solvents, adhesives) with stormwater. The construction SWPPP would specify properly designed, centralized storage areas that keep these materials out of the rain. When grading is conducted during the rainy season, the primary BMPs selected would focus on erosion control (i.e., keeping sediment in place) and then on sediment control (i.e., keeping sediment on site). Measures would include a range of stormwater control BMPs, including installing erosion control such as silt fences, staked fiber rolls, and geofabric to prevent silt runoff to storm drains or waterways. Topsoil and backfill would be stockpiled, protected, and replaced at the conclusion of construction activities. Disturbed soil would be revegetated as soon as possible with the appropriate selection and schedule for turf, plants, and other landscaping vegetation.

Table 16. Minimum BMPs for Construction Sites

BMP Category	BMP
Project Planning	Minimization of areas that are cleared and graded to only the portion of the site that is necessary for construction Develop and implement a SWPPP or Construction BMP Plan Contractor Training (formal training or District staff training)
Non-Stormwater Management	Water Conservation Practices (NS-1) Illicit Connection/Illegal Discharge Detection and Reporting (NS-6) Dewatering Operations (NS-2) Paving and Grinding Operations (NS-3) Potable Water/Irrigation (NS-7) Vehicle and Equipment Cleaning (NS-8) Vehicle and Equipment Fueling (NS-9) Vehicle and Equipment Maintenance (NS-10)
Good Housekeeping/ Waste Management	Cover construction material stockpiles such as treated lumber during wet weather (WQIP Strategy PO-13) Material delivery and storage (WM-1) Material Use (WM-2) Solid Waste Management (WM-5) Stockpile Management (WM-3) Spill Prevention and Control (WM-4) Hazardous Waste Management (WM-6) Contaminated Soil Management (WM-7) Concrete Waste Management (WM-8) Sanitary/Septic Waste Management (WM-9) Construction Road Stabilization (TC-2) Stabilized Construction Entrances (TC-1) Entrance/Outlet Tire Wash (TC-3)
Erosion Control[a] (choose at least one or a combination based on site conditions)	Preservation of Existing Vegetation (EC-2) Minimization of Exposure Time of Disturbed Soil Areas Scheduling (EC-1)[b] Hydraulic Mulching (EC-3) Soil Binders – (EC-5) Straw Mulches (EC-6) Wood Mulching – (EC-8) Geotextiles and Mats (EC-7) Wind Erosion Control (WE-1) Soil Preparation/Roughening (EC-15) Preservation of Natural Hydrologic Features Where Feasible Permanent Revegetation or Landscaping as Early as Feasible
Sediment Control (choose at least one or a combination based on site conditions)	Silt Fence (SE-1) Street Sweeping and Vacuuming (SE-7) Sand Bag Barrier (SE-8) Storm Drain Inlet Protection (SE-10) Sediment Trap (SE-3) Sediment Basin (SE-2) Check Dams (SE-4) Fiber Rolls (SE-5) Gravel Bag Berms (SE-6) Compost Socks and Berms (SE-13)
Run-on and Runoff Control	Protect site perimeter to prevent run-on from entering the site and site runoff

Source: District 2015.

[a] Erosion controls must be implemented in all inactive disturbed soil areas. An inactive disturbed soil area is where construction activities such as grading, clearing, excavation, or disturbances to ground are not occurring and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

[b] Limitation of grading to a maximum disturbed area, determined by the District to be 5 acres during the rainy season and 17 acres during the non-rainy season, before either temporary or permanent erosion controls are implemented to prevent stormwater pollution (see Section 5.6.1 of the JRMP for additional information).

In addition to the SWPPP, the project proponent would be required to implement the construction BMPs identified in the District's JRMP. The SWPPP would specify construction BMPs to ensure that water quality standards or waste discharge requirements are not violated. BMPs selected would be designed to comply with the requirements of the District's JRMP and the Construction General Permit and would be subject to review and approval by the District. Construction-related measures would include BMPs from the following categories, and as listed in Table 16.

- Project Planning
- Non-Stormwater Management
- Good Housekeeping/Waste Management
- Erosion Control
- Sediment Control
- Run-on and Run-off Control

Excavation required for utility relocation would extend approximately 5 feet below ground surface and digging or trenching activities for building foundations would not extend beyond 6 feet below ground surface. Groundwater was encountered at approximately 12 feet below the Project site (Appendix E); therefore, it is unlikely that groundwater would be encountered and dewatering would not be required. Because the proposed Project would comply with **MM-HWQ-1** through **MM-HWQ-3**, Section 10 and Section 401 permits, and the BMPs contained in the SWPPP and District's JRMP; properly dispose of potentially hazardous materials, consistent with the regulations discussed in Section IX, *Hazards and Hazardous Materials*; and avoid impacts on groundwater, water quality impacts related to landside construction would be less than significant. No violations of water quality objectives or waste discharge requirements would occur, and impacts would be less than significant.

Operation – Waterside Improvements

Water quality concerns associated with typical marina operational activities include generation and use of materials that, if uncontained, could result in pollution. Operations at the proposed Project marina would remain consistent with existing uses and include routine maintenance activities; waste storage, handling, and disposal; outdoor parking; patronage of commercial/retail uses; as well as vessel storage and use. Potential pollutants that may be generated during operations at the marina include metals, nutrients, oil and grease, organics, sediment, and trash. Pollutants generated from boat hull maintenance, in-water cleaning, and leaking oil may impair water quality and threaten the health of, and toxicity to, aquatic systems. Chemicals used in top-side and underwater cleaning can also degrade water quality. Water quality impacts can be avoided or lessened by using non-toxic cleaning products, minimizing or eliminating toxic cleaning agents, and implementing practices that prevent or reduce opportunities for toxic products to contact surface water.

Water quality impacts from copper-based hull paints have been identified in marina basins throughout California (District 2017b). Copper has been a standard ingredient in hull paints for many decades, and the paint has caused exceedances of water quality standards throughout the San Diego Bay. Copper-based antifouling hull paints are currently the most commonly used antifouling coating. The San Diego Bay shoreline at Harbor Island West Basin is currently listed on the SWRCB 303(d) list of water quality impairments for copper. In addition, there is an existing TMDL for copper for the Shelter Island Yacht Basin located southwest of the project site in the Bay.

The proposed project would result in a reduction of on-site boat slips. While it is not anticipated that boating activities would increase, the proposed Project would allow for the continued use of the site as a marina through a new lease. As such, the proposed project would continue to contribute to the existing copper impairment in the Harbor Island West Basin albeit slightly less than existing conditions given the fewer boat slips. However, given a TMDL is currently under development, the project would continue to contribute to the copper impairment of the Harbor Island West Basin. However, impacts would be less than significant through compliance with the District's In-Water Hull Cleaning Ordinance[13] combined with ongoing efforts of the District's Copper Reduction Program including: in-water hull cleaning policy development & legislation; monitoring and data assessment; hull paint conversion; alternative hull paint testing and research; and, outreach. The In-Water Hull Cleaning Ordinance requires businesses that perform in-water hull cleaning to secure a permit to ensure that best management practices generally recognized by the industry and being effective and environmentally sound are adhered to. Therefore, water quality impacts related to Project operation on the waterside would be less than significant.

Operation – Landside Improvements

Proposed changes to the landside portion of the Project site would involve the removal of the 23,000 square feet of existing buildings and construction of approximately 15,682 square feet of new buildings. In addition, existing landscaping would be removed and new drought-resistant landscaping would be installed, increasing the overall landscaped area from 15,000 square feet to 18,000 square feet. The existing asphalt parking lot would be demolished and repaved, resulting in a decrease from 120,000 square feet to 116,000 square feet of pavement area. The increased landscaped areas would reduce pollutant discharges and treat stormwater runoff through biological uptake, allowing plant materials to filter pollutants.

As described above in the existing setting, all new development and redevelopment projects are required to comply with the District's JRMP and complete and submit to the District a SWQMP accurately describing how the project will meet applicable stormwater requirements. Projects categorized as Priority Development Projects (PDPs) must incorporate stormwater pollutant control BMPs into the site design and, where applicable, address potential hydromodification impacts from changes in flow and sediment supply. The proposed Project would qualify as a PDP pursuant to the MS4 (R9-2013-0001 as amended) and under the BMP Design Manual because it is a redevelopment project that creates or replaces more than 5,000 square feet of impervious areas. Accordingly, the Project proponent would ensure that post-construction designs and/or controls for minimizing urban runoff pollution would be incorporated into the proposed Project, consistent with the Port's BMP Design Manual (District 2018b). In general, the BMP Design Manual provides updated procedures for planning, selecting, and designing permanent structural stormwater BMPs based on specific performance standards. BMP maintenance requirements are also addressed to ensure ongoing pollution prevention. Stormwater pollutant control BMPs are engineered facilities that are designed to retain (i.e., intercept, store, infiltrate, evaporate, and evapotranspire), biofilter, and/or provide flow-through treatment of stormwater runoff produced from a 24-hour, 85th percentile storm event (Design Capture Volume) on the Project site. Typical BMPs that would be implemented by the proposed Project to reduce post-construction impacts include:

- Landscaping shall be designed to minimize irrigation and runoff and promote surface infiltration, where appropriate.
- Rain shutoff devices shall be employed to prevent irrigation after precipitation.
- Permeable materials shall be used to promote surface infiltration, where appropriate.
- Landscaped or other pervious areas shall be constructed to receive and infiltrate, retain, and/or treat surface runoff prom impervious areas.
- Compliance with the BMP Design Manual (District 2018b), which includes source and treatment-control BMPs, shall be ensured.

Because operation of the proposed Project would comply with the District's In-Water Hull Cleaning Ordinance and the ongoing efforts of the District's Copper Reduction Program as well as implementing requirements of the District's JRMP and BMP Design Manual, to minimize the amount of post-construction water runoff flowing to the Bay, through structural treatment controls and applicable hydrological capture requirements (see response X.c.ii), water quality impacts related to Project operation would be less than significant. Therefore, no violations of water quality standards or waste discharge requirements, and no

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[13] https://pantheonstorage.blob.core.windows.net/administration/Ordinance-No-2681-An-Ordinance-Amending-Unified-Port-District-Code-Section-414-Regulation-of-In-Water-Hull-Cleaning.pdf

degradation of surface or groundwater quality would occur. Impacts would be less than significant with mitigation incorporated.

b. Would the project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

No Impact. The proposed Project would involve demolition and repaving of existing impervious surfaces. Groundwater depths at the Project site are approximately 12 feet below the existing grade (Appendix E). Site grading and trenching are not anticipated to go more than 6 feet below the existing grade; thus, dewatering would not be required. After construction, the proposed Project would decrease the total amount of impervious surfaces by approximately 3,000 square feet. The decrease in impervious surfaces would allow additional ground absorption of stormwater under post-construction conditions. However, it should be noted that the Project site is also close to San Diego Bay; groundwater in the area is saline from saltwater intrusion. As such, the Project site is not considered to be an area identified for water recharge activities.

Project construction and operation does not propose to use groundwater resources or to otherwise affect any groundwater resources that are used for water supply. Potable water for the facility comes from the City of San Diego. More information on potable water supply is provided in Section XIX, *Utilities and Service Systems*. Since the proposed Project would not deplete groundwater supplies or interfere substantially with groundwater recharge, no impact associated with this issue would occur as a result of construction or operation of the proposed Project and no mitigation measures are required.

c. Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner that would:

i. Result in substantial erosion or siltation on- or off-site;

Less Than Significant. See responses X.a and X.b. The proposed Project involves the repair, maintenance, and replacement of several elements comprising of the HIWM. Construction of the proposed Project would involve landside and waterside earthwork that would include grading, excavation, pile driving, and other standard construction practices. During construction, the proposed Project would be required to comply with Section 401 permit and the BMPs contained in the SWPPP and District's JRMP. BMPs would minimize the potential for erosion and sedimentation in nearby storm drains and temporary changes in drainage during construction. For example, exposed stockpiles of dirt or other loose, granular construction materials that could contribute sediment to waterways would be enclosed and covered. Erosion and sediment control measures, such as silt fences and straw wattles, to prevent sediment from entering storm drains and surface waters, would also be implemented during construction. Efforts would be made by the contractor to conduct the majority of land-disturbing work outside of the typical wet season and minimize the potential for large rain events to mobilize loose sediment during construction. Both construction and post-construction BMPs would be implemented for the proposed Project, as discussed in response X.a, including landscaping that would minimize the amount of irrigation runoff and promote surface infiltration and stormwater capture.

Operation of the proposed Project would result in reductions in impervious surfaces and an increase in landscape coverage and pervious surfaces. Therefore, the proposed Project would not substantially alter drainage patterns or storm water flows on the Project site and would not result in significant changes in absorption rates, drainage patterns, or the rate and amount of surface runoff. In addition, no alteration of a stream or river would be required during construction. During operation, disturbance of exposed soil would not occur because all activity would be on paved areas or on the waters of the bay. Therefore, impacts related to changes in the drainage pattern, including changes related to erosion and/or siltation, would be less than significant with mitigation incorporated.

ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;

Less Than Significant. See response X.a and X.b. Project construction activities may result in temporary increases in the rate or amount of local surface runoff (onsite) and temporary flooding. However, compliance with Section 401 permit and the BMPs contained in the SWPPP and District's JRMP would reduce the potential for flooding on- or off-site during construction. Existing drainage patterns would ultimately be improved by increasing the total area of pervious surfaces (landscaped areas would increase by 3,000 sq. ft.) to capture, retain and treat stormwater runoff compared to existing conditions. Given the increase in pervious surfaces, runoff rates would be anticipated to decrease compared to existing conditions. The NPDES CGP and JRMP aims to match post-construction runoff to pre-construction runoff for the 85th-percentile storm event. In addition, the SWQMP is required to include a description of all post-construction BMPs. Both construction and post-construction BMPs would be implemented for the proposed Project, as outlined in the District's JRMP, BMP Manual, and project-specific SWQMP. As a result, no substantial changes in drainage patterns would occur, and the proposed Project would not cause surface runoff to result in flooding on- or off-site. Impacts would be less than significant.

iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

No Impact. As noted in response X.c-ii, the proposed Project would not result in an increase in the volume of runoff water that would exceed the capacity of the existing or planned stormwater drainage system given the decrease in impervious surfaces and increase in landscaped areas. The proposed Project may require changes to existing on-site storm drains because existing buildings would be replaced; the new storm drains would be appropriately sized and able to carry stormwater during a rain event, as required by the District's JRMP, thereby preventing on-site drainage issues. Stormwater pollutant control BMPs would meet the District's JRMP and BMP Design Manual performance standards, which mandate that post-construction runoff rates match pre-construction runoff rates for the 85th-percentile storm event. BMPs would be implemented that would retain onsite the pollutants contained in the volume of stormwater runoff produced from a 24-hour, 85th percentile storm event. In addition, the District performs a regular inspection of catch basins with filters that are located within the Port's jurisdiction to evaluate the condition of the catch basin filter inserts. Inserts are cleaned and maintained or replaced, as required; catch basins are cleaned of all debris and sediment semiannually or more frequently, as required. The storm drain clarifier units that are located within the Port's jurisdiction are also inspected and cleaned regularly by the District's Environmental Protection Department and its contractors. The proposed Project is not expected to contribute additional sources of polluted runoff during operation because the type of on-site uses would be the same as under existing conditions. Implementation of the proposed Project would result in a less intensive development through the reduction of building area, dock system area, and pavement area within the Project site. With a reduction in building area, dock system area, and pavement area, it is anticipated that fewer pollutants would be generated on site when compared to current conditions. Moreover, the proposed Project's SWQMP and related BMPs would minimize the potential for pollutants to enter storm drains. Therefore, no impact would occur from construction or operation of the proposed Project.

iv. Impede or redirect flood flows?

Less Than Significant. Refer to responses X.a through X.c above. The proposed Project includes a reduction in impervious areas and an increase in landscape coverage and pervious surfaces. Therefore, absorption rates would be reduced and surface water runoff would not increase. In addition, because the proposed Project involves redevelopment of an existing marina, no new structures would be constructed in areas that were previously undeveloped. Therefore, the Project would not impede or redirect flood flows.

In addition, the Project site has the potential to be affected by sea level rise, which could change the flooding patterns and thus require that development be sited to minimize the risk to users and property from said flooding. A California judicial decision, *Ballona Wetland Foundation v. City of Los Angeles* (2011) 201 Cal App. 4th 455, holds that a lead agency is not required to analyze the impacts of sea level rise (SLR) on a project, because CEQA does not require an analysis of "impacts of the environment on a project." However, the Project is within the California Coastal Zone and must be consistent with the California Coastal Act (CCA), which contains several policies that address the effects of SLR. As such, an analysis of the potential impacts of SLR on the proposed Project is required.

Below is a sampling of the Chapter 3 policies (a non-exhaustive list) that the proposed Project must be consistent with, and such consistency may be affected by SLR. For example, if SLR changes the flooding patterns or increases the flooding of the Tidelands, new development must be sited to minimize the risk to users and property from said flooding, and if that new development is not a coastal dependent use, development of a seawall or similar improvement to protect the users or property may not be available. CCA policies that are relevant to SLR include:

- 30210: In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.
- 30211: Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization . . .
- 30220: Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.
- 30234: Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded . . .
- 30235: Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply.
- 30236: Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (l) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the floodplain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.
- 30253: New development shall: (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard; (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs . . . (5) Where appropriate, protect special communities and neighborhoods which, because of their unique characteristics, are popular visitor destination points for recreational uses.

In addition, the California Coastal Commission adopted its Sea Level Rise Policy Guidance in 2015 and an update to the science in 2018. This guidance provides principles for addressing SLR in the coastal zone, an overview of the science behind SLR as well as a description of the potential consequences, and an outline of the steps for addressing SLR in PMPs or Coastal Development Permits. Based on the Coastal Commission guidance, the Project is evaluated against a low risk aversion sea level rise scenario and a medium-high risk aversion sea level rise scenario. An extreme high risk aversion scenario is not warranted for the project since it is not critical infrastructure, nor would damage result in significant public health or safety impacts.

It should be noted that the District is developing guidance for future planning and development related to sea level rise. However, because this guidance has not been finalized, Project site elevation and projections were analyzed for the conditions in years 2030, 2060, and 2100. Table 17 displays a summary of this analysis. As shown, the Project site would remain sufficiently above both permanent and temporary sea level rise projections out to the 2100 time frame.

Table 17. Sea Level Rise Elevation and Projections (feet)

	Existing Tidal Datum[1]		Sea Level Rise Projection[2]		Project Elevation Relative to Projections – Permanent SLR[3]		Project Elevation Relative to Projections with Storm Surge– Temporary SLR[4]	
Year	Site Elevation above MSL	MHHW Elevation above MSL	Low Risk	Medium-High Risk	Low Risk	Medium-High Risk	Low Risk	Medium-High Risk
2030	12.0	2.8	0.6	0.9	8.6	8.3	6.2	5.9
2060	12.0	2.8	1.6	2.7	7.6	6.5	5.2	4.1
2100	12.0	2.8	3.6	7.0	5.6	2.2	3.2	-0.2

[1] Mean Higher High Water Elevation above MSL calculated based on the difference between mean higher high water (5.72 feet) and MSL (2.94 feet). Obtained from: https://tidesandcurrents.noaa.gov/datums.html?id=9410170

[2] Based on projections for San Diego. Obtained from: https://documents.coastal.ca.gov/assets/slr/guidance/2018/0_Full_2018AdoptedSLRGuidanceUpdate.pdf

[3] Based on the difference between site elevation, Mean Higher High Water Elevation above MSL, and sea level rise projections. For example, the lower end elevation for 2030 is calculated as follows: 22.0 – 2.8 – 0.6 = 18.6 feet.

[4] Based on the addition of the 100-year (1% annual exceedance probability) surge events on top of the projected permanent SLR (relative to MHHW). For example, the low risk elevation for 2030 is calculated as follows: 18.6 – 2.4 = 16.2 feet. This assumes that future storm surges above MHHW are similar to historical surge.

Note that this table does not take into account the SLR between 2000 (baseline for SLR projects) and 2018 (existing levels used for calculations) change in sea level different in sea levels. The mean sea level trend is 2.17 millimeters/year (or 0.09 inches/year). Accounting for this change would reduce the project elevation relative to the water levels by approximately 0.1 feet. See: https://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?id=9410170

MSL = mean sea level; MHHW = mean higher high water.

The landside portion of the Project site is approximately 12 feet above mean sea level (msl) in the southern portion of the site and 15 feet above msl in the northern portion of the site. Assuming a 40 year lease is initiated in 2020, the proposed lease for the Project site would expire in 2060. Considering sea level rise, at the end of the lease (2060) the low point of the Project site is projected to remain 4.1-5.2 feet above the 100-year storm surge water level. Therefore, over the lease of the Project, the Project site is not expected to experience any permanent or temporary inundation.

Even when looking out to 2100, the site would remain 3.2 feet above a 2100 100-year storm surge if the low risk aversion sea level projections come to pass. If the medium-high risk aversion sea level projections materialize, the site could be inundated by up to 0.2 feet (2.4 inches) of water during a 100-year storm surge in the year 2100. Given the range of projections and the uncertainty in the 2100 time period, it is appropriate that no action be taken at this point in time to address sea level rise. A new analysis of sea level rise projections and impacts will be required in 2060 for an extension of the lease, which would allow sufficient time for action before 2100 sea levels materialize. Accordingly, impacts would be less than significant.

The waterside portion of the Project site consists of a floating marina. For the guide piles and gangways to accommodate the medium-high sea level rise projections and storm surge events over the lifetime of the lease (till 2060), they will need to allow for water elevations of up to 7.9 feet above today's mean sea level.[14] To accommodate the medium-high sea level rise projections and storm surge events out to 2100, the guide piles and gangways would need to accommodate water elevations of up to 12.2 feet above today's mean

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[14] The 7.9 feet above MSL is comprised of 2.8 feet to account for high tides (MHHW), 2.7 feet of sea level rise under the medium-high risk adverse scenario, and 2.4 feet of storm surge in a 1% annual exceedance probability storm.

sea level. Therefore, the proposed Project would not result in impedance or redirection of flood flows. Impacts would be less than significant.

d. In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Less Than Significant Impact. According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), the Project site is located in Zone AE, which is a special flood hazard area inundated by a 100-year flood (FEMA 2012).

The Project site is located on the San Diego Bay, which does present some risk for tsunami events. The State of California Tsunami Inundation Map for Emergency Planning indicates that the Project site is located within the tsunami inundation area for the San Diego Bay (DOC 2009). This inundation area considers potential tsunamis caused by both local and distant sources. For this reason, the Project site is considered at risk for tsunami-related flooding due to distant and local fault rupturing and/or subaqueous land sliding offshore of southern California and/or distant sources. Although the Project site is mapped as being within a tsunami inundation zone, the California Emergency Management Agency, California Geological Society, and the University of Southern California map preparers note that tsunamis are rare events and that, because of a lack of known occurrences in the historical record, their map does not contain information about the probability of a tsunami affecting any area within a specific period of time. According to the County of San Diego, tsunamis in the vicinity of San Diego have been infrequent and low in height. Four tsunamis have been reported since 1952, none more than 5 feet in height (County of San Diego 2011). The Project site sits at an elevation between 12 and 15 feet above msl. Although inundation from a tsunami is possible, it is unlikely; if it were to occur, damage would most likely be limited to ground-floor water damage.

The Project site would not be subject to inundation by seiche as this phenomenon is typically associated with land-locked bodies of water, none of which occur near the Project site.

The project site is a marina facility that does not store large quantities of pollutants that would risk release in the event of inundation. The proposed use would be similar to the existing use and would not increase risk of release of pollutants compared to existing conditions. As such, the proposed Project would not exacerbate flooding conditions in flood hazard, seiche, or tsunami zones that would risk release of pollutants due to inundation; thus, impacts would be less than significant and no mitigation measures would be required.

e. Would the project conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Less than Significant with Mitigation Incorporated. The project site is located within the San Diego RWQCB jurisdiction and must comply with the Water Quality Control Plan for the San Diego Basin (Basin Plan), which is the regional water quality control plan in which beneficial uses, water quality objectives, and implementation programs are established in order to maintain water quality. The Sustainable Groundwater Management Act (SGMA) requires all groundwater basins designated as medium or high priority to develop a Groundwater Sustainability Plan (GSP) to achieve sustainable management by 2040-2042 (California Department of Water Resources 2019). In San Diego County, the State has designated four of the county's basins as medium-priority and subject to SGMA: Borrego Valley, San Diego River Valley, San Luis Rey Valley and San Pasqual Valley (County of San Diego 2011). Groundwater at the site is directly tied to the San Diego Bay and thus the groundwater in the area is saline from saltwater intrusion. As such, the Project site is not considered within a medium or high priority groundwater basin and no GSP has been or will be prepared. The proposed Project would maintain the existing use of the Project site as a marina and recreational space.

In-water construction would include demolition of existing docks, removal of existing piles, and installation of new piles and docks. As discussed in Threshold X.a., to ensure in-water construction would not decrease water quality, thereby conflicting with the goals of the Basin Plan, **MM-HWQ-1** through **MM-HWQ-3** would be implemented during construction activities. The proposed Project would also be subject to the requirements of a Section 10 permit from USACE, as well as standard regulatory controls and conditions to protect water quality as identified in the Regional Water Board's Construction General Permit and 401 Water Quality Certification Permit that would be implemented during construction activities.

Landside construction would involve soil disturbance from concrete removal, grading, repaving related to building demolition and construction; utility improvements; vegetation removal and planting; construction staging; and operation of heavy equipment for excavation and grading operations. Potential water quality impacts associated with these landside activities would be avoided by the implementation of BMPs included in the project's SWPPP as discussed in X.a. In addition, all development and redevelopment projects are required to complete and submit to the District a SWQMP accurately describing how the project will meet applicable stormwater requirements, in order to meet established water quality standards. The proposed Project would implement post-construction stormwater BMPs to avoid post-construction impacts to water quality.

Operation of the marina would generally include the use of materials that, if uncontained, could result in pollution, such as cleaners, organics, leaking oil, and other chemicals used for maintenance or cleaning. Water quality impacts can be avoided by using non-toxic materials and implementing practices to reduce opportunities for toxic products to contact surface water, such as required by the District's In-Water Hull Cleaning Ordinance. In addition, as discussed in Threshold X.a., it has been documented copper-based antifouling hull paints are a source of copper contamination in the San Diego Bay, which is listed on the State Resources Control Board 303(d) impaired water body list for copper along the shoreline at Harbor Island West Basin. However, boat activity is not anticipated to increase, and the project would comply with the District's In-Water Hull Cleaning Ordinance to reduce impacts to water quality associated with copper. Therefore, with the implementation of regulatory requirements for construction and post-construction BMPs, **MM-HWQ-1** through **MM-HWQ-3,** and compliance with District's In-Water Hull Cleaning Ordinance the proposed Project would not conflict with the goals and programs of the Basin Plan, and the impact would be less than significant.

XI. Land Use and Planning

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Physically divide an established community?	☐	☐	☐	☒
b. Cause a significant environmental impact due to conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☒	☐

Environmental Setting

The Project site is located on Harbor Island, which is a man-made peninsula with tidelands and submerged lands. Consequently, the Project site is under the District's jurisdiction. The District is charged with upholding the public trust doctrine. Public trust uses were initially limited to water-related commerce, navigation, and fishing. In more recent years, however, the California Supreme Court has found that the public trust embraces the right of the public to use the navigable waters of the state for "bathing, swimming, boating, and general recreational purposes." The District's PMP is the guiding land use document. The PMP provides official planning policies, consistent with the public trust doctrine, for the physical development of the tidelands and submerged lands conveyed and granted to the District.

The Project site is located within Planning District 2, Harbor Island/Lindbergh Field, of the certified PMP. The specific land and water use designations for the Project site include Commercial Recreation, Recreation Boat Berthing, Fueling Dock, and Sanitary Pump Station (District 2017a). Figure 13 shows the existing land and water use designations on and surrounding the Project site.

Existing landside uses on Harbor Island generally consist of hotels, restaurants, public parks, and marine-related services. Water-related uses in the area are predominantly related to recreational boating and include slip rentals, boat rentals, charters, lessons, sailing clubs, and other visitor-serving uses.

Existing adjacent land uses to the Project site include the Hilton San Diego Airport/Harbor Island Hotel to the east; Tom Ham's Lighthouse Restaurant to the west; open water to the north; and Harbor Island Drive, Harbor Island Park, and North San Diego Bay to the south. Major circulation facilities in the area include North Harbor Drive, Rosecrans Street, and I-5.

Analysis of Environmental Impacts

a. Would the project physically divide an established community?

No Impact. The proposed Project would redevelop an existing marina, including both waterside and landside infrastructure. As proposed, the Project would not expand the physical boundaries of the existing marina or develop areas outside of its current boundaries. Existing land and water use designations within the Project boundary consist of Commercial Recreation (landside) and Recreational Boat Berthing, Fueling Dock, and Sanitary Pump Station (waterside). Adjacent surrounding land use designations are also related to Commercial Recreation (landside) and Recreational Boat Berthing (waterside). No established communities exist on the Project site or in the immediate Project area. Neither construction nor operation of the proposed Project would physically divide an established community on Harbor Island. No impacts would occur and no mitigation measures are required.

b. Would the project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Less Than Significant Impact. The applicable land use plans governing the Project site are the certified PMP, including the PMP Precise Plan, and the California Coastal Act (CCA). The Project site is located within the Planning District 2, Harbor Island/Lindbergh Field, of the District's certified PMP. The specific land and water use designations for the Project site include Commercial Recreation, Recreation Boat Berthing, Fueling Dock, and Sanitary Pump Station.

Commercial recreation uses include hotels, restaurants, the convention center, recreational vehicle parks, specialty shopping, pleasure craft marinas, water-dependent educational and recreational program facilities and activities, dock-and-dine facilities (i.e., public boat docks located in proximity to a restaurant or other retail use where boaters may tie up and disembark for a short period of time to dine, shop, or enjoy other recreational activities), and sportfishing. Recreational boat berthing uses include recreational craft storage, refueling, a boat brokerage storage area, sailing school docking, water taxi, excursion ferry and charter craft operations, guest docking, boat launching, sewage pump out, water craft rental, boat navigation corridors, breakwaters for recreational craft protection, navigation facilities, aids to navigation, floats, docks, piers, breakwaters, wave attenuation structures, seawalls, shoreline protection, and any other necessary or essential facilities for providing waterside docking refuge to recreational marine craft and commercial passenger vessels.

The proposed Project involves the repair, maintenance, and replacement of several elements comprising the HIWM. The proposed Project would not change the existing land and water uses identified in the PMP because the proposed Project is compatible with the Commercial Recreation, Recreation Boat Berthing, Fueling Dock, and Sanitary Pump Station land and water use designations. As such, the proposed Project would not conflict with the land and water use designations of the PMP. As detailed summarized below, the proposed Project would be consistent with the PMP, the California Eelgrass Mitigation Policy, and the CCA.

The proposed Project's landside features, including commercial buildings that support marine-related businesses and the marina, are consistent with the Commercial Recreation designation. The waterside portion of the Project would redevelop the existing dock and improve the general safety of the marina, maintaining consistency with the Recreational Boat Berthing, Fueling Dock, and Sanitary Pump Station designations.

The Project is also consistent with the policies of Chapters 3 and 8 of the CCA. Table 18 includes a detailed list of the applicable CCA policies and analyzes how the Project is consistent with them. The following provides a brief summary of the proposed project's CCA consistency. (Refer to Section X, *Hydrology and Water Quality*, for a discussion of sea level rise and consistency with the CCA). The proposed Project would increase and improve public access to the waterfront by creating a public promenade and improving the public viewing deck. Implementation of the proposed Project would also result in less impervious surface area and less overwater shading which would lead to more landscaping and potentially more waterside habitat, respectively. None of the proposed Project related actions would impede coastal access, including public access to the waterfront. Implementation of the proposed Project would build upon the future provision of access along the waterfront on Harbor Island by connecting to the existing public promenade on Tom Ham's Lighthouse Restaurant and by providing waterfront access along the entire length of the waterfront on site. As such, the proposed Project would not conflict with the adopted PMP or CCA.

The proposed Project also requires the issuance of an appealable CDP in compliance with the CCA. Because the proposed Project is consistent with the goals and objectives of the PMP and the policies of Chapters 3 and 8 of the CCA, the proposed Project would not conflict with any applicable land use plan, policy, or regulation. In addition, subsequent issuance of an appealable CDP in compliance with the CCA would further ensure that the proposed Project would not conflict with any applicable land use plan, policy, or regulation. Impacts associated with the construction and operation of the proposed Project would be less than significant.

Table 18. Land Use Consistency

Applicable Plan, Policy, or Goal	Project Consistency
Port Master Plan	
Port Master Plan: The Port District's Port Master Plan provides the official planning policy for the physical development of the tidelands and submerged lands conveyed in trust to the District.	The underlying land and water use designations for the project site are Commercial Recreation (landside), Recreational Boat Berthing (waterside), Fueling Dock (waterside), and Sanitary Pump Station (waterside) uses. The project is consistent with these land and water use designations because it would redevelop the existing marina into a new marina with slightly less vessel slips and a smaller building. An increase in the operational capacity of the Harbor Island Marina would not occur.
Port Master Plan Goal I: Provide for the present use and enjoyment of the Bay and tidelands in such a way as to maintain options and opportunities for future use and enjoyment.	The project would continue to provide opportunities for use and enjoyment of the bay by updating and redesigning the marina and associated buildings and ensuring adequate public access is available through sufficient parking, a new public promenade, and redeveloping the existing viewing dock for public enjoyment. Therefore, the project is consistent with Goal I of the Port Master Plan.
Port Master Plan Goal II: The Port District, as trustee for the people of the State of California, will administer the tidelands so as to provide the greatest economic, social, and aesthetic benefits to present and future generations.	The project would allow for greater accessibility by being designed pursuant to the 2019 California Building Code, and the accessibility requirements therein. The project would provide social and economic benefits by improving an existing public viewing dock and constructing a new public promenade. Therefore, the project is consistent with Goal II of the Port Master Plan.
Port Master Plan Goal IV. The Port District, in recognition of the possibility that its actions may inadvertently tend to subsidize or enhance certain other activities, will emphasize the general welfare of State-wide considerations over more local ones and public benefits over private ones. - Foster and encourage the development of commerce, navigation, fisheries and recreation by the expenditure of public moneys for the preservation of lands in their natural state, the reclamation of tidelands, the construction of facilities, and the promotion of its use.	The marina would continue to be used by recreational vessels and boaters. Overall, the project would improve an existing marina facility by bringing it up to modern standards. Therefore, the project is consistent with Goal IV of the Port Master Plan.
Port Master Plan Goal V. The Port District will take particular interest in and exercise extra caution in those uses or modifications of the bay and tidelands that constitute irreversible action or loss of control. - Bay fills, dredging, and granting of long-term leases will be taken only when substantial public benefit is derived.	The project involves a 40-year lease to operate the proposed redeveloped marina facility. No dredging or fill is proposed within the bay. The project would result in a substantial public benefit by improving public access including access for disabled users and the overall safety of the marina by incorporating fire standpipes. Therefore, the project would be consistent with Port Master Plan Goal V.

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Port Master Plan Goal VII. The Port District will remain sensitive to the needs, and cooperate with adjacent communities and other appropriate governmental agencies in bay and tidal development.	The project is consistent with the surrounding community uses and would not disproportionately affect surrounding jurisdictions. Therefore, the project would be consistent with Goal VII of the Port Master Plan.
Port Master Plan Goal VIII. The Port District will enhance and maintain the Bay and tidelands as an attractive physical and biological entity. - Each activity, development, and construction project should be designed to best facilitate its particular function, which function should be integrated with and related to the site and surroundings of the activity. - Establish guidelines and standards facilitating the retention and development of an aesthetically pleasing tideland environment free of noxious odors, excessive noise and hazards to the health and welfare of the people of California.	The project involves improvements to an existing marina facility. The improvements will facilitate the function of the existing facility by providing improvements and greater access through incorporation of 2019 California Building Code requirements and the addition of firefighting standpipes. Implementation of the project, with the inclusion of appropriate mitigation measures, would not significantly affect any biological community, existing view corridors, conflict with the visual character of the community, result in excessive noise or odor, or cause hazards to the health and welfare of the people of California. Therefore, the project would be consistent with Goal VIII of the Port Master Plan.
Port Master Plan Goal IX. The Port District will insure physical access to the Bay except as necessary to provide for safety and security, or to avoid interference with waterfront activities.	The project would improve physical access to the bay by providing a public promenade, redeveloping the viewing deck, and constructing to 2019 CBC standards. Therefore, the project would be consistent with Port Master Plan Goal IX.
Port Master Plan Goal X. The quality of water in San Diego Bay will be maintained at such a level as will permit human water contact activities.	Implementation of the project would not result in water quality impacts that would prevent human water contact activities. Therefore, the project would be consistent with Port Master Plan Goal X.
Port Master Plan Goal XI. The District will protect, preserve, and enhance natural resources, including natural plant and animal life in the Bay as a desirable amenity and ecological necessity, and a valuable and usable resource.	Project impacts to marine biological resources would be reduced to less than significant with the implementation of appropriate mitigation. Therefore, the project would be consistent with Goal XI of the Port Master Plan.
Port Master Plan Precise Plan Text. The project is located in Planning District 2, Harbor Island/ Lindbergh Field, Subarea 22 (West Harbor Island), which is delineated on Precise Plan Map Figure 9 in the Port Master Plan. The Port Master Plan land and water use designations in the project area are Commercial Recreation (landside), Recreational Boat Berthing (waterside), Fueling Dock (waterside), and Sanitary Pump Station (waterside). The Precise Plan concept text notes that Subarea 22 “has been completely developed with commercial recreational uses such as hotels, restaurants, marinas, and marine related commercial business.”	The project is consistent with the PMP Precise Plan text because it would update existing buildings with the same land uses. Specifically, the project would redevelop a marina facility and improve physical access to the Bayfront by developing a public promenade, redeveloping an existing viewing deck, and ensuring there is sufficient public parking for the facility. Therefore, the project would be consistent with the Port Master Plan Precise Plan text.
California Eelgrass Mitigation Policy	
California Eelgrass Mitigation Policy. The California Eelgrass Mitigation Policy offers specific guidelines and mitigation measures for activities that threaten eelgrass	Impacts to eelgrass would occur with the project. However, these impacts would be mitigated through creation of eelgrass habitat

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vegetated habitats.	on the site, following the guidance in the California Eelgrass Mitigation Policy. No conflict would occur.
California Coastal Act – Chapter 3	
30210 Access; recreational opportunities; posting: In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.	The project would improve access and recreational opportunities consistent with public safety needs by providing access to the marina for users with disabilities and improving access and increasing safety for all users of the marina. The project is located on public tidelands and therefore, would not conflict with public rights and the rights of private property owners. Overall, it would provide additional and improved public access and would not encroach on private property outside of the project site.
30211 Development not to interfere with access: Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.	The project would enhance public access by providing accessibility enhancements, providing modern building and marina amenities, improving firefighting capabilities by include 30 standpipes, and generally enhancing operations at the facility. A public promenade and view deck would be compliant with 2019 CBC accessibility requirements to ensure enjoyment by the general public.
30212 New development projects: a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where: 1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, 2) adequate access exists nearby, or 3) agriculture would be adversely affected. Dedicated accessway shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway.	The project would enhance public access to the shoreline as described above under Section 30211. The project would maintain existing access from the nearest public roadway to the shoreline.
30212.5 Public facilities; distribution: Wherever appropriate and feasible, public facilities, including parking areas or facilities, shall be distributed throughout an area so as to mitigate against the impacts, social and otherwise, of overcrowding or overuse by the public of any single area.	The project would mitigate against overuse and overcrowding of recreational marinas by making improvements to the existing marina, thereby extending its useful life. This would ensure that members of the public can continue to use the marina along with the other marina facilities within San Diego Bay.
30213 Lower cost visitor and recreational facilities; encouragement and provision; overnight room rentals: Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred.	The project would provide lower-cost visitor and recreational facilities by providing continued access to the marina, providing for smaller and thus lower cost boat slips, developing a new public promenade, and enhancing the existing public viewing deck. The project does not involve overnight room rentals.
30214 Implementation of public access policies; legislative intent: a) The public access policies of this article shall be implemented in a manner that takes into account the need	The project would make improvements to the existing Harbor Island West Marina and comply with public access policies of the Coastal Act and Port Master Plan. The project

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to regulate the time, place, and manner of public access depending on the facts and circumstances in each case including, but not limited to, the following: 1) Topographic and geologic site characteristics. 2) The capacity of the site to sustain use and at what level of intensity. 3) The appropriateness of limiting public access to the right to pass and repass depending on such factors as the fragility of the natural resources in the area and the proximity of the access area to adjacent residential uses. 4) The need to provide for the management of access areas so as to protect the privacy of adjacent property owners and to protect the aesthetic values of the area by providing for the collection of litter. b) It is the intent of the Legislature that the public access policies of this article be carried out in a reasonable manner that considers the equities and that balances the rights of the individual property owner with the public's constitutional right of access pursuant to Section 4 of Article X of the California Constitution. Nothing in this section or any amendment thereto shall be construed as a limitation on the rights guaranteed to the public under Section 4 of Article X of the California Constitution. c) In carrying out the public access policies of this article, the commission and any other responsible public agency shall consider and encourage the utilization of innovative access management techniques, including, but not limited to, agreements with private organizations which would minimize management costs and encourage the use of volunteer programs.	would continue to be regulated consistent with the District’s Port Code and the Coastal Act.
30220 Protection of certain water-oriented activities: Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.	The project would protect water-oriented recreational activities by making improvements to the existing marina, thereby extending the useful life of one of the marinas within San Diego Bay.
30221 Oceanfront land; protection for recreational use and development: Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.	The project is for the redevelopment of a recreational use marina and therefore is consistent with this section.
30222 Private lands; priority of development purposes: The use of private lands suitable for visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation shall have priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry.	The project does not involve privately-owned lands; therefore, this section does not apply.

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30222.5 Oceanfront lands; aquaculture facilities; priority: Oceanfront land that is suitable for coastal dependent aquaculture shall be protected for that use, and proposals for aquaculture facilities located on those sites shall be given priority, except over other coastal dependent developments or uses.	The project site would not be suitable for aquaculture. The project is for the redevelopment of an existing coastal dependent marina. Therefore, the project is consistent with this section.
30223 Upland areas: Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.	The project site does not include development of any upland areas.
30224 Recreational boating use; encouragement; facilities: Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.	The project would encourage recreational boating use of coastal waters by making improvements to the existing marina, thereby extending the useful life of an existing marina facility within San Diego Bay. Although the project would not increase the size or capacity of the marina, it would increase the range of available boat slip sizes as well as improve accessibility and improve fire safety at the marina.
30230 Marine resources; maintenance: Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.	The project involves renovation of the existing marina. Impacts to eelgrass would occur with the project. However, the project would maintain and enhance marine resources through the implementation of appropriate mitigation, including the creation of eelgrass habitat on the site following the guidance in the California Eelgrass Mitigation Policy, as described in Section IV, *Biological Resources*. No dredging or fill would occur within the bay.
30231 Biological productivity; water quality: The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface waterflow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.	The project would not result in impacts related to water quality or biological productivity that would affect marine organisms or human health. Project impacts to marine biological resources would be less than significant with the implementation of appropriate mitigation. In addition, the project would comply with all required stormwater and water quality regulations and would not alter natural streams, as described in Section X, *Hydrology and Water Quality*.
30232 Oil and hazardous substance spills: Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.	The project would protect against the spillage of crude oil, gas, petroleum products, or hazardous substances by maintain a fueling station and sanitary pump station that meet all state requirements. Compliance with applicable laws regulating fuel and oils/lubricants in use on the boats and towing vehicles would further protect against the spillage of crude oil, gas, petroleum products, or hazardous substances, as described in Section IX, *Hazards and Hazardous Materials*.

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30233 Diking, filling or dredging; continued movement of sediment and nutrients: (a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following: (l) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities. (2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps. (3) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities. (4) Incidental public service purposes, including but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines. (5) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas. (6) Restoration purposes. (7) Nature study, aquaculture, or similar resource dependent activities. (b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for these purposes to appropriate beaches or into suitable longshore current systems. (c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the 19 coastal wetlands identified in its report entitled, “Acquisition Priorities for the Coastal Wetlands of California”, shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, if otherwise in accordance with this division. For the purposes of this section, “commercial fishing facilities in Bodega Bay” means that not less than 80 percent of all boating facilities proposed to be developed or improved, where the improvement would create additional berths in Bodega Bay, shall be designed and used for commercial fishing activities. (d) Erosion control and flood control facilities constructed on watercourses can impede the movement of sediment and nutrients that would otherwise be carried by storm runoff into coastal waters. To facilitate the continued	The project involves renovation of the existing marina that would reduce the size of the building. There are no other feasible or less environmentally damaging alternatives as development of a larger facility would likely result in increased impacts, and appropriate mitigation would be required to minimize adverse environmental impacts related to implementation of the project. The project would also include BMP’s, such as use of a silt curtain during in-water construction activities and mitigation measures such as implementation of soft-start pile driving techniques, to minimize disruption to marine and wildlife habitats and water circulation. The project does not involve dredging, including dredging within wetlands or estuaries or the construction of erosion or flood control facilities, as described in Section IV, *Biological Resources.*

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delivery of these sediments to the littoral zone, whenever feasible, the material removed from these facilities may be placed at appropriate points on the shoreline in accordance with other applicable provisions of this division, where feasible mitigation measures have been provided to minimize adverse environmental effects. Aspects that shall be considered before issuing a coastal development permit for these purposes are the method of placement, time of year of placement, and sensitivity of the placement area.	
30234 Commercial fishing and recreational boating facilities: Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.	The project would renovate the existing marina, thereby protecting and upgrading a facility that serves the recreational boating industry. The project would reduce the size of the facility to meet the anticipated future demand, but would not interfere with the needs of the commercial fishing industry.
30235 Construction altering natural shoreline: Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fishkills should be phased out or upgraded where feasible.	The project would not alter the natural shoreline.
30236 Water supply and flood control: Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (l) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the flood plain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.	The project does not involve channelization, dams, or alteration of rivers and streams; therefore, this section does not apply.
30240 Environmentally sensitive habitat areas; adjacent developments: (a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas. (b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.	The project involves renovation of the existing marina. Impacts to eelgrass would occur with the project. However, the project would protect against any significant disruption of habitat values through the implementation of appropriate mitigation, including the creation of eelgrass habitat on the site following the guidance in the California Eelgrass Mitigation Policy, as described in Section IV, *Biological Resources*.

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30241 Prime agricultural land; maintenance in agricultural production: The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas' agricultural economy, and conflicts shall be minimized between agricultural and urban land uses through all of the following: (a) By establishing stable boundaries separating urban and rural areas, including, where necessary, clearly defined buffer areas to minimize conflicts between agricultural and urban land uses. (b) By limiting conversions of agricultural lands around the periphery of urban areas to the lands where the viability of existing agricultural use is already severely limited by conflicts with urban uses or where the conversion of the lands would complete a logical and viable neighborhood and contribute to the establishment of a stable limit to urban development. (c) By permitting the conversion of agricultural land surrounded by urban uses where the conversion of the land would be consistent with Section 30250. (d) By developing available lands not suited for agriculture prior to the conversion of agricultural lands. (e) By assuring that public service and facility expansions and nonagricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality. (f) By assuring that all divisions of prime agricultural lands, except those conversions approved pursuant to subdivision (b), and all development adjacent to prime agricultural lands shall not diminish the productivity of such prime agricultural lands.	The project site is not located on agricultural land; therefore, this section does not apply.
30241.5 Agricultural land; determination of viability of uses; economic feasibility evaluation: (a) If the viability of existing agricultural uses is an issue pursuant to subdivision (b) of Section 30241 as to any local coastal program or amendment to any certified local coastal program submitted for review and approval under this division, the determination of "viability" shall include, but not be limited to, consideration of an economic feasibility evaluation containing at least both of the following elements: (1) An analysis of the gross revenue from the agricultural products grown in the area for the five years immediately preceding the date of the filing of a proposed local coastal program or an amendment to any local coastal program. (2) An analysis of the operational expenses, excluding the cost of land, associated with the production of the agricultural products grown in the area for the five years immediately preceding the date of the filing of a proposed local coastal program or an amendment to any local coastal program. For purposes of this subdivision, "area" means a geographic area of sufficient size to provide an accurate evaluation of the economic feasibility of agricultural uses for those lands included in the local coastal program or in the proposed amendment to a certified local coastal program.	The project site is not located on agricultural land; therefore, this section does not apply.

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(b) The economic feasibility evaluation required by subdivision (a) shall be submitted to the commission, by the local government, as part of its submittal of a local coastal program or an amendment to any local coastal program. If the local government determines that it does not have the staff with the necessary expertise to conduct the economic feasibility evaluation, the evaluation may be conducted under agreement with the local government by a consultant selected jointly by local government and the executive director of the commission.	
30242 Lands suitable for agricultural use; conversion: All other lands suitable for agricultural use shall not be converted to nonagricultural uses unless (l) continued or renewed agricultural use is not feasible, or (2) such conversion would preserve prime agricultural land or concentrate development consistent with Section 30250. Any such permitted conversion shall be compatible with continued agricultural use on surrounding lands.	The project site is not located on lands suitable for agricultural use; therefore, this section does not apply.
30243 Productivity of soils and timberlands; conversions: The long-term productivity of soils and timberlands shall be protected, and conversions of coastal commercial timberlands in units of commercial size to other uses or their division into units of noncommercial size shall be limited to providing for necessary timber processing and related facilities.	The project site is not located on agricultural land or timberlands; therefore, this section does not apply.
30244 Archaeological or paleontological resources: Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.	The project would not adversely impact archaeological or paleontological resources, as described in Sections V, *Cultural Resources*, and VII, *Geology and Soils*.
30250 Location; existing developed area: (a) New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. In addition, land divisions, other than leases for agricultural uses, outside existing developed areas shall be permitted only where 50 percent of the usable parcels in the area have been developed and the created parcels would be no smaller than the average size of surrounding parcels. (b) Where feasible, new hazardous industrial development shall be located away from existing developed areas. (c) Visitor-serving facilities that cannot feasibly be located in existing developed areas shall be located in existing isolated developments or at selected points of attraction for visitors.	The project involves renovation of the existing marina, a visitor-serving facility, in its current location. Adequate public services exist to support the project, as described in Section XV, *Public Services*. The project would not involve the development of new hazardous industrial uses.
30251 Scenic and visual qualities: The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural landforms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded	The project involves renovation of the existing marina. The project would protect the scenic and visual qualities of the site and surrounding area by ensuring that the renovations are consistent with the scale and character of the existing marina (about 1/3 smaller). In addition, the project would develop a new pedestrian promenade and enhance the existing public

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areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.	viewing deck. Finally, the project would not alter natural landforms and would be professional designed as a smaller facility that the existing facility, ensuring the project would not result in a negative site aesthetic.
30252 Maintenance and enhancement of public access: The location and amount of new development should maintain and enhance public access to the coast by (1) facilitating the provision or extension of transit service, (2) providing commercial facilities within or adjoining residential development or in other areas that will minimize the use of coastal access roads, (3) providing nonautomobile circulation within the development, (4) providing adequate parking facilities or providing substitute means of serving the development with public transportation, (5) assuring the potential for public transit for high intensity uses such as high-rise office buildings, and by (6) assuring that the recreational needs of new residents will not overload nearby coastal recreation areas by correlating the amount of development with local park acquisition and development plans with the provision of onsite recreational facilities to serve the new development.	The project would enhance public access by providing accessibility on the proposed docks for users with disabilities, providing a pedestrian promenade, and redeveloping the existing public viewing deck. Since the project does not involve an increase in size or capacity of the existing marina, the proposed parking would be sufficient to support the project.
30253 Minimization of adverse impacts: New development shall do all of the following: (a) Minimize risks to life and property in areas of high geologic, flood, and fire hazard. (b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. (c) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Board as to each particular development. (d) Minimize energy consumption and vehicle miles traveled. (e) Where appropriate, protect special communities and neighborhoods that, because of their unique characteristics, are popular visitor destination points for recreational uses.	The project involves redevelopment of an existing marina facility with the same or reduced capacity and would not be considered a new development. However, the project would not increase risks to life or property due to geologic, flood, or fire hazards because it would not increase the size or capacity of the existing marina, and the project would not be subject to sea level rise during its lifetime, as described in Sections VII, *Geology and Soils*, VIII, *Greenhouse Gas Emissions*, and X, *Hydrology and Water Quality*. The project would be designed to be structurally sound and would not require the construction of protective devices that would alter natural landforms along bluffs and cliffs. Furthermore, the project would not violate any air quality standards of the SDAPCD. The project would minimize energy consumption by installing energy-efficient LED lighting for safety and operational purposes. Finally, the project will enhance the existing Harbor Island Marina West project site, a popular commercial recreation destination.
30254 Public works facilities: New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division; provided, however, that it is the intent of the Legislature that State Highway Route 1 in rural areas of the coastal zone remain a scenic two-lane road. Special districts shall not be formed or expanded except where assessment for, and provision of, the service would not induce new	The project does not involve new or expanded public works facilities, such as public facilities for water, wastewater, electrical, telephone, or public transportation. Furthermore, the project site is not located near State Highway Route 1. Therefore, this section does not apply.

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development inconsistent with this division. Where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreation, and visitor-serving land uses shall not be precluded by other development.	
30254.5 Terms or conditions on sewage treatment plant development; prohibition: Notwithstanding any other provision of law, the commission may not impose any term or condition on the development of any sewage treatment plant which is applicable to any future development that the commission finds can be accommodated by that plant consistent with this division. Nothing in this section modifies the provisions and requirements of Sections 30254 and 30412.	The project does not involve the development of any sewage treatment plant; therefore, this section does not apply.
30255 Priority of coastal-dependent developments: Coastal-dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in this division, coastal-dependent developments shall not be sited in a wetland. When appropriate, coastal-related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support.	The project involves redevelopment of a coastal-dependent marina facility. The project would not be sited in a wetland.
30260 Location or expansion: Coastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with this division. However, where new or expanded coastal-dependent industrial facilities cannot feasibly be accommodated consistent with other policies of this division, they may nonetheless be permitted in accordance with this section and Sections 30261 and 30262 if (1) alternative locations are infeasible or more environmentally damaging; (2) to do otherwise would adversely affect the public welfare; and (3) adverse environmental effects are mitigated to the maximum extent feasible.	The project does not involve the development or expansion of coastal-dependent industrial facilities; therefore, this section does not apply.
30261 Tanker facilities; use and design: Multi-company use of existing and new tanker facilities shall be encouraged to the maximum extent feasible and legally permissible, except where to do so would result in increased tanker operations and associated onshore development incompatible with the land use and environmental goals for the area. New tanker terminals outside of existing terminal areas shall be situated as to avoid risk to environmentally sensitive areas and shall use a monobuoy system, unless an alternative type of system can be shown to be environmentally preferable for a specific site. Tanker facilities shall be designed to (1) minimize the total volume of oil spilled, (2) minimize the risk of collision from movement of other vessels, (3) have ready access to the most effective feasible containment and recovery equipment for oil spills, and (4) have onshore deballasting facilities to receive any fouled ballast water from tankers where operationally or legally required.	The project does not involve the use of existing or development of new tanker facilities; therefore, this section does not apply.

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30262 Oil and gas development: a) Oil and gas development shall be permitted in accordance with Section 30260, if the following conditions are met: (1) The development is performed safely and consistent with the geologic conditions of the well site. (2) New or expanded facilities related to that development are consolidated, to the maximum extent feasible and legally permissible, unless consolidation will have adverse environmental consequences and will not significantly reduce the number of producing wells, support facilities, or sites required to produce the reservoir economically and with minimal environmental impacts. (3) Environmentally safe and feasible subsea completions are used when drilling platforms or islands would substantially degrade coastal visual qualities unless use of those structures will result in substantially less environmental risks. (4) Platforms or islands will not be sited where a substantial hazard to vessel traffic might result from the facility or related operations, as determined in consultation with the United States Coast Guard and the Army Corps of Engineers. (5) The development will not cause or contribute to subsidence hazards unless it is determined that adequate measures will be undertaken to prevent damage from such subsidence. (6) With respect to new facilities, all oilfield brines are reinjected into oil-producing zones unless the Division of Oil and Gas, Geothermal Resources of the Department of Conservation determines to do so would adversely affect production of the reservoirs and unless injection into other subsurface zones will reduce environmental risks. Exceptions to reinjections will be granted consistent with the Ocean Waters Discharge Plan of the State Water Resources Control Board and where adequate provision is made for the elimination of petroleum odors and water quality problems. (7)(A) All oil produced offshore California shall be transported onshore by pipeline only. The pipelines used to transport this oil shall utilize the best achievable technology to ensure maximum protection of public health and safety and of the integrity and productivity of terrestrial and marine ecosystems. (B) Once oil produced offshore California is onshore, it shall be transported to processing and refining facilities by pipeline. (C) The following guidelines shall be used when applying subparagraphs (A) and (B): (i) “Best achievable technology,” means the technology that provides the greatest degree of protection taking into consideration both of the following: (I) Processes that are being developed, or could feasibly be developed, anywhere in the world, given overall reasonable expenditures on research and development. (II) Processes that are currently in use anywhere in the world. This clause is not intended to create any conflicting	The project does not involve the development of oil or gas; therefore, this section does not apply.

Applicable Plan, Policy, or Goal	Project Consistency
or duplicative regulation of pipelines, including those governing the transportation of oil produced from onshore reserves. (ii) "Oil" refers to crude oil before it is refined into products, including gasoline, bunker fuel, lubricants, and asphalt. Crude oil that is upgraded in quality through residue reduction or other means shall be transported as provided in subparagraphs (A) and (B). (iii) Subparagraphs (A) and (B) shall apply only to new or expanded oil extraction operations. "New extraction operations" means production of offshore oil from leases that did not exist or had never produced oil, as of January 1, 2003, or from platforms, drilling island, subsea completions, or onshore drilling sites, that did not exist as of January 1, 2003. "Expanded oil extraction" means an increase in the geographic extent of existing leases or units, including lease boundary adjustments, or an increase in the number of well heads, on or after January 1, 2003. (iv) For new or expanded oil extraction operations subject to clause (iii), if the crude oil is so highly viscous that pipelining is determined to be an infeasible mode of transportation, or where there is no feasible access to a pipeline, shipment of crude oil may be permitted over land by other modes of transportation, including trains or trucks, which meet all applicable rules and regulations, excluding any waterborne mode of transport. (8) If a state of emergency is declared by the Governor for an emergency that disrupts the transportation of oil by pipeline, oil may be transported by a waterborne vessel, if authorized by permit, in the same manner as required by emergency permits that are issued pursuant to Section 30624. (9) In addition to all other measures that will maximize the protection of marine habitat and environmental quality, when an offshore well is abandoned, the best achievable technology shall be used. b) Where appropriate, monitoring programs to record land surface and near-shore ocean floor movements shall be initiated in locations of new large-scale fluid extraction on land or near shore before operations begin and shall continue until surface conditions have stabilized. Costs of monitoring and mitigation programs shall be borne by liquid and gas extraction operators. c) Nothing in this section shall affect the activities of any state agency that is responsible for regulating the extraction, production, or transport of oil and gas.	
30263 Refineries or petrochemical facilities: (a) New or expanded refineries or petrochemical facilities not otherwise consistent with the provisions of this division shall be permitted if (1) alternative locations are not feasible or are more environmentally damaging; (2) adverse environmental effects are mitigated to the maximum extent feasible; (3) it is found that not permitting such development would adversely affect the public welfare; (4) the facility is not located in a highly scenic or	The project does not involve the development of new or expanded refineries or petrochemical facilities; therefore, this section does not apply.

Applicable Plan, Policy, or Goal	Project Consistency
seismically hazardous area, on any of the Channel Islands, or within or contiguous to environmentally sensitive areas; and (5) the facility is sited so as to provide a sufficient buffer area to minimize adverse impacts on surrounding property. (b) New or expanded refineries or petrochemical facilities shall minimize the need for once-through cooling by using air cooling to the maximum extent feasible and by using treated waste waters from in-plant processes where feasible.	
30264 Thermal electric generating plants: Notwithstanding any other provision of this division, except subdivisions (b) and (c) of Section 30413, new or expanded thermal electric generating plants may be constructed in the coastal zone if the proposed coastal site has been determined by the State Energy Resources Conservation and Development Commission to have greater relative merit pursuant to the provisions of Section 25516.1 than available alternative sites and related facilities for an applicant's service area which have been determined to be acceptable pursuant to the provisions of Section 25516.	The project does not involve the construction of new or expanded thermal electric generating plants; therefore, this section does not apply.
California Coastal Act – Chapter 8	
30703 Protection of commercial fishing harbor space: The California commercial fishing industry is important to the State of California; therefore, ports shall not eliminate or reduce existing commercial fishing harbor space, unless the demand for commercial fishing facilities no longer exists or adequate alternative space has been provided. Proposed recreational boating facilities within port areas shall, to the extent it is feasible to do so, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.	The project would not eliminate or reduce existing commercial fishing harbor space. The project would redevelop an existing marina with a smaller marina. The project would not interfere with the needs of the commercial fishing industry.
30705 Diking, filling or dredging water areas: (a) Water areas may be diked, filled, or dredged when consistent with a certified port master plan only for the following: (1) Such construction, deepening, widening, lengthening, or maintenance of ship channel approaches, ship channels, turning basins, berthing areas, and facilities as are required for the safety and the accommodation of commerce and vessels to be served by port facilities. (2) New or expanded facilities or waterfront land for port-related facilities. (3) New or expanded commercial fishing facilities or recreational boating facilities. (4) Incidental public service purposes, including, but not limited to, burying cables or pipes or inspection of piers and maintenance of existing intake and outfall lines. (5) Mineral extraction, including sand for restoring beaches, except in biologically sensitive areas. (6) Restoration purposes or creation of new habitat areas. (7) Nature study, mariculture, or similar resource-dependent activities. (8) Minor fill for improving shoreline appearance or public access to the water.	The project would redevelop an existing marina with a smaller marina. No dredging would be required within the bay, but the project would have in-water construction in the form of new docks and up to 155 new piles. The project uses are consistent with the certified PMP. The project is a coastal-dependent marina facility that provides public access and recreational opportunities and serves the recreational boating and commercial recreation industries. The project would also include BMP’s, such as use of a silt curtain during in-water construction activities and mitigation such as implementation of soft-start pile driving techniques, to minimize disruption to fish and bird habitats, eel grass, and water quality.

Applicable Plan, Policy, or Goal	Project Consistency
(b) The design and location of new or expanded facilities shall, to the extent practicable, take advantage of existing water depths, water circulation, siltation patterns, and means available to reduce controllable sedimentation so as to diminish the need for future dredging. (c) Dredging shall be planned, scheduled, and carried out to minimize disruption to fish and bird breeding and migrations, marine habitats, and water circulation. Bottom sediments or sediment elutriate shall be analyzed for toxicants prior to dredging or mining, and where water quality standards are met, dredge spoils may be deposited in open coastal water sites designated to minimize potential adverse impacts on marine organisms, or in confined coastal waters designated as fill sites by the master plan where such spoil can be isolated and contained, or in fill basins on upland sites. Dredge material shall not be transported from coastal waters into estuarine or fresh water areas for disposal. (d) For water areas to be diked, filled, or dredged, the commission shall balance and consider socioeconomic and environmental factors.	
30706 Fill: In addition to the other provisions of this chapter, the policies contained in this section shall govern filling seaward of the mean high tide line within the jurisdiction of ports: (a) The water area to be filled shall be the minimum necessary to achieve the purpose of the fill. (b) The nature, location, and extent of any fill, including the disposal of dredge spoils within an area designated for fill, shall minimize harmful effects to coastal resources, such as water quality, fish or wildlife resources, recreational resources, or sand transport systems, and shall minimize reductions of the volume, surface area, or circulation of water. (c) The fill is constructed in accordance with sound safety standards which will afford reasonable protection to persons and property against the hazards of unstable geologic or soil conditions or of flood or storm waters. (d) The fill is consistent with navigational safety.	The project does not involve filling seaward of the mean high tide line; therefore, this section does not apply.
30707 Tanker terminals: New or expanded tanker terminals shall be designed and constructed to do all of the following: (a) Minimize the total volume of oil spilled. (b) Minimize the risk of collision from movement of other vessels. (c) Have ready access to the most effective feasible oil spill containment and recovery equipment. (d) Have onshore deballasting facilities to receive any fouled ballast water from tankers where operationally or legally required.	The project does not involve the development of new or expanded tanker terminals; therefore, this section does not apply.
30708 Location, design and construction of port-related developments: All port-related developments shall be located, designed, and constructed so as to: (a) Minimize substantial adverse environmental impacts. (b) Minimize potential traffic conflicts between vessels.	The project involves renovation of the existing marina, a port-related development that supports recreational uses consistent with the public trust. The project would include appropriate mitigation to minimize adverse

Applicable Plan, Policy, or Goal	Project Consistency
(c) Give highest priority to the use of existing land space within harbors for port purposes, including, but not limited to, navigational facilities, shipping industries, and necessary support and access facilities. (d) Provide for other beneficial uses consistent with the public trust, including, but not limited to, recreation and wildlife habitat uses, to the extent feasible. (e) Encourage rail service to port areas and multi-company use of facilities.	environmental impacts related to implementation of the project. The project would also enhance pedestrian access by developing a public promenade and enhance firefighting capabilities by installing 30 standpipes. No increase in potential traffic conflicts between vessels would occur.

XII. Mineral Resources

Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?	☐	☐	☐	☒
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Environmental Setting

The proposed Project is not located in an area where mineral resources are known to exist and is also not in an area designated by the State of California or the PMP as a minerals resource zone.

Analysis of Environmental Impacts

a. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State?

No Impact. No commercial mining operations currently exist on the Project site or within the San Diego Bay. The site does not contain aggregate resources and is not located in a mineral resource zone that contains important resources, as designated by the California Department of Conservation Division of Mines and Geology. The City identifies the Project site as Mineral Resource Zone 1 (MRZ-1) which indicates that no known mineral deposits are present and the likelihood of their presence is low (City of San Diego 2008). In addition, there are no designated plans for mineral resource extraction nor has there been any important mineral resources identified by the PMP. As such, the proposed Project would not result in a loss of availability of a known mineral resource or locally-important mineral resource recovery sites. No impact would occur and no mitigation measures are required.

b. Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

No Impact. Refer to response XII.a above.

XIII. Noise

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐
b. Generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☒	☐
c. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☒	☐

Environmental Setting

Project-specific noise calculations were conducted (Appendix F), which were used, along with additional relevant information, in this section. The District has not adopted noise standards or thresholds. Therefore, as is customary for the District, this analysis relies on the City of San Diego noise standards to determine the proposed Project's potential noise impacts. To control transportation-related noise sources such as arterial roads, freeways, airports, and railroads, the City of San Diego has established noise compatibility guidelines in the General Plan Noise Element for all land use categories.

In addition, the City of San Diego Municipal Code Section 59.5.0404 states that it "shall be unlawful for any person, including the City of San Diego, to conduct any construction activity so as to cause, at or beyond the property lines of any property zoned residential, an average sound level (L_{eq}) greater than 75 decibels during the 12-hour period from 7:00 a.m. to 7:00 p.m." The City of San Diego does not identify any maximum noise criteria to control single-event noise level impacts, such as those associated with pile driving activities.

The City of San Diego Significance Determination Thresholds states: "Temporary construction noise which exceeds 75 dB (A) L_{eq} at a sensitive receptor would be considered significant. Construction noise levels measured at or beyond the property lines of any property zoned residential shall not exceed an average sound level greater than 75-decibles (dB) during the 12-hour period from 7:00 a.m. to 7:00 p.m.". The City's construction noise standard is applied to all sensitive receptors. According to the City's Land Use-Noise Compatibility Guidelines, noise sensitive land uses include residential uses, hospitals, nursing facilities, intermediate care facilities, child educational facilities, libraries, museums, places of worship, child care facilities, and certain types of passive recreational parks and open space.

The closest existing noise sensitive receivers in the vicinity of the HIWM include Harbor Island Park, located on the south side of Harbor Island Drive, approximately 400 feet southeast of the marina; Spanish Landing Park, located on the south side of North Harbor Drive, approximately 600 feet north the marina; and a residential community (military housing), located approximately 1,650 feet northwest of the marina. These receivers are shown in Figure 18 (Noise Sensitive Receptor Locations).

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Figure 18
Noise-Sensitive Receptor Locations
Harbor Island West Marina Redevelopment Project

In addition, there is one hotel, the Hilton Hotel, located 50 feet east of the Project site. While this hotel use is not zoned residential or specifically identified as a noise sensitive land use according to the definition provided by the City, hotels are considered by the District to be transient housing that is a noise-sensitive land use during only the evening and nighttime hours between 7 p.m. and 7 a.m. when guests would be sleeping. Since Project construction would be conducted only between 7 a.m. and 7 p.m. per City of San Diego Municipal Code Section 21.04, the Hilton Hotel is not a noise-sensitive land use with regards to temporary construction noise. Therefore, the analysis included in this Initial Study as it relates to hotels is for informational and discussion purposes only. Other land uses in the vicinity include restaurants near the marina; however, restaurants are not considered noise sensitive by the District.

The primary existing noise sources in the Project area are traffic on Harbor Island Drive, North Harbor Drive, and other roadways; civilian and military aircraft associated with SDIA and Naval Air Station North Island; and activities at the Project site and other neighboring marinas.

As shown in Figure 19 (Noise Monitoring Locations), short-term (ST) measurements were obtained at four locations in the study area. These locations were selected to document the existing noise environment adjacent to the Project site and at nearby noise-sensitive receptors. The noise level measurements are summarized in Table 19. Each measurement was conducted over a period of approximately 15 to 20 minutes.

Table 19. Short Term Noise Level Measurements

Receiver Identifier	Start Time	Duration (Minutes)	Location Description[1]	Noise Level (dBA)		
				L_{eq}	L_{max}	L_{min}
ST-1	1:38 p.m.	16	1895 Tattnal Way. Community park at The Village on the NTC (Lincoln Military Housing). Picnic/barbeque area near center of park.	59.2	71.0	45.7
ST-2	12:24 p.m.	19	4300 North Harbor Drive. Spanish Landing Park West. Picnic area on south side of park.	63.4	75.9	53.4
ST-3	11:35 a.m.	17	1960 Harbor Island Drive. Hilton Hotel. Adjacent to outdoor pool/spa area.	56.7	69.4	48.2
ST-4	11:01 a.m.	20	3299 Tidelands Avenue. Harbor Island Park. Seating area near west end of park.	60.9	72.8	53.2

Source: Appendix F

[1] See Figure 19 for a map of the noise measurement locations and Appendix F for measurement location photos.

dBA = A-weighted decibel scale, which is weighted to approximate the frequency response of human hearing.

L_{eq} = equivalent sound level, the average noise level during the measurement period

L_{max} = The maximum noise level during the measurement period

L_{min} = The minimum noise level during the measurement period

Source: ESRI USA Imagery (2017)

Legend

- ⊕ Noise Monitoring Locations

Harbor Island West Marina Redevelopment Project

- 🟨 Phase I
- 🟥 Phase II

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Figure 19
Noise Monitoring Locations
Harbor Island West Marina Redevelopment Project

Analysis of Environmental Impacts

a. Would the project result in generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

Less Than Significant Impact. Project construction would take place in two phases, each consisting of a number of overlapping tasks. Phase I would include all waterside work (i.e., the demolition of the existing dock system and the installation the new dock system) and some landside work (demolition and construction) at the west portion of the Project site. Phase II construction would consist of the remaining landside work (demolition and construction) at the east portion of the Project site as well as final landscaping of the entire property. Given the construction schedule for the proposed Project, noise analyses were conducted for each of the two phases using the periods that would have the highest noise levels because of overlapping tasks. Project construction would be conducted between the hours of 7 a.m. and 7 p.m. Monday through Friday.

Two types of short-term noise could occur during construction of the proposed Project, noise associated with construction traffic and noise associated with onsite construction equipment. Construction traffic noise is associated with construction workers who would commute to and from the site, and trucks that would transport equipment and materials on access roads. Onsite construction equipment noise is typically associated with demolition of the existing facilities (e.g., docks, parking lots, and buildings) and construction of the new facilities (e.g., dock system, parking lots, and buildings).

As identified in the Section XVII, *Transportation*, construction-related traffic activity attributed to material delivery and haul truck use is anticipated to generate up to 10 truck trips per day during peak construction periods. In addition, construction worker commute trips are anticipated to generate up to 111 trips per day. At a reference distance of 50 feet from the centerline of Harbor Island Drive, these vehicles would generate an average hourly noise level of approximately 49 dBA L_{eq} and a daily noise level of approximately 41 dB Community Noise Equivalent Level (CNEL) (Refer to Appendix F). This daily noise level is well below 65 dB CNEL, which is a compatibility guideline for sensitive land uses that is widely used by California municipalities, including within the Noise Element of the City of San Diego General Plan (City of San Diego 2008).

Onsite construction noise was analyzed using data and methodologies from FHWA's Roadway Construction Noise Model (RCNM), which predicts average noise levels (L_{eq}) at nearby receptors by analyzing the type of equipment, usage factor, the distance from source to receptor, and the presence, or absence, of intervening shielding between source and receptor. As noted previously, the analyses focused on the worst-case (loudest) construction periods when the maximum number of equipment items would operate simultaneously due to overlapping construction tasks. For the pile driving activity included in Phase I construction, pile jetting would be utilized for 80 to 90 percent of the time and an impact pile hammer would be used for the remaining 10 to 20 percent of the time. To provide a conservative estimate, an 80/20 split (80 percent jetting, 20 percent impact hammer) was assumed in the analysis. Calculations of the Project construction equipment noise levels were completed, as detailed in Appendix F. The average construction traffic noise level of 49 dBA (described above) was also added to the results for each receiver. This is a conservative approach because most receptors will either not be exposed to all of the construction traffic noise (because vehicles will be split among different alternative routes) or the portion of the receptor most exposed to traffic noise will not be the same as the portion that is most exposed to noise from onsite construction activity. The combined construction noise levels are summarized in Table 20. As identified in Table 20, the predicted construction noise levels do not exceed the City of San Diego's 75 dBA L_{eq} 12-hour construction noise level limit at the identified noise sensitive receptors.

Table 20. Estimated Construction Noise Levels

Location Description	Phase I Construction Noise Levels (12-Hour L_{eq}, dBA)[1]	Phase II Construction Noise Levels (12-Hour L_{eq}, dBA)	Construction Noise Limit (12-Hour L_{eq}, dBA)[2]	Exceeds Threshold?
The Village on the Naval Training Center (Lincoln Military Housing)	59.2	52.8	75	No
Spanish Landing Park West	66.6	58.4	75	No
Hilton Hotel[3]	85.7	78.0	N/A	No
Harbor Island Park	69.7	63.6	75	No

Source: Appendix F

[1] Phase I construction includes pile driving activities as part of the waterside improvements. Noise levels presented in this table represent worst case scenario (i.e., pile driving closest to the receptor).

[2] Construction Noise Limit is a 12-hour Average Noise Level (12-hour L_{eq}) per City of San Diego Municipal Code 59.5.0404 (Noise Ordinance) requirements for temporary construction noise.

[3] The District considers the Hilton Hotel as a sensitive receptor only during nighttime hours. Project construction would not occur during nighttime hours. Data for the Hilton Hotel has been included for informational purposes only.

dBA = A-weighted decibel scale, which is weighted to approximate the frequency response of human hearing.

L_{eq} = equivalent sound level, the average noise level over a given period of time

All estimated construction noise levels include the contribution of construction traffic on nearby streets; this contribution is conservatively estimated as 49 dBA for each receiver.

Noise generated by construction activity was also compared against ambient noise levels at the identified sensitive receptors in order to evaluate potential temporary noise increases. As noted above, construction would generate up to 10 truck trips and 111 commuter trips per day. These vehicles would travel from the HIWM construction site on Harbor Island Drive and North Harbor Drive before continuing to I-5 or dispersing onto other roadways. Existing average daily traffic (ADTs) on Harbor Island Drive and North Harbor Drive range from 5,222 to nearly 50,000. Adding 10 heavy truck trips and 111 automobile trips per day would increase overall noise levels by 0.2 dB CNEL or less. Such a small increase would be imperceptible.

Predicted onsite construction noise levels (see Table 20) were compared with ambient noise levels (see Table 19) in order to calculate the anticipated temporary noise increases due to onsite construction equipment. Table 21 summarizes the results of this analysis.

As shown in Table 21, the identified receptors would experience a temporary increase in ambient noise levels during construction of the proposed Project. An increase of 3 dBA is considered to be barely perceptible, an increase of 5 dBA is considered readily perceptible, and an increase of 10 dBA is generally perceived as a doubling of loudness. The Lincoln Military Housing on NTC would experience a temporary 3.0 dBA increase over existing ambient noise levels during Phase I of construction and a 0.9 dBA increase during Phase II of construction. The Spanish Landing Park West would experience a 4.9 dBA increase from during Phase I of construction and a 1.2 dBA increase during Phase II of construction. The Harbor Island Park would experience a 9.3 dBA increase during Phase I of construction and a 4.6 dBA increase during Phase II of construction. However, noise at each of the sensitive receptors would be below the applicable construction standard. The worst-case noise increases would be limited to the noisiest (i.e., closest) periods of Phase I construction only and would cease as soon as pile driving activities stop.

Table 21. Estimated Temporary Noise Increases Due to Project Construction

Location Description	Existing Ambient Noise Level (dBA, L_{eq})	Phase I Construction Noise Levels			Phase II Construction Noise Levels		
		Project[1] (dBA L_{eq})	Project + Ambient (dBA L_{eq})	Change (dBA)[2]	Project (dBA L_{eq})	Project + Ambient (dBA L_{eq})	Change (dBA)[2]
The Village on the Naval Training Center (Lincoln Military Housing)	59.2	59.2	62.2	3.0	52.8	60.1	0.9
Spanish Landing Park West	63.4	66.6	68.3	4.9	58.4	64.6	1.2
Hilton Hotel[3]	56.7	85.7	85.7	29.0	78.0	78.0	21.3
Harbor Island Park	60.9	69.7	70.2	9.3	63.6	65.5	4.6

Source: Appendix F

[1] Phase I construction includes pile driving activities as part of the waterside improvements. Noise levels presented in this table represent worst case scenario (e.g., pile driving closest to the receptor).

[2] This is the change between existing ambient noise levels and project + ambient noise levels.

[3] The District considers the Hilton Hotel as a sensitive receptor only during nighttime hours. Project construction would not occur during nighttime hours. Data for the Hilton Hotel has been included for informational purposes only.

dBA = A-weighted decibel scale, which is weighted to approximate the frequency response of human hearing.

L_{eq} = equivalent sound level, the average noise level over a given period of time

Due to the proximity of the Hilton Hotel, project construction activities could generate temporary noise increases in the range of 20 to 30 dBA at locations facing the project site. While this level of noise would temporarily dominate the noise environment and could cause a short-term nuisance at the hotel, it would not occur during the nighttime hours when the District considers hotels to be sensitive. In addition, the worst-case noise increases would only occur when construction is closest to the hotel. Levels would decrease rapidly with distance from the hotel (at a rate of approximately 6 dB for every doubling of distance) as construction moves to other portions of the project site. As a result, there would be no significant construction noise impact at the hotel.

In summary, noise from temporary construction activities, including construction-related traffic, would not exceed local noise. There would be no substantial temporary noise increases at nearby noise-sensitive land uses and no construction activity would increase ambient noise levels above the City of San Diego's construction noise standard of 75 dBA 12-hour Leq. Therefore, temporary noise impacts would be less than significant. No mitigation measures are required.

Noise associated with operation of the existing HIWM includes engine noise from haul vehicles and boats, as well as noise from loading and unloading activities. The proposed Project would replace existing facilities with similar facilities, but on a smaller scale, and would retain the existing function of the marina. General operations of the HIWM would not change with implementation of the proposed Project. However, because the proposed Project would slightly reduce the number of boat slips and the main users of the landside marina facilities are from the marina it is expected that sources of noise (vessels, cars) would be the same or less than the existing condition. As such, operation of the proposed Project after construction is anticipated to generate the same or less ambient noise than the existing development and would not cause a substantial increase in noise levels. Consequently, no noise impacts associated with Project operation are anticipated and no mitigation measures are required.

b. Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Less Than Significant Impact. Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment. The effects of ground-borne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Human perception of vibration occurs at much lower levels than would be associated with potential building damage. People are generally less sensitive to groundborne vibration when they are outside or engaged in physical activity. Typically, groundborne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal, and is measured in inches per second (in/s). PPV can be used to assess potential vibration impacts to both buildings and people.

The California Department of Transportation (Caltrans) provides widely referenced vibration guidelines in its publication *Transportation and Construction-Induced Vibration Guidance Manual* (Caltrans 2013). The manual defines two different types of potential vibration impact: (1) building damage potential and (2) annoyance potential, as summarized in Tables 22 and 23, below.

Table 22. Caltrans Vibration Building Damage Potential Threshold Criteria

Structure and Condition	Maximum PPV (in/s) Transient Sources	Maximum PPV (in/s) Continuous/Frequent Intermittent Sources
Extremely fragile historic buildings, ruins, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5

Source: Caltrans 2013

Transient sources create a single isolated vibration event, such as blasting or drop balls.

Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV= peak particle velocity; the maximum instantaneous positive or negative peak amplitude of the vibration velocity, measured in inches per second.

Table 23. Caltrans Vibration Annoyance Potential Criteria

Human Response	Maximum PPV (in/s) Transient Sources	Maximum PPV (in/s) Continuous/Frequent Intermittent Sources
Barely perceptible	0.04	0.01
Distinctly perceptible	0.25	0.04
Strongly perceptible	0.90	0.10
Severe	2.00	0.40

Source: Caltrans 2013

Transient sources create a single isolated vibration event, such as blasting or drop balls.

Continuous/frequent intermittent sources include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment.

PPV= peak particle velocity; the maximum instantaneous positive or negative peak amplitude of the vibration velocity, measured in inches per second.

The primary source of groundborne vibration occurring as part of the proposed Project would be associated with construction activity, particularly the use of heavy machinery and pile driving equipment. Based on data published by Caltrans, typical construction equipment (with exception of crack-and-seat operations and pile driving equipment) generate between 0.003 and 0.24 in/s PPV at 25 feet, and typical impact pile driving equipment produces 0.65 in/s PPV at 25 feet. Vibration levels from construction equipment attenuate as they radiate from the source.

For the consideration of potential human annoyance, vibration effects are typically only considered inside occupied buildings and not at outside areas such as residential yards or open space. As such, the District does not consider parks to be vibration sensitive. In addition, the District considers hotels to be vibration sensitive only during the evening and nighttime hours of 7 p.m. to 7 a.m. Because there would be no construction during these evening and nighttime hours, nearby hotels are not considered sensitive with regard to human annoyance for this analysis. Human response estimates for these land uses are provided for informational purposes only. The closest occupied vibration-sensitive land uses are the homes at The Village on the Naval Training Center.

For the purposes of assessing potential building damage, it is also appropriate to consider the vibration levels at the closest buildings to the Project site. The two closest buildings to the Project site are the Hilton Hotel to the east and the Tom Ham's Lighthouse restaurant to the west. Table 24 summarizes the estimated vibration levels at each of the closest receptors to the Project site.

Table 24. Project Construction Vibration Levels at Nearby Receptors

Location Description	Distance from construction source (Feet) [1]		Vibration PPV Level (in/sec) at Receptor Location		PPV Threshold for Potential Building Damage (in/sec) [2]	Exceeds Potential Damage Threshold?	Human Response
	Waterside Sources	Landside Sources[2]	Waterside Sources	Landside Sources			
The Village on the Naval Training Center (Lincoln Military Housing)	1,650	2,000	0.006	0.001	0.5	No	Below barely perceptible
Spanish Landing Park West	600	1,000	0.020	0.002	N/A[3]	No	Barely perceptible[4]
Hilton Hotel	50	25	0.303	0.089	0.5	No	Strongly perceptible[4]
Harbor Island Park	400	400	0.031	0.004	N/A[3]	No	Barely perceptible[4]
Tom Ham's Lighthouse Restaurant	300	270	0.042	0.006	0.5	No	Below barely perceptible[4]

Source: Appendix F

[1] All sources associated with project construction are continuous/frequent intermittent sources. Waterside construction includes pile driving activities. Landside construction sources include excavators, backhoes, rollers, compactors, and graders.

[2] Building vibration thresholds are dependent on the type of building as identified in Table 22 of this Initial Study.

[3] There are no buildings associated with this location, therefore the building vibration threshold does not apply.

[4] Human response reported for informational purposes only. The District does not consider these land uses (restaurant, hotel during daytime hours, and parks) to be sensitive receptors with regard to human annoyance from groundborne vibration. Project construction would not occur during nighttime hours.

PPV= peak particle velocity; the maximum instantaneous positive or negative peak amplitude of the vibration velocity, measured in inches per second.

As summarized in Table 24, construction activities associated with the proposed Project would not result in an exceedance of potential building damage vibration thresholds and would not result in building damage as a result of groundborne vibration. With the exception of one location (e.g., Hilton Hotel), groundborne vibration caused by construction activities associated with the proposed Project would be barely perceptible for visitors and workers in the area. Due to the proximity of the Hilton Hotel, limited pile driving activities associated with the waterside improvements could generate an estimated 0.303 PPV which would be above the “strongly perceptible” threshold of 0.10 PPV. While this level of vibration could cause a short-term nuisance at the hotel, it would not occur during the nighttime hours when the District considers hotels to be sensitive. In addition, the worst case vibration would only occur when pile driving is closest to the hotel and levels would drop below the “strongly perceptible” threshold at a distance of approximately 140 feet, and below the “distinctly perceptible” threshold at a distance of approximately 320 feet. Therefore, groundborne vibration generated by construction activities would be below applicable criteria for annoyance or building damage. Impacts would be less than significant and no mitigation measures would be required.

Mechanical equipment installed as a result of implementation of the proposed Project would produce some localized vibration that may be perceptible at nearby locations within the same building. However, there would be no major sources of vibration that would generate perceptible vibration at offsite locations. As such, vibration impacts associated with operation of the proposed Project would be less than significant and no mitigation measures are required.

e. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

Less Than Significant Impact. The nearest private use airport to Project site is NAS North Island, which is located approximately 0.9 mile southeast of the Project site. The Project site is located within the noise contours for NAS North Island, as identified by the Air Installation Compatible Use Zones (AICUZ) Study Update for NAS North Island and Naval Outlying Landing Field Imperial Beach (Onyx Group 2011). As identified in Figure 4-8 (Prospective Noise Contours) of the AICUZ Study Update, the Project site is located at the outer edge of the Prospective Noise Contours, with an estimated noise exposure of approximately 62 to 63 dB CNEL from NAS North Island.

The Project site is located within 2 miles of one major public air facility, SDIA. Airport Influence Area (AIA) boundaries around SDIA have been adopted by San Diego County Regional Airport Authority in the ALUCP for SDIA (Airport Land Use Commission, San Diego County Regional Airport Authority 2014). The Project site is located within the AIA. As identified in Exhibit 2-1 (Noise Contour Map) of the ALUCP, the Project site is located at the outer edge of the Forecast Noise Exposure areas, with an estimated noise exposure of approximately 60 to 62 dB CNEL from SDIA.

Adding together the worst-case noise levels (i.e., the noise levels at the high end of each estimated range) for NAS North Island and SDIA results in a total noise exposure of 66 dB CNEL. This is below the applicable noise compatibility standards of 75 dB CNEL for marina uses and 70 dB CNEL for the office, retail, and service land uses that are proposed at the Project site. Therefore, the construction and operation of the proposed Project would not expose people residing or working within the Project site to excessive airport noise levels. Impacts associated with this issue would be less than significant and no mitigation measures are required.

XIV. Population and Housing

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☒	☐
b. Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Environmental Setting

HIWM is located in the City of San Diego within District jurisdiction. No residential uses exist within District jurisdiction, including on the Project site. The nearest residential uses to the Project site are located approximately 0.5 mile to the northwest and across the bay, in the community of Point Loma.

Analysis of Environmental Impacts

a. Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Less Than Significant Impact. Typically, the growth-inducing potential of a project would be considered significant if it fosters growth or a concentration of population in excess of what is assumed in pertinent land use plans. Significant growth impacts could also occur if the proposed Project provides infrastructure or service capacity to accommodate growth beyond the levels currently permitted by local or regional plans and policies. The proposed Project involves the repair, maintenance, and replacement of several elements comprising of the HIWM. Construction of the proposed Project would create approximately 51 short-term construction jobs during the proposed Project's 2-year construction period. It is anticipated that the demand for these short-term construction jobs would be met by the local work force and would not result in substantial population growth.

Operation of the proposed Project would not result in an increase in the local population as there would be a reduction in total building area and number of boat slips compared to existing conditions. Therefore, no growth inducement during operation of the proposed Project would occur. Finally, infrastructure, including roads, sewers, water, and electricity already exist in and around the Project site. No extension or expansion of HIWM infrastructure or capacity is proposed that would indirectly induce population growth. The proposed Project would not result in substantial population growth in the area, either directly or indirectly. Impacts would be less than significant and no mitigation measures would be required.

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

No Impact. There are no residential uses associated with the site or its surroundings. Therefore, construction of the proposed Project would not directly or indirectly cause the displacement of housing or people. No impacts associated with housing would occur and no mitigation measures are required.

XV. Public Services

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Fire protection?	☐	☐	☒	☐
b. Police protection?	☐	☐	☒	☐
c. Schools?	☐	☐	☐	☒
d. Parks?	☐	☐	☒	☐
e. Other public facilities?	☐	☐	☐	☒

Environmental Setting

The City of San Diego's Fire-Rescue Department (SDFRD) provides emergency and nonemergency fire, medical, and lifeguard services within the Project vicinity. In addition, the San Diego Harbor Police Department provides marine firefighting services. The closest fire station to the Project site is Fire Station 3 located at 725 West Kalmia Street, approximately 2.40 miles east of the Project site. Law enforcement in the Project vicinity is provided by the San Diego Harbor Police Department and the City of San Diego Police Department (SDPD). The San Diego Harbor Police Dock is the closest police facility to the Project site. Located at 3380 N Harbor Drive, it is approximately 0.95 mile northeast of the Project site.

The Project site is located within the San Diego Unified School District (SDUSD). The closest school to the Project site is the Baypoint Preschool, which is located 0.50 mile northwest of HIWM. The closest grade schools to the Project site are the Loma Portal Elementary School and Cabrillo Elementary School, which are located 1.10 miles northwest and west of HIWM, respectively. As identified in the Recreation section, recreational facilities in the vicinity of the Project site include Harbor Island Park, located across Harbor Island Drive, approximately 0.25 mile to the southeast. Nearby recreational facilities that are across the bay include Spanish Landing Park, located 0.4 mile to the north; NTC Park, located 0.6 mile to the north; and Shoreline Park, located 0.9 mile southwest of the Project site. The closest library is the Point Loma/Hervey Branch Public Library, located at 3701 Voltaire Street, approximately 1.40 miles northwest of the Project site. The nearest hospital is Paradise Valley Hospital, located approximately 2.60 miles southeast of the Project site.

Analysis of Environmental Impacts

Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:

a. Fire protection?

Less Than Significant Impact. The proposed Project includes the repair, maintenance, and replacement of several elements comprising of the HIWM. An increase in the operational capacity of the HIWM would not occur. Furthermore, the proposed Project does not include a residential component or a significant new job source; thus, it would not contribute to a direct increase in population. It is anticipated that the proposed Project would use construction workers from the local labor force. Therefore, the proposed Project would not generate a significant demand for increased fire protection. Therefore, the proposed Project would not result in significant environmental impacts associated with construction of new or physically altered governmental facilities in order to maintain acceptable service ratios, response times, or other performance objectives for fire protection. Impacts would be less than significant and no mitigation measures would be required.

b. Police protection?

Less Than Significant Impact. The proposed Project would redevelop the existing HIWM, including both waterside and landside infrastructure. Police protection services are already provided to the Project site. During construction, it is possible that police protection may be required, but any need would represent a short-term demand and would not require permanent increases in police protection services or affect response times in a manner that would require new or physically altered police protection facilities. Because of the low probability and short-term nature of potential police protection needs during construction, the proposed Project would result in less than significant impacts on police protection services.

The proposed Project's operation would not directly or indirectly expand existing operations or increase the number or size of buildings on site. Moreover, no one would reside on the Project site. Operations under the proposed Project would be similar to operations under existing conditions in terms of the need for police protection services. Therefore, the proposed Project would not result in increased demand that would require new or physically altered police protection facilities; impacts would be less than significant.

c. Schools?

No Impact. Schools within the Project vicinity include Loma Portal Elementary School and Cabrillo Elementary School, located 1.1 miles northwest and west of the site, respectively. In addition, the Baypoint Preschool is located 0.50 mile to the northwest. No school facilities are located within or immediately adjacent to the Project site that would be physically impacted. As discussed in response XIV (a), the proposed Project would not increase population. Jobs generated during construction and operation of the proposed Project would be drawn from the local workforce already served under existing school capacities. Therefore, the proposed Project would not increase demand for new schools. No impacts associated with this issue are anticipated to occur and no mitigation measures would be required.

d. Parks?

Less Than Significant Impact. Harbor Island Park is located across from the Project site and offers a view of bay activities, a shoreline path for pedestrians, a route for bikers, and restrooms. The next closest park is Spanish Landing Park, located 0.2 mile north of the Project site at 4300 North Harbor Drive. This park offers bike parking, bike paths, picnic tables, play equipment, public art, restrooms, a sand beach, and telephones.

The proposed Project would not result in adverse impacts on parks, specifically Harbor Island Park or Spanish Landing Park. Physical impacts on parks are usually associated with in-migration and population growth, which increase the demand for and use of parks. The proposed Project would have no effect on population growth as the proposed Project would not result in additional employees at the HIWM and in surrounding areas. Although construction workers would be present during construction, representing an increase in the typical number of people at the Project site, they would not be expected to use existing neighborhood or regional parks, or any other park facilities, to a degree that would constitute the need for new or altered park facilities. Therefore, construction and operation of the proposed Project would not result in increased demand that would require new or physically altered park facilities. Impacts would be less than significant and no mitigation measures would be required.

e. Other public facilities?

No Impact. No other public facilities (libraries, community centers, etc.) are located within or immediately adjacent to the Project site that would be physically impacted. As discussed in response XIV (a), the proposed Project would not increase population. Jobs generated during construction and operation of the proposed Project would be drawn from the local workforce already served by existing public facilities. Therefore, the proposed Project would not increase demand for new public facilities of this type. No impact associated with this issue would occur and no mitigation measures are required.

XVI. Recreation

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☒	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☒	☐	☐

Environmental Setting

Recreational facilities in the vicinity of the Project site include Harbor Island Park, located across Harbor Island Drive, approximately 0.25 mile southeast of the Project site. Other nearby recreational facilities include Spanish Landing Park, located 0.4 mile north of the Project site and across the Harbor Island West Basin; NTC Park, located 0.6 mile north of the Project site and across the Harbor Island West Basin; and Shoreline Park, located 0.9 mile southwest of the Project site.

Other public recreational facilities in the vicinity of the Project site include an existing approximately 1.4 mile public promenade that runs the length of the southern side of the entire Harbor Island peninsula. There are also sections of a public promenade on the north side of the peninsula; however, the connections are incomplete and require one to leave the promenade in places and reconnect further down the path.

Analysis of Environmental Impacts

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

Less Than Significant Impact. An increase in the use of existing parks and recreational facilities typically results from an increase in the number of housing units or residents in an area. The proposed Project would not result in an increase in local housing. During construction of the proposed Project approximately 51 construction workers would be employed, and up to 35 employees during Project operations. It is anticipated that the demand for 51 short-term construction jobs would be met by the local work force. Therefore, the temporary construction jobs are not anticipated to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

During the proposed Project's approximately 2 year construction period, the HIWM would remain operational and open to the public. Other public recreational facilities located outside of the Project construction area, such as restrooms and parking areas, would remain open and available for use during the Project construction period. As identified in Section 2, *Project Description*, a phased construction schedule is proposed to allow the HIWM to remain open to the public and businesses as well as to avoid displacing boaters from the marina during construction. It is anticipated that the existing docks would be demolished and rebuilt one dock at a time so that there is enough vacancy within the marina to accommodate marina users during construction. Therefore, it is anticipated that there would not be a temporary increase in use of other marina facilities in the area. Therefore, use of existing neighborhood, regional parks, or other recreational facilities would not increase as a result of Project construction such that substantial physical deterioration of these facilities would occur or be accelerated.

During the construction period, it is estimated that impact-type pile driving could occur intermittently during the Phase 1 Construction of dock and boat slips. Although recreationists who would normally use Harbor Island Shelter Island may use other parks outside of the noise impact area instead during this period, including park areas located along Harbor Drive that offer similar public recreational activities, it is not anticipated that this would result in substantial physical deterioration of other parks in the area. Thus, construction of the proposed Project would not increase the use of existing parks or recreational facilities such that substantial physical deterioration would occur or be accelerated.

Finally, the proposed Project would not involve the construction of housing or other amenities that would increase population. Also, no expansion or increase in the operational capacity of the HIWM is proposed. As such, there would be no increase in the use of neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated due to population increases associated with operation of the proposed Project. Impacts would be less than significant and no mitigation measures would be required.

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

Less Than Significant Impact with Mitigation Incorporated. The existing HIWM itself is a recreational facility. The proposed Project would include elements that would improve the recreational features of the facility for the use of the public. The proposed Project would improve the existing facility; however, no expansion of use of the existing marina facility is anticipated. While there are elements of the redevelopment of the HIWM that would encourage recreational uses (e.g., providing an upgraded public promenade and public viewing deck) in the area, the redevelopment and operation of the proposed Project would not necessitate an expansion of off-site recreational facilities. Physical effects from construction and operation of the proposed Project are discussed in this Initial Study. As discussed elsewhere in this Initial Study, impacts from the proposed Project would be less than significant with the exception of biological resources, geology and soils, hazards and hazardous materials, and hydrology and water quality. Mitigation measures have been identified for biological resources, geology and soils, hazards and hazardous materials, and hydrology and water quality, which would reduce Project related impacts to a less than significant level.

XVII. Transportation

Would the project:	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	☐	☐	☒	☐
b. Conflict or be inconsistent with CEQA Guidelines section 15064.3 subdivision (b)?	☐	☐	☒	☐
c. Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
d. Result in inadequate emergency access?	☐	☐	☐	☒
e. Would the project result in inadequate parking capacity?	☐	☐	☒	☐

Environmental Setting

Information about the environmental setting for transportation, traffic, and parking is summarized from the *Harbor Island West Marina Redevelopment Project – Technical Memorandum* prepared by Chen Ryan Associates in December 2018 (Appendix G).

The District has not adopted transportation/traffic standards or thresholds. Therefore, this analysis relies on the City of San Diego Traffic Impact Study Manual thresholds to determine the proposed Project's potential transportation/traffic impacts, as shown in Table 25 below.

Table 25. City of San Diego Traffic Impact Study Manual Significance Thresholds

	Allowable Change Due to Project Impact					
	Freeways		Roadway Segments		Intersections	Ramp Metering
Level of Service with Project[1]	V/C	Speed (mph)	V/C	Speed (mph)	Delay (seconds)	Delay (minutes)
E (or ramp meter delays above 15 minutes)	0.010	1.0	0.02	1.0	2.0	2.0
F (or ramp meter delays above 15 minutes)	0.005	0.5	0.01	0.5	1.0	1.0

Source: City of San Diego 2016a

[1] All LOS measurements are based upon Highway Capacity Manual procedures for peak hour conditions. However, V/C ratios for roadway segments are estimated on an ADT24-hour traffic volume basis (using Table 2 of the City's Traffic Impact Study Manual). The acceptable LOS for freeways, roadways, and intersections are generally D (C for undeveloped locations). For metered freeway ramps, LOS does not apply. However, ramp meter delays above 15 minutes are considered excessive

LOS = Level of service
ADT = Average daily traffic
V/C = Volume to capacity ratio
MPH = Mile per hour

The City of San Diego *Traffic Impact Study Manual* requires that the defined study area include all freeway segments, roadway segments, and intersections where the proposed Project would add 50 or more peak hour trips in either direction. Based on the estimated construction trip generation for the proposed Project, four roadway segments and three intersections were included in the traffic study area. In accordance with the City of San Diego *Traffic Impact Study Manual*, the proposed Project is not anticipated to add 50 or more peak hour trips to any metered freeway ramps or segments; therefore, no metered ramps or freeway segments were analyzed. Table 26 provides the existing traffic volumes for study area roadway segments. Based on existing traffic volumes, the segment of North Harbor Drive between Harbor Island Drive and Winship Lane is currently operating at an unsatisfactory level of service (LOS), while Harbor Island Drive, the access road to the proposed Project, is operating at LOS A or B.

Table 26. Existing Average Daily Traffic Volumes at Study Area Roadway Segments

Roadway Segment	Buildout Capacity (LOS E)[1]	ADT	V/C	LOS
North Harbor Drive				
SDIA Terminal 2/Spanish Landing to Harbor Island Drive	50,000	28,826	0.577	C
Harbor Island Drive to Winship Lane	50,000	49,987	1.000	E
Harbor Island Drive				
North Harbor Drive to Harbor Island Drive Southern Terminus	40,000	10,862	0.272	A
Western Terminus to Harbor Island Drive	15,000	5,222	0.348	B

Source: Appendix G
[1] Capacities based on City of San Diego’s Roadway Classification and LOS Table
ADT = Average daily traffic
V/C = Volume to capacity ratio
LOS = Level of Service

Table 27 shows existing study area intersection operations during the AM and PM peak hours. As indicated, no intersections operate at an unsatisfactory LOS during AM or PM peak hours.

Table 27. Existing Average Daily Traffic Volumes at Study Area Intersections

Intersection	AM Peak Hour		PM Peak Hour	
	Delay	**LOS**	**Delay**	**LOS**
Harbor Island Drive/Airport Terminal Road and North Harbor Drive	51.5	D	36.6	D
North Harbor Drive and Winship Lane	6.4	A	5.5	A
Harbor Island Drive (West)/Harbor Island Drive (East) and Harbor Island Drive	4.6	A	5.4	A

Source: Appendix G
[1] Average delay expressed in seconds per vehicle
LOS = Level of Service
Signalized

Delay	LOS
0.0 < 10.0	A
10.1 to 20.0	B
20.1 to 35.0	C
35.1 to 55.0	D
55.1 to 80.0	E
> 80.1	F

As presented in the analysis below, the proposed Project would generate less than 100 peak hour trips or 1,000 average daily trips (ADT) during the construction phase and would generate a net negative number of ADTs and peak hour trips during operation. As such, a traffic impact study would not be required per the City of San Diego's Traffic Impact Study Manual.

Analysis of Environmental Impacts

a. *Would the project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?*

Less Than Significant Impact. Project construction would occur over a 24-month period with two total phases. During construction, demolition debris and materials for redevelopment of the site would be hauled to and from the project site. Peak construction-related traffic activity would occur during the partially overlapping grading and site preparation phases of construction. During this period, approximately 10 haul trucks and 37 construction workers would access the Project site on a daily basis from Harbor Island Drive. To be conservative, it was assumed that all construction workers would drive individual vehicles to the Project site and would arrive and depart during the AM and PM peak hours, respectively. The daily trip rate per employee was assumed to be 3 trips per employee to account for lunch breaks or off-site errands/meetings. The analysis also assumed that haul trucks would arrive and depart at even intervals throughout the 8-hour workday. Table 28 provides the trip generation during the peak of Project construction.

Table 28. Project Construction Trip Generation

Use	Units	Vehicle Conversion Rate/Passenger Car Equivalent Trips	Rate/ Trips Per Unit	Daily Trips	AM Peak Hour		PM Peak Hour	
					In	**Out**	**In**	**Out**
Construction Workers	37	1	3/Worker	111	37	0	0	37
Haul Trucks	10	3	2/Truck	60	3	3	3	3
Total				**171**	**40**	**3**	**3**	**40**

Source: Appendix G

As shown, Project construction is anticipated to generate approximately 171 daily trips, including 43 trips (40 in / 3 out) during the AM peak hour and 43 trips (3 in / 40 out) during the PM peak hour. These trips were then distributed and assigned to the roadway segments and intersections in the Project study area. The Project trip distribution patterns were developed based on existing travel patterns, the proposed Project's location in relation to nearby land uses, nearby residential density, and freeway access.

The proposed Project's impact on the study area transportation network under existing plus Project conditions was analyzed. Existing plus Project traffic volumes were derived by combining the existing traffic volumes and the Project's trip assignment volumes. The results of this analysis are provided in Table 29 for roadway segments and Table 30 for intersections.

Table 29. Average Daily Traffic Volumes at Study Area Roadway Segments During Project Construction

Roadway Segment	Buildout Capacity (LOS E)[1]	Existing Traffic Volumes			Existing + Project Construction Traffic Volumes			Change in V/C	Sig?
		ADT	V/C	LOS	ADT	V/C	LOS		
North Harbor Drive									
SDIA Terminal 2/Spanish Landing to Harbor Island Drive	50,000	28,862	0.577	C	28,843	0.577	C	0.000	N
Harbor Island Drive to Winship Lane	50,000	49,987	1.000	E	50,141	1.003	F	0.003	N
Harbor Island Drive									
North Harbor Drive to Harbor Island Drive Southern Terminus	40,000	10,862	0.272	A	11,033	0.276	A	0.004	N
Western Terminus to Harbor Island Drive	15,000	5,222	0.348	B	5,393	0.360	B	0.012	N

Source: Appendix G
[1] Capacities based on City of San Diego's Roadway Classification and LOS Table
ADT = Average daily traffic
V/C = Volume to capacity ratio
LOS = Level of Service

Table 30. Average Daily Traffic Volumes at Study Area Intersections During Project Construction

Intersection	Existing Delay AM/PM	Existing LOS AM/PM	AM Peak Hour		PM Peak Hour		Δ Delay AM/PM	S?
			Avg. Delay	LOS	Avg. Delay	LOS		
Harbor Island Drive/ Airport Terminal Road and North Harbor Drive	51.5/36.6	D/D	51.7	D	38.9	D	0.2/2.3	N
North Harbor Drive and Winship Lane	6.4/5.5	A/A	6.4	A	5.4	A	0.0/-0.1	N
Harbor Island Drive (West)/Harbor Island Drive (East) and Harbor Island Drive	4.6/5.4	A/A	4.6	A	5.4	A	0.0/0.0	N

As summarized in Table 29 above, all study area roadway segments would continue to operate at LOS D or better under existing plus Project conditions, except for the segment of North Harbor Drive between Harbor Island Drive and Winship Lane (LOS F). Based on the City of San Diego's Traffic Impact Criteria outlined above, construction traffic associated with the proposed Project would not increase the volume to capacity ratio (V/C ratio) by more than 0.01 for LOS F roadway segments. In addition, as shown in Table 30 above, all study area intersections would continue to operate at LOS D or better under existing plus Project conditions. Therefore, Project construction would not result in any direct impacts on study area roadway segments or intersections. It should be noted that, while the existing marina would remain operational, there would be a decrease in operational traffic to the site during construction because vessel slips would be taken out of operation on a phased schedule. Project construction would have no effect on other modes of transportation such as mass transit, pedestrian walkways, or bicycle paths because no such facilities would need to be modified or temporarily interrupted by the Project's construction. Impacts related to construction traffic would be less than significant.

Once the proposed Project is operational, the smaller building and slightly fewer vessel slips would lead to a reduction in the number of ADTs currently generated at the Project site as boaters are the main users of the marina facilities. As a result, traffic associated with the proposed Project's operational phase is anticipated to be less than under existing traffic conditions. Therefore, no conflicts with local policies that measure the effectiveness of the circulation system would occur during Project operations because (1) access to the Project site would continue to be provided similar to existing conditions; (2) the proposed Project would not add a substantial number of ADTs or peak hour trips to the existing roadway network; (3) sufficient street infrastructure and facilities already exist to service the Project site; (4) no adverse changes would occur related to mass transit, pedestrian, and bicycle facilities; and (5) the proposed Project would add a public promenade along the north side of the Harbor Island peninsula to help contribute to pedestrian access to the Project site. Impacts would be less than significant and no mitigation measures would be required.

b. Would the project conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

Less Than Significant Impact. The provisions of Section 15064.3 are not required to be applied statewide until July 1, 2020, therefore, this threshold does not apply to the proposed Project. An analysis of the proposed project's transportation impacts is provided above in response XVII.a.

c. Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

No Impact. The proposed Project would not change the design of local roads or result in incompatible uses. Additionally, the proposed Project would not change or expand the existing use of the Project site or introduce any incompatible uses. No impact would occur as a result of construction or operation of the proposed Project and no mitigation measures would be required.

d. Would the project result in inadequate emergency access?

No Impact. Existing access to the Project site is provided from Harbor Island Drive at the southern Project boundary. Construction-related traffic activity consists of material delivery and truck haul use, as well as construction worker commute trips. Although the proposed Project would generate traffic trips during construction, the amount of trips anticipated would not interfere with emergency access. As discussed under response XVII.a., construction traffic associated with the proposed Project would not result in any significant impacts on study area roadway segments or intersections. During construction, portions of the parking lot would be utilized for a staging and laydown area. However, ingress and egress from Harbor Island Drive would not be impeded. In addition, site-specific activities, including temporary construction activities, are reviewed and approved on a project-by-project basis by the District when development plans are submitted. The District ensures that emergency access is maintained during construction through its project review and approval process. Thus, emergency access would be maintained during construction of the proposed Project.

Operation of the proposed Project would not include any characteristics (e.g., permanent road closures, long-term blocking of road access) that would physically impair or otherwise interfere with emergency access. For these reasons, ingress and egress to Harbor Island Drive would not be hindered in any way by the proposed Project, and Project traffic generation would decrease compared with the existing condition due to the reduction in total building area and number of slips on the site compared to existing conditions. Therefore, no impacts would occur from construction or operation of the proposed Project and no mitigation measures would be required.

e. Would the project result in inadequate parking capacity?

Less Than Significant Impact. The District approved Tidelands Parking Guidelines for use throughout the District in January 2001 (District 2001). The Tidelands Parking Guidelines are intended to assist in the determining how many parking spaces should be provided to serve uses in each of the planning districts. As identified in Table 31, based on the suggested base unadjusted parking demand rates identified in the Tidelands Parking Guidelines for Harbor Island, the proposed Project would need approximately 657 parking spaces.

Table 31. Parking Demand Rates

Use	Proposed Square Footage	Parking Factor[1]	Number of Spaces Required
Retail	8,125	4.7 spaces per 1,000 square feet of floor area	38 spaces
Office	4,270	2.8 spaces per 1,000 square feet of floor area	12 spaces
Marine Sales/ Services	950	3.9 spaces per 1,000 square feet of floor space	4 spaces
Marina	603	1 space per slip	603 spaces
Total Parking Spaces Suggested			**657 spaces**

[1] Parking factors based on Table 1 (Suggested Base Unadjusted Parking Demand Rates by District) in Tidelands Parking Guidelines, San Diego Unified Port District, January 2001.

Existing parking on the Project site consists of 351 parking spaces within an existing asphalt lot. Parking on site is designated parking and currently serves boaters accessing the marina facility, employees, and patrons of the businesses on site. Table 32 provides a summary of parking counts taken at HIWM since 2004.

Table 32. Harbor Island West Marina Historical Annual Peak Parking Summary

Year	Average Parking Occupancy	Total Parking Stall Inventory	% Parking Spaces Occupied	% Parking Spaces Unoccupied	Available Parking Stalls During Peak Period
2004	251	351	71.5%	28.5%	100
2005	207	351	59%	41%	144
2006	193	351	55%	45%	158
2007	210	351	59.8%	40.2%	141
2008	203	351	57.8%	42.2%	148
2009	199	351	56.7%	43.3%	152
2010	190	351	54.1%	45.9%	161
2011	171	351	48.7%	51.3%	180
2012	207	351	59%	41%	144
2013	187	351	53.3%	46.7%	164
2014	195	351	55.6%	44.4%	156
2015	215	351	61.3%	38.7%	136
2016	201	351	57.3%	42.7%	150
2017	218	351	62.1%	37.9%	133
2018[1]	181	351	51.6%	48.4%	170
Averages	**202**	**351**	**57.5%**	**42.5%**	**149**

Source: Harbor Island West, 2018

[1] Date for 2018 goes through March 28, 2018.

As identified in Table 32 above, on average the Project site's existing uses utilize approximately 57.5 percent of the total parking inventory with an average of approximately 42.5 percent remaining available. As identified in Section 2, *Project Description*, the redevelopment of the Project site would increase the number of parking spaces from 351 to 380 parking spaces, an increase in 29 parking spaces from existing conditions.

The Tidelands Parking Guidelines specifically state that to use the guidelines correctly, it is important to understand the difference between the parking demand a potential development generates and the parking requirement that development of a project on a specific site might create. Factors that influence parking demand include land use type, transit accessibility, airport accessibility, and pedestrian orientation. Factors that influence parking requirements include displacement of existing parking, existing parking shortages, public bay access, and parking needs of the proposed Project. Table 33 provides a comparison for each of the factors that influence parking demand and factors that influence parking requirements and how it applies to the proposed Project.

Table 33. Parking Demand and Parking Requirement Factors

Factor	Factor Description	Applicability to the Proposed Project
Parking Demand Influence Factors		
Price of Parking	The Tidelands Parking Guidelines assume that new developments will charge for parking at the current market rate.	Based on preliminary site design, approximately 352 parking spaces would be utilized for marina users while approximately 28 parking spaces would be open public parking. Therefore, no charges for parking are included.
Land Use Type	Demand for parking is very dependent on the types of uses or developments involved.	Current uses on the Project site include commercial office space, a restaurant, snack bar, deli, liquor store, clubroom, lockers/storage, laundry, maintenance facilities, and a chandlery. The proposed Project would redevelop the Project site with the same type of uses currently existing.
Transit Accessibility	Demand for parking is influenced by the availability of public transit in an area such as light rail, bus, or passenger train. Generally, the better the transit services, the less demand for parking.	There are no light rail or passenger services that currently serve the Project area. Two bus lines (Bus Line 923 and 992) currently service North Harbor Drive but do not service Harbor Island Drive. However, rideshare companies such as Uber and Lyft currently service the Project area.
Airport Accessibility	Locations with good access to Lindbergh Field are likely to experience a reduction in parking demand due to air travelers' use of shuttles, taxis, and public transit, rather than an individual automobile.	The proposed Project would be located within 1.0 mile of Lindbergh Field and is adjacent to or in close proximity to hotels (e.g., Hilton San Diego Airport/Harbor Island, Sheraton San Diego Hotel and Marina Bay Tower, Sheraton San Hotel & Marina) that offer shuttles and taxis.
Pedestrian Orientation	Areas with a strong pedestrian orientation tend to require less parking than suburban areas where motorist tend to drive their cars between destinations. In a pedestrian oriented area, motorists can visit several uses or sites without moving their car.	The Project site is located on the west side of Harbor Island. Properties within West Harbor Island are connected by a common sidewalk north of Harbor Island Drive and a pedestrian walkway south of Harbor Island Drive. The proposed Project would result in the redevelopment of Harbor Island West Marina and would allow for motorists to visit several uses in the area without moving their car.

Factor	Factor Description	Applicability to the Proposed Project
Parking Requirement Influence Factors		
Displacement of Existing Parking	Does the project site result in the displacement of existing parking?	No. The Project site currently has 351 parking spaces that are reserved for existing marina users. The proposed Project would include the addition of 29 parking spaces, resulting in a total of 380 parking spaces. No parking displacement would occur.
Existing Parking Shortages	Does the project area currently experience parking shortages?	No. As identified in Table 31, although the Project site is currently “under parked,” pursuant to the District’s Tideland Parking Guidelines (640 spaces are required), daily counts since 2004 indicate that the existing parking capacity (351 spaces) is rarely ever reached.
Public Bay Access	The availability of parking in District tidelands can influence the degree of bay access afforded by the public. Does the new development displace parking that is currently utilized by those seeking access to Bayfront recreational areas?	No. The Project site currently has 351 parking spaces for uses associated with the existing marina. There currently are no free parking spaces for those seeking access to Bayfront recreational areas. The proposed Project would increase the number of parking spaces to a total of 380 parking spaces of which HIW will dedicate approximately 28 parking spaces for free public use. The proposed Project would add parking that could be utilized by those seeking access to Bayfront recreational areas.

Source: District, 2018

Although the Project site is currently under parked pursuant to the District’s Tideland Parking Guidelines, parking counts since 2004 indicate that parking capacity is rarely ever reached (HIW 2018). Moreover, the proposed Project would decrease the amount of current building space from approximately 23,000 square feet to 15,682 square feet while the number of slips would decrease from 620 to 603, which could reduce the parking demand proportionately. As detailed in Table 32, under the existing and proposed conditions on site, adequate onsite parking needs would be maintained while not displacing existing parking, creating or impacting parking shortages, or decreasing public bay access. Therefore, a less than significant impact associated with parking would occur and no mitigation is required.

XVIII. Tribal Cultural Resources

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

	Potentially Significant Impact	Less Than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☒	☐
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	☐	☐	☐	☒

Environmental Setting

Recent legislation (Assembly Bill 52) amended CEQA to add another category of cultural resource: Tribal Cultural Resources. Tribal Cultural Resources are defined as “sites, features, places, and objects with cultural value to descendant communities or cultural landscapes; and sacred places including, but not limited to, Native American sanctified cemeteries, places of worship, religious or ceremonial sites, or sacred shrines.” These resources must be listed in the NAHC’s Sacred Lands File, included in or eligible for the California Register of Historical Resources (CRHR), included in a local register of historical resources, or be determined significant by the CEQA lead agency. At present, no Native American tribes have requested consultation for environmental review projects under CEQA per AB 52 within the District’s jurisdiction.

Analysis of Environmental Impacts

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or

Less Than Significant Impact. A records search was obtained from the SCIC for the proposed Project to determine if tribal cultural resources are present within the Project site. No tribal cultural resources that are listed in or eligible for listing in the CRHR were identified during the records search; however, tribal cultural resources are not typically recorded. The results of a Sacred Lands File Search, conducted by the Native American Heritage Commission for the Port Master Plan Update in 2017, indicated that no sacred lands have been previously reported in the project area. In addition, the Project site is part of Harbor Island, which was constructed in the early 1960s by hydraulically dredging, pumping, and depositing sand in the current configuration of Harbor Island. The hydraulically placed sands were placed up to the mean high tide line with fill soils imported and placed up to the existing ground surface with typically 10 to 12 feet of placed fill comprising the near-surface soils of Harbor Island. The proposed Project site is also completely developed with an active marina facility. Therefore, the proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources and less than significant impacts would occur.

b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

No Impact. Refer to response XVIII.a. No tribes have contacted the District to request notification of projects under AB 52; therefore, tribal consultation was not conducted, and no tribal cultural resources were identified as the result of an AB 52 consultation process. Therefore, there would be no impact associated with a tribal cultural resource determined by the lead agency pursuant to subdivision (c) of Public Resources Code Section 5024.1.

XIX. Utilities and Service Systems

Would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Require or result in the relocation or construction of new or expanded water, wastewater treatment, or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☐	☐	☐	☒
b. Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☐	☐	☒	☐
c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☒	☐
d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐
e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	☐	☐	☒	☐

Environmental Setting

Water service is currently provided to the Project site by the City of San Diego's Public Utilities Department (Water Branch). The City of San Diego relies heavily on imported water supplies from the Colorado River and State Water Project (approximately 85 to 90 percent of total water supply) through agreements with the San Diego County Water Authority (SDCWA). The SDCWA secures the San Diego region's water supply from the Metropolitan Water District of Southern California (MWD). Because of the City's heavy reliance on imported water, the convergence of critical water supply issues has far-reaching implications for the City that requires long range and proactive planning.

As a result, the City of San Diego has prepared the 2015 San Diego Urban Water Management Plan (UWMP) to identify the reliability of imported water supply during droughts, restrictions resulting from environmental regulations and state mandated water conservation, the quality of imported water that impacts local water recycling, groundwater, and water customers, and climate change impacts on local water demands, local water supply, and imported water.

The City of San Diego's UWMP looks at the City's historic and current water use projections and compares water supplies with demands over the next 25 years. The UWMP serves as a long range planning document for water supply and demand and provides an overview of the City's water supply and usage, recycled water and conservation programs. Tables 34, 35, and 36 provide a summary of the City of San Diego's existing and projected supply and demand for water.

Table 34. City of San Diego Projected Water Demand and Supply in Normal Year

	Demands and Supplies (AFY)				
	2020	**2025**	**2030**	**2035**	**2040**
Water Demand	200,984	242,038	264,840	273,748	273,408
Water Supplies					
Recycled Water (City service area only)	13,650	13,650	13,650	13,650	13,650
Local Surface Supply	22,900	22,800	22,700	22,600	22,500
Groundwater	3,100	3,100	3,100	3,100	3,100
Water Supply from SDCWA (purchased water)	161,334	202,488	225,390	234,398	23,4158
Total City Water Supplies	**200,984**	**242,038**	**264,840**	**273,748**	**273,408**
Estimated Water Shortages	**0**	**0**	**0**	**0**	**0**

Source: City of San Diego 2016b
AFY = Acre Feet Per Year
SDCWA = San Diego County Water Authority

Table 35. City of San Diego Projected Water Demand and Supply in Single Dry Year

Normal Year Demands/Supplies	Demands and Supplies (AFY)				
	2020	**2025**	**2030**	**2035**	**2040**
Water Demand	213,161	256,883	281,167	290,654	290,292
Water Supplies					
Recycled Water (City service area only)	13,650	13,650	13,650	13,650	13,650
Local Surface Supply	16,657	16,584	16,512	16,439	16,366
Groundwater	3,100	3,100	3,100	3,100	3,100
Water Supply from SDCWA (purchased water)	179,754	223,549	247,906	257,466	257,176
Total City Water Supplies	**213,161**	**256,883**	**281,167**	**290,654**	**290,292**
Estimated Water Shortages	**0**	**0**	**0**	**0**	**0**

Source: City of San Diego 2016b
AFY = Acre Feet Per Year
SDCWA = San Diego County Water Authority

Table 36. City of San Diego Projected Water Demand and Supply in Multiple Dry Year

Normal Year Demands/Supplies	Demands and Supplies (AFY)				
	2020	**2025**	**2030**	**2035**	**2040**
Water Demand	213,161	256,883	281,167	290,654	290,292
Water Supplies					
Recycled Water (City service area only)	13,650	13,650	13,650	13,650	13,650
Local Surface Supply	16,657	16,584	16,512	16,439	16,366
Groundwater	3,100	3,100	3,100	3,100	3,100
Water Supply from SDCWA (purchased water)	179,754	223,549	247,906	257,466	257,176
Total City Water Supplies	**213,161**	**256,883**	**281,167**	**290,654**	**290,292**
Estimated Water Shortages	**0**	**0**	**0**	**0**	**0**

Source: City of San Diego 2016b
AFY = Acre Feet Per Year
SDCWA = San Diego County Water Authority

Wastewater treatment services are currently provided to the Project site by the City of San Diego's Public Utilities Department Wastewater Branch (Wastewater Branch). Wastewater generated on the Project site is routed for treatment through the existing sewer system to the Point Loma Wastewater Treatment Plant (PLWTP), which is owned by the City of San Diego. The PLWTP, located at 1902 Gatchell Road, San Diego, currently treats approximately 175 million gallons per day (mgd) of wastewater that is generated in a 450-square-mile area by more than 2.2 million City residents. Located on a 40-acre site on the bluffs of Point Loma, the PLWTP currently has a treatment capacity of 240 mgd (City of San Diego 2018). Treated effluent from the PLWTP is discharged to the ocean through a 4.5-mile-long ocean outfall off Point Loma.

Solid waste generated at the Project site is collected by a City of San Diego-franchised waste hauler (Allied Waste) and transported to a local landfill. The waste hauler must be City of San Diego approved per San Diego Municipal Code Section 66.0101. City of San Diego-approved waste haulers are allowed to dispose of municipal solid waste (MSW) at any of the landfills in San Diego County. West Miramar Landfill is the nearest landfill, located 8.7 miles north of the Project site. The West Miramar Landfill, located at 5180 Convoy Street, San Diego, California, currently has a maximum permitted throughput of 8,000 tons per day and a remaining capacity of 15,527,878 cubic yards (California Department of Resources Recycling and Recovery [CalRecycle] 2015).

San Diego Gas & Electric (SDG&E) provides electrical power and natural gas to the Project site. As a regulated public utility, SDG&E provides energy service to a population of 3.6 million people through 1.4 million electric meters and 873,000 natural gas meters within a 4,100-square-mile service area that includes San Diego and southern Orange Counties (SDG&E 2016). Existing uses on the Project site generate an electricity and natural gas demand of approximately 3,577 million kilowatt-hours and 24.6 therms per year, respectively (Appendix A).

Analysis of Environmental Impacts

a. Would the project require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

No Impact. During the construction phase, water would be used to suppress dust in accordance with SDAPCD rules. However, water would be trucked in and would not increase the use of on-site water.

The proposed Project operations would not change the use or increase the capacity of the HIWM. Therefore, there would be no increase in the use of water, wastewater, electricity, natural gas, or telecommunication facilities and no new facilities would be required. The proposed Project would involve upgrading utilities to current building standards and efficiency standards throughout the Project site, such as the installation of more efficient LED lighting and Energy-Star appliances. The proposed Project would also include the installation of more efficient water facilities to conserve water use on the Project site, including low-flow fixtures and appliances, drought-resistant landscaping, and automated irrigation systems.

Due to the installation of energy and water efficiency features, and the fact that the proposed Project would not increase capacity at the Project site, the proposed Project would result in a reduction of energy and water usage by the redeveloped marina facility compared to the existing marina facility. No new utility infrastructure upgrades/improvements would be required, aside from those completed on-site. Wastewater from the properties within the City is treated at the PLWTP, and the HIWM would continue to the existing sewer system in which wastewater is ultimately routed and treated at the PLWTP. Therefore, the construction and operation of the proposed Project would not require or result in the construction of new water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities or expansion of existing facilities that would result in significant environmental effects. No impact would occur and no mitigation measures would be required.

b. Would the project have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

Less Than Significant Impact. As mentioned previously, water service is currently provided to the Project site by the City of San Diego. The City of San Diego relies heavily on imported water supplies from the Colorado River and State Water Project (approximately 85 to 90 percent of the City's total water supply) through agreements with the SDCWA and MWD. Existing water use on the Project site is 7,600 gallons a day.

Construction activities for the proposed Project would result in a temporary demand for water associated with soil compaction and earthwork, dust control, mixing and placement of concrete, equipment and site cleanup, irrigation for plant and landscaping establishment, testing of water connections and flushing, and other short-term related activities. These activities would occur incrementally throughout the construction of the proposed Project (from the start of construction to Project buildout). The amount of water used during construction would vary depending on soil conditions, weather, and the specific activities being performed. Based on preliminary construction information, it is anticipated that a water truck with a capacity of approximately 2,000 gallons would be needed for dust suppression and other landside construction activities. Water truck use would be limited primarily to the grading phase, which would last approximately 3 months (1 month for the west (Phase 1) parking lot, 2 months for the east (Phase 2) parking lot).

Given the temporary nature of construction activities, the short-term and intermittent water use during construction of the proposed Project would be less than the net water consumption of the proposed Project at buildout. In addition, water use during construction would be offset by the water currently consumed by the existing uses, which would be removed at part of the proposed Project's construction. No infrastructure improvements would be needed to provide water during the construction of the proposed Project.

As concluded in the City's 2015 UWMP, projected water demand for the City would be met by the available supplied during a normal year, single dry year, and multiple dry year in each year from 2020 through 2040. As previously identified, Project construction would occur over approximately 24 months and is anticipated to be completed in the summer of 2020. The existing marina was accounted for in the City's UWMP water demand projections. Therefore, the proposed Project's temporary and intermittent demand for water during construction could be met by the City's available supplies during each year of Project construction. As such, construction related impacts to water supply and infrastructure would be less than significant and no mitigation measures would be required.

As described in Section 2, *Project Description*, the proposed Project upon buildout would include a reduction of 7,318 square feet of building space and the installation of drought tolerant landscaping. Due to the reduction in building square footage, the installation of drought-tolerant landscaping, and the inclusion of water efficient features (e.g., water-efficient toilets) as required under existing building code, operation of the proposed Project would result in a decrease in long-term water demand for consumption, operational uses, maintenance and other activities on the Project site.

The 2015 UWMP utilized SANDAG's 2050 Regional Growth Forecast data that provide for reliable water demand forecasts that take into account changes in population, housing units, and employment. Data collected as part of SANDAG's 2050 Regional Growth Forecast included existing and planning uses, zoning, current adopted general and community plans, and guidance on likely development patterns by 2050. As noted previously, the proposed Project would result in the redevelopment of an existing marina facility. Existing land uses and land use designations would not change with implementation of the proposed Project and land use intensities would not increase on the Project site. Therefore, the proposed Project would remain consistent with the assumptions provided in the SANDAG's 2050 Regional Growth Forecast, on which the City's 2015 UWMP assumptions rely on.

Based on the data above, the proposed Project's water demand has been accounted for in the City's overall total demand projections set forth in the City's 2015 UWMP. Specifically, the 2015 UWMP forecasts adequate water supplies to meet all projected water demands in the City through 2040. Therefore, the decrease in water demand for the proposed Project falls within the available and projected water supplies for normal year, single dry year, and multiple dry years through 2040, as described in the City's 2015 UWMP.

As outlined in the 2015 UWMP, the City is committed to providing a reliable water supply for the City. The 2015 UWMP takes into account the realities of climate change and the concerns of drought and dry weather and notes that the City of San Diego will meet all new demand for water through a combination of water conservation and water recycling. The 2015 UWMP also addresses the current and future State Water Project supply shortages and concludes the MWD's actions in response to the threats to the State Water Project will ensure continued reliability of its water deliveries to member agencies. By focusing on demand reduction and alternative sources of water supplies, the City will further ensure that long-term dependence on MWD supplies will not be exacerbated by potential future shortages.

Based on the above, the estimated water demand for the operation of the proposed Project would not exceed the available water supplies projected by the City of San Diego, including during normal, dry, and multiple dry years. Therefore, the City would be able to meet the water demand of the proposed Project, as well as the existing and planning future water demands of its service area. The proposed Project's operation related impacts on water supply would be less than significant and no mitigation measures would be required.

c. Would the project result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Less Than Significant Impact. As noted above, wastewater treatment services are currently provided to the Project site by the City of San Diego's Wastewater Branch. Wastewater generated on the Project site is routed for treatment through the existing sewer system to the PLWTP. The PLWTP currently treats approximately 175 mgd of wastewater and has a treatment capacity of 240 mgd (City of San Diego 2018).

During construction activities, wastewater would typically be generated from use of portable toilets for construction workers. The wastewater generated by the proposed Project during construction activities would not be expected to impact existing capacity or require facility expansion at the PLWTP. Impacts to wastewater treatment facility capacity during construction would be less than significant and no mitigation measures are required.

The Project site is already being serviced by the City of San Diego's Wastewater Branch, and the generation of wastewater by existing uses factored into the existing daily treatment throughput for PLWTP. Operation of the proposed Project would not result in an increase or intensity of uses on site. In addition, during operations, wastewater generated from HIWM would likely decrease when compared to existing conditions due to a smaller building footprint and a reduction in supporting uses on site. The wastewater generated by the proposed Project during operation would not be expected to impact existing capacity or require facility expansion at the PLWTP. Impacts to wastewater treatment facility capacity during operation would be less than significant and no mitigation measures are required.

d. Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

Less Than Significant Impact. Solid waste generated at the Project site is collected by a City of San Diego-franchised waste hauler (Allied Waste) and transported to a local landfill. The waste hauler must be City of San Diego approved per San Diego Municipal Code Section 66.0101. City of San Diego-approved waste haulers are allowed to dispose of MSW at any of the landfills in San Diego County. West Miramar Landfill is the nearest landfill, located 8.7 miles north of the Project site. Because the West Miramar Landfill is nearest to the Project site and would be the least expensive in terms of transportation costs, it is anticipated that the majority of Project-generated solid waste during construction and operation would be disposed of there.

Under existing operations, solid waste is picked up and disposed of at the local landfill approximately twice a month. An on-site trash compactor compresses the majority of solid waste prior to pickup and disposal. In addition, a network of recycling containers and a recycling dumpster are maintained on site. Existing uses on site currently generate about 6 tons of solid waste each month or approximately 0.2 tons (400 pounds) of solid waste per day (District 2013b).

During site demolition and preparation approximately 16,860 cubic yards of demolition materials, including wood, glass, steel, and concrete from the existing HIWM would be disposed of in the West Miramar Landfill. Daily disposal at the West Miramar Landfill is approximately 3,900 tons per weekday with a maximum permitted throughput of 8,000 tons per day (California Department of Resources Recycling and Recovery [CalRecycle] 2015). The West Miramar Landfill currently has a remaining capacity of 15,527,878 cubic yards (CalRecycle 2015). The 16,860 cubic yards of demolition material associated with the proposed Project represents approximately 11,000 tons of material, which would be 0.11 percent of its total remaining capacity. Therefore, disposal of waste produced by the proposed Project during demolition and construction would not be expected to materially alter the capacity of the landfill. The impact on landfill capacity during construction would be less than significant and no mitigation measures are required.

Materials which are non-recyclable and hazardous such as ACM, lead-based paint materials, and other building finishes would be disposed of by an approved hazardous waste handler at an appropriate hazardous waste facility in accordance with Title 22 CCR Division 4.5, *Environmental Health Standards for the Management of Hazardous Wastes*. Any landscaping green waste would be disposed of at the Miramar Greenery.

During operations, solid waste generated from HIWM would likely decrease when compared to existing conditions due to a smaller building footprint and a reduction in supporting uses on site. Waste generated by users of the facility includes general trash and recyclables that are either removed from the site by the users or disposed of in District-provided trash cans near the facility. No net increase in waste volume or change in type of waste is expected. In addition, recycling at the Project site would continue in accordance with state and local diversion requirements such as the City of San Diego's Recycling Ordinance and the Clean Marina Program. Therefore, no operational impacts associated with this issue are anticipated to occur and no mitigation measures are required.

e. Would the project comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Less Than Significant Impact. The proposed Project would be required to comply with applicable elements of the RCRA (40 CFR Parts 239 to 282), the Toxic Substances Control Act (TSCA) (15 U.S.C.

Section 2601 et seq.), California Department of Toxic Substances Control's hazardous waste regulations (CCR, Title 22, Division 4.5), AB 1327, Chapter 18 (California Solid Waste Reuse and Recycling Access Act of 1991), and other applicable local, state, and federal solid waste disposal standards such as AB 939 (Integrated Waste Management Act).[15] Demolition materials would be disposed of at the West Miramar Landfill while a recycling program would be implemented for operations as required by the City of San Diego's Recycling Ordinance. As such, the proposed Project would comply with federal, state, and local statues and regulations related to solid waste. Impacts would be less than significant and no mitigation measures are required.

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[15] Assembly Bill (AB) 939 requires each city in the State to divert at least 50 percent of its solid waste from landfill disposal through measures such as source reduction, recycling, and composting.

XX. Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:	**Potentially Significant Impact**	**Less Than Significant with Mitigation Incorporated**	**Less Than Significant Impact**	**No Impact**
a. Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
b. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒
c. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒
d. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

Environmental Setting

The Project site is not located in or near state responsibility areas, or lands classified as very high hazard severity zone, as depicted by the California Department of Forestry and Fire (CAL FIRE) San Diego Very High Fire Hazard Severity Zones in LRA (CAL FIRE 2009).

a. *Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?*

No Impact. The proposed Project is for improvement of existing landside and waterside marina facilities and is not located in or near state responsibility areas or lands classified as very high hazard severity zone. In addition, the proposed Project would not alter circulation or access at the Project site or in the vicinity. Thus, the proposed Project would not impair an adopted emergency response plan or evacuation plan. There would be no impact.

b. *Would the project, due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?*

No Impact. The proposed Project is surrounded by development and water and is not on a slope. The proposed Project would improve existing a recreational marina facility, and is not located within a Very High Fire Hazard Severity Zone. There are no factors that could exacerbate wildlife risk and therefore there would be no impact.

c. ***Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?***

No Impact. The proposed Project is within a developed area that is not within a Very High Fire Hazard Severity Zone, thus the proposed Project does not propose infrastructure, such as fuel breaks or emergency water sources that are associated with wildfire protection. In addition, the Project site is an existing marina that is serviced by existing utilities and infrastructure, including roads, electricity, natural gas, water, and wastewater pipelines, and does not propose the construction of additional infrastructure. Therefore, the proposed Project would involve infrastructure that would exacerbate fire risk or result in temporary or permanent impacts to the environment and there would be no impact.

d. ***Would the project expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?***

No Impact. The proposed Project and surrounding area is on flat land, and is not located within a Very High Fire Hazard Severity Zone. The proposed Project would not result in any drainage changes or slope instability. Thus, the proposed Project would not expose people or structures to significant risks as a result of runoff, post-fire slope instability or drainage changes, and there would be no impact.

XXI. Mandatory Findings of Significance

	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less Than Significant Impact	No Impact
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☐	☒	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? (*Cumulatively considerable* means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☐	☒	☐	☐
c. Does the project have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	☐	☒	☐	☐

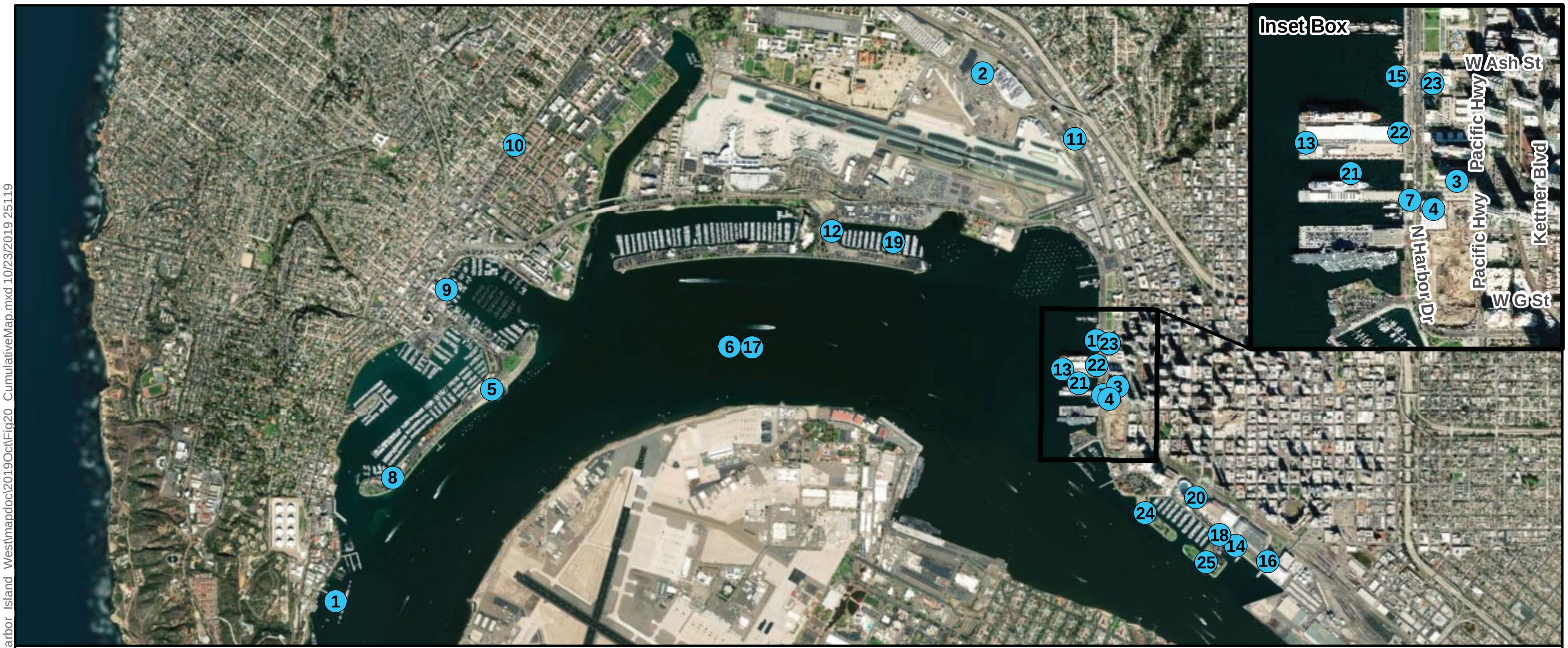
Environmental Setting

State CEQA Guidelines Section 15130 requires a discussion of the cumulative impacts of a project when the project's incremental effect is "cumulatively considerable," meaning that the project's incremental effects are considerable when viewed in connection with the effects of past, current, and probable future projects. The cumulative impacts discussion does not need to provide as much detail as is provided in the analysis of project-specific impacts and should be guided by the standards of practicality and reasonableness.

State CEQA Guidelines Section 15130(b) identifies the following three elements that are necessary for an adequate cumulative analysis:

- A list of past, present, and reasonably anticipated future projects producing related or cumulative impacts, including those projects outside the control of the lead agency, or a summary of projections contained in an adopted general plan or related planning document designed to evaluate regional or area-wide conditions. This information is provided below. Past projects for this document are defined as those that were recently completed (within the last five years) and are now operational. Present projects are defined as those that are under construction but not yet operational. Reasonably foreseeable future projects are defined as those for which a development application has been submitted or credible information is available to suggest that project development is a probable outcome.
- A summary of expected environmental effects to be produced by those projects. The summary shall include specific reference to additional information stating where that information is available.
- A reasonable analysis of the cumulative impacts of the relevant projects and an examination of reasonable options for mitigating or avoiding any significant cumulative effects.

Based on information provided by the District and the City of San Diego, 30 cumulative projects were identified for this analysis. The projects listed in the proposed Project's cumulative study area have had applications submitted or have been approved, are under construction, or have recently been completed. These projects were selected based on their proximity to the project site and San Diego Bay along with the potential to contribute to cumulative impacts. The cumulative projects identified in the study area are listed in Table 37 (project numbering corresponds to numbers shown in Figure 20). Generally speaking, the geographic scope of the area affected by cumulative effects varies according to the issue area. The study area for each issue area is described further under the respective resource headings that follow.



Legend

1. Naval Base Point Loma Fuel Pier (18) Replacement and Dredging
2. San Diego International Airport Master Plan – Parking Plaza
3. Lane Field North and South
4. Navy Broadway Complex
5. Shelter Island Boat Launch Facility Improvements Project
6. San Diego Bay + Imperial Beach Oceanfront Fireworks Display Event
7. North Embarcadero Plan and Port Master Plan Amendment
8. Kona Kai Resort Hotel Expansion Project
9. Intrepid Landing Buildings A and B
10. Navy Miramar Pipeline Repair and Relocation
11. Palm Street Observation Area
12. Lockheed Martin Company Marine Terminal Demolition Project
13. B Street Mooring Dolphin
14. Fifth Avenue Landing Redevelopment
15. Portside Pier Restaurant Redevelopment Project
16. San Diego Convention Center Phase III Expansion and Expansion Hotel as shown in the Port Master Plan
17. Integrated Planning Process - Port Master Plan Update
18. San Diego Symphony Bayside Performance Park Project
19. Harbor Island East Basin Industrial Subarea Redevelopment and Port Master Plan Amendment Project
20. Marriott Marquis San Diego Hotel and Marina Facilities
21. B Street Shore Power
22. B Street Pier Cruise Ship Terminal Maintenance Projects

23a. Wyndham Hotel Renovations

23b. Potential 205-foot setback park pursuant to NEVP Phase 1 CDP Conditions and MOU

24. Redevelopment of the Elbow parce on East Harbor Island
25. Bayside Performance Park Enhancement Project

N

0 2,000 4,000

Feet

Source: ESRI World Imagery (2017)

Figure 20
Cumulative Project Locations
Harbor Island West Marina Redevelopment Project

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Table 37. Cumulative Projects

	Project Name (Estimated Completion)	Location	Description	Status
1.	Naval Base Point Loma Fuel Pier (P151) Replacement and Dredging	Naval Station Point Loma and Alternative Bait Barge locations within State lands, San Diego, CA	Temporary Space and Naval Warfare Systems Center (SSC) marine mammal facilities at Naval Main and Anti-Submarine Warfare Command (NMAWC) and then relocation of the program to NMAWC; demolished existing Naval Base Point Loma Fuel Pier in phases so as to leave pier operational throughout project; constructed 71,180-square-foot double-deck replacement pier and performed associated dredging; returned SSC marine mammal program to original location.	Completed
2.	San Diego International Airport Master Plan – Parking Plaza	3225 North Harbor Drive, San Diego, CA	A parking plaza adjacent to Terminal 2 on the San Diego International Airport was constructed. The parking plaza is a three-story, 1,035 million square-foot approximately 34-48 foot-high parking structure with 1,753 new parking spaces over an existing surface parking lot with 1,323 parking spaces for a total of 3,076 parking spaces, removed 46 palm trees, landscaped, and graded 34,400 cubic yards (cy) (31,800 cy cut, 2,600 cy fill).	Completed
3.	Lane Field North and South	North side of Broadway between North Harbor Drive and Pacific Highway, San Diego, CA 91910	Two hotels (totaling 800 rooms), parking facilities, and retail uses on a 5.8-acre parcel formerly used as a parking lot. Construct park/plaza on western 150-feet of property.	Construction of Lane Field North and the park completed. Construction of Lane Field South began in June 2016 and anticipated to be completed in Fall 2018
4.	Navy Broadway Complex	Broadway/Harbor Drive/Pacific Highway, San Diego, CA 92101	Redevelopment of a 13.7-acre parcel with 2.9 million square feet of office space, including a 351,000-square-foot museum; 213,000-square feet of retail and restaurant space; more than 3,100 parking spaces; and a 1.9 acre public park at the corner of Broadway and Harbor Drive.	Development Agreement, Master Plan, Phase I Buildings Consistency Determination approved in 2009, Construction began 2017
5.	Shelter Island Boat Launch Facility Improvements Project	2210 Shelter Island Drive, San Diego, CA 92106	Repaired, maintained, and replaced the boat launch ramp, jetties (including public walkways), gangways, and floating docks, as well as minor improvements to the kayak launching area, restrooms, and parking.	Completed

	Project Name (Estimated Completion)	Location	Description	Status
6.	San Diego Bay and Imperial Beach Oceanfront Fireworks Display Event	Throughout District tidelands	The project proposed the addition of an Ordinance to the Port District Code that would establish a program to regulate fireworks. Specifically, the program would govern the existing and proposed new fireworks display events requiring a discretionary action by the District or operated by the District's tenants that occur within the San Diego Bay and Imperial Beach Oceanfront. Four proposed new fireworks display events are anticipated to require a future discretionary action by the District, including three displays along the Chula Vista Bayfront and one display along the National City Bayfront.	EIR certified and Ordinance was adopted on May 25, 2017
7.	North Embarcadero Plan and Port Master Plan Amendment	North Harbor Drive between Laurel and G Street	This project consists of environmental review associated with the realignment of North Harbor Drive between Laurel Street and G Street in order to define the future character of North Embarcadero consistent with conditions specified in the California Coastal Commission-issued Coastal Development Permit (CDP) dated April 18, 2011 (District Clerk Document No. 58230) and a memorandum of understanding (MOU) entered into on November 9, 2010 (District Clerk Document No. 57019). The project will analyze plans for key public infrastructure improvements related to parks and open space, parking, traffic, and multi-modal circulation, including an analysis of 15 "planning elements" described in the CDP and MOU. This will be considered as part of the Port Master Plan Update.	Anticipated to be part of the Port Master Plan Update EIR scheduled for release in 2018
8.	Kona Kai Resort Hotel Expansion Project	1551 Shelter Island Drive, San Diego, CA 92106	The project involves expansion and renovation of the existing Kona Kai Resort, as follows: 1) construction of 41 new guest rooms in two new buildings; 2) construction of a new two-story marina facility retail building; 3) construction of a new pool and pool deck; 4) expansion of the existing pool deck and construction of a new pool bar; and 5) renovation of the existing restaurant, spa and fitness center, conference and meeting facilities, guest rooms, lobby marina facility building, dock master building, beach, parking lot, and landscaping.	Completed

	Project Name (Estimated Completion)	Location	Description	Status
9.	Intrepid Landing Buildings A and B	2702 Shelter Island Drive, San Diego, CA 92106	The project involves construction of approximately 6,240 square feet of marine sales and service buildings with approximately 281 square feet of food service made up of Building A and B with parking, pedestrian walkway of 10-foot width, hardscape, and landscaping.	Completed
10.	Navy Miramar Pipeline Repair and Relocation	Between Naval Base Point Loma (NBPL) Defense Fuel Support Point (DFSP) in the NBPL Complex (south end of the pipeline) and the first 5 miles of pipeline extending out into the City of San Diego	The project would involve the repair and relocation of the existing Navy owned 8-inch Miramar Fuel Pipeline along various locations in the City of San Diego within the first five miles of the pipeline. The project is needed to maintain the safe, consistent, and continuous use of the pipeline between Defense Fuel Support Point Loma and Marine Corps Air Station Miramar. This project would repair various pipeline anomalies and mitigate potential geohazards to provide for the continued fueling needs of existing and future Navy ships.	In construction, construction anticipated to be completed Spring 2018
11.	Palm Street Observation Area	Palm Street/Pacific Highway/Admiral Boland Way, San Diego, CA 92101	Construction of an observation area for pedestrians to view the surrounding airport and approaching aircraft. Previously used as the main vehicle entrance to a former GA facility which was demolished and reconstructed to the north, the observation area is proposed on a remnant parcel of approximately 0.7 acre. The observation area would create a small park setting and provide an area from which pedestrians may observe aircraft approaching and departing the airport. In addition, light rail transit passengers from the Middletown trolley station will be guided to walk through the observation area to access the free bus shuttle to the airport terminals. The area will combine art, seating, landscaping, lighting, and pedestrian walkways. No vehicle parking will be provided	In construction
12.	Lockheed Martin Company Marine Terminal Demolition Project	1160 Harbor Island Drive, San Diego, CA 92101	The project involves demolition of 5,500 square feet of building space and removal of a pier and trolley rail.	NOP release for EIR anticipated August 2019.
13.	B Street Mooring Dolphin	B Street Pier, 1140 North Harbor Drive, San Diego, CA 92101	Moorings off the end of B Street Pier to allow for larger cruise ship docking.	The Draft EIR was circulated in February 2013. The Final EIR has not yet been certified

	Project Name (Estimated Completion)	Location	Description	Status
14.	Fifth Avenue Landing Redevelopment	South end of Fifth Avenue, between the back of the Convention Center and South Embarcadero Park, San Diego, CA 92101	Development includes: two hotel structures, one 44-story, approximately 498-foot tall 850-room hotel tower, and one 5-story, approximately 82-foot tall 565-bed lower-cost visitor-serving hotel; a 263-space parking structure; retail; meeting space; ancillary guest amenities; an optional bridge connecting the hotel to the Convention Center; approximately 85,490 square feet of public access areas approximately 3,190 square feet at ground level and 82,300 square feet on a podium level; and expansion of the marina by an additional 57,696 square feet of dock space. The project would maintain the existing 35-foot-wide bayfront promenade.	Draft EIR released December 2017. Final EIR not yet certified.
15.	Portside Pier Restaurant Redevelopment Project	1360 North Harbor Drive, San Diego, CA 92101	Redevelopment of an existing waterfront restaurant with a new facility, including new pilings, piers, decking, and structure. Development involves demolition of an existing restaurant and supporting structure (including 66 piles) and redevelopment with a new, two-story restaurant and supporting structure (on 53 piles). The new facility would be approximately 33,577 square feet and include three distinct dining establishments, a coffee and gelato shop, an expanded dock and dine for short-term boat berthing, and a public viewing deck. The project would involve an approximately 8,722-square-foot increase in building floor area and a 4,480-square foot net increase in water coverage. Restaurant seating would be increased by 464 seats. A new public viewing deck with approximately 108 seats is proposed and the replacement dock and dine boat dock would allow an increase in boat slips from 2 to 12 boat slips; however, 4 would be constructed initially.	Under construction
16.	San Diego Convention Center Phase III Expansion and Expansion Hotel as shown in the Port Master Plan	111 West Harbor Drive, San Diego, CA 92101	This project consists of approximately 220,150 square feet of prime exhibit hall, approximately 101,500 square feet of meeting rooms, and approximately 78,470 square feet of ballroom space. The project would also add approximately 26,000 square feet of retail and a 5-acre rooftop park. The adjacent Hilton Bayfront Hotel would add an additional 500-room tower to the current configuration.	EIR certified and Port Master Plan Amendment approved by District Board in September 2012. PMPA certified by the Coastal Commission in October 2013. The SDCC Phase III Expansion Project is

	Project Name (Estimated Completion)	Location	Description	Status
				currently unfunded and the San Diego Convention Center Corporation does not have real property rights to the site, but the City of San Diego has expressed interest in pursuing the project.
17.	Integrated Planning Process – Port Master Plan Update	Throughout District tidelands	Comprehensive Update of the Port Master Plan that is anticipated to include new topical sections, or elements, to provide Baywide guidance related to Land and Water Use, Coastal Access and Recreation, Mobility, Natural Resources, Safety and Resiliency, and Economic Development	Planning Phase – Program EIR under preparation
18.	San Diego Symphony Bayside Performance Park Project	Portion of Embarcadero Marina Park South, 224 Marina Park Way, San Diego, CA 92101	Construction of a permanent outdoor forum to facilitate concerts and events, including San Diego Symphony performances and rehearsals, guest seating, restrooms, ancillary structures, and public park improvements and amenities.	EIR certified on January 9, 2018. In entitlement phase
19.	Harbor Island East Basin Industrial Subarea Redevelopment and Port Master Plan Amendment Project	East Basin Industrial Subarea of Planning District 2 (Harbor Island/Lindbergh Field); bounded by the U.S. Coast Guard station to the east, Harbor Island Drive to the west, Harbor Drive to the north, and a water navigation area to the south adjacent to Sunroad Resort Marina	Approximately 35 acres of land and 13 acres of water. Preliminarily maximum buildout envelope of up to 2.5 million square feet of mixed-use development, including retail/restaurant establishments, maritime-related or water-dependent office space, hotel rooms, and Harbor Police Department/Port Administration facilities, as well as 534,000 square feet of public open space. Other project components would consist of potential demolition of existing land and water improvements and potential filling and/or reuse of the Convair Lagoon remediation cap. The proposed project would require a Port Master Plan Amendment (PMPA).	Concept proposed, no application and not entitled
20.	Marriott Marquis San Diego Hotel and Marina Facilities	333 West Harbor Drive	This project included the demolition of the former 131,500-square-foot Marriott Hall to accommodate a new facility containing 71,800 square feet of ballroom and meeting space. The new Marriott Hall, which includes a ballroom, an exhibit hall space, an outdoor event area, and a new marina bathroom facility, increased the gross building	Completed

	Project Name (Estimated Completion)	**Location**	**Description**	**Status**
			area from 131,500 square feet to 169,400 square feet, and the total building footprint increased from 60,900 square feet to 80,400 square feet. The project did not increase the number of hotel rooms at the hotel.	
21.	B Street Shore Power	B Street Pier and Broadway Pier, 1140 and 1000 North Harbor Drive	Project consists of infrastructure components to provide shore power to existing terminal operations at the B Street and Broadway Piers (three berths) with the result of reducing air pollutant emissions and greenhouse gas emissions while cruise ships are berthed. Initially, shore power will be available to one ship at a time; in subsequent years, two ships will be able to use shore power at the same time.	Initial phase completed in December 2010. The second phase is scheduled to be completed in 2017.
22.	B Street Pier Cruise Ship Terminal Maintenance Projects	B Street Pier, 1140 North Harbor Drive	Projects on B Street Pier addressing routine maintenance requirements to improve safety, security, integrity, aesthetics, and comfort of this facility. Roof replaced, roll-up and rolling rate doors installed, fire system upgraded, cleaned and painted ceilings and hangers, mobile gangway and platform painted, and a photovoltaic system.	Completed
23a.	Wyndham Hotel Renovations	1355 North Harbor Drive	The project proposes the demolition of 28,685 square feet of existing facilities, to relocate the hotel entrance to Pacific Highway and A street, construction of approximately 70,303 square feet to include a new lobby, pool deck, retail and pavilions, 2.8 acres of public space, and the addition of 141 parking spaces on a new parking deck on the existing parking structure. This project may include a setback park along its western edge.	Proposed, not entitled.
23b.	Potential 205-foot setback park pursuant to NEVP Phase 1 CDP Conditions and MOU	1355 North Harbor Drive, San Diego, CA 92101	This project involves two alternative 205-foot waterfront setback park as specified in the NEVP Phase 1 CDP dated April 18, 2011 (District Clerk Document No. 58230) and Memorandum of Understanding (MOU) entered into on November 9, 2010 (District Clerk Document No. 57019). The alternate 205-foot setback park is part of the 15 “planning elements” to be analyzed on equal footing and considered as part of a proposed amendment to the Port Master Plan or as part of the Port Master Plan Update.	Anticipated to be part of the Port Master Plan Update EIR currently under preparation

	Project Name (Estimated Completion)	**Location**	**Description**	**Status**
24.	Redevelopment of the Elbow parcel on East Harbor island	7-acre parcel of land north of the East Basin Industrial Subarea in the current PMP known as the Elbow parcel	Involves an approximately 500-room hotel with other amenities including swimming pools, spas, gym, retail shops, open space event lawn, and a viewing deck.	Proposed, not entitled
25.	Bayside Performance Park Enhancement Project	Embarcadero Marina park South (EMPS)	Involves the replacement and enhancement of structures in the EMPS and new facilities including the Bayside Performance Park, a new performance and event venue to hold up to 10,000 attendees and various other park improvements.	EIR certified on January 9, 2018. Construction anticipated to commence 2019/2020.

Analysis of Environmental Impacts

a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

Less Than Significant Impact with Mitigation Incorporated. The waterside portion of the Project site provides eelgrass habitat for fish and other marine wildlife species. Mitigation is required to ensure that direct and indirect impacts on the eelgrass habitat would not be significant (see **MM-BIO-4**). In addition, the effects of noise generated by pile driving on marine wildlife would be significant if the pile driving caused harm to marine species such as East Pacific green sea turtle and marine mammals. Mitigation would require pile-driving to use a soft-start method to reduce noise impacts and require a biological monitor during all pile-driving activities (see **MM-BIO-1** and **MM-BIO-2**). **MM-HWQ-1** through **MM-HWQ-3** would require silt curtains to reduce turbidity from in-water construction activities, water quality monitoring, and a series of response actions if any issues are observed. In addition, initiation of construction activities would be timed to minimize potential impacts to nesting birds (**MM-BIO-3**). No other potential biological resources impacts would occur, and the proposed Project would not substantially degrade the quality of the environment, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, or reduce the number or restrict the range of a rare or endangered plant or animal. Also, because Harbor Island was not created until the 1960s and the current facilities on the Project site were not developed until the early 1970s, the buildings do not meet the age threshold requiring evaluation for listing in the California Register of Historical Resources. Impacts would be less than significant with mitigation incorporated.

b. Does the project have impacts that are individually limited, but cumulatively considerable? (Cumulatively considerable means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)

Less Than Significant with Mitigation Incorporated. Given that the proposed Project would have no impact on agriculture and forest resources, mineral resources, or wildfire, it was determined that the proposed Project would have no potential to result in cumulative impacts related to those resource areas. The proposed Project would have less than significant impacts, in some cases only with mitigation incorporated, on aesthetics, air quality, biological resources, cultural resources, energy, geology/soils, GHGs, hazards and hazardous materials, hydrology and water quality, land use and planning, noise and vibration, population and housing, public services, recreation, transportation, tribal cultural resources, and utilities. The proposed Project would not result in any significant and unavoidable impacts. The proposed Project's cumulative effect on these resources is discussed below.

Aesthetics

The proposed Project would have no impacts on scenic vistas or scenic resources located along a scenic highway. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to these issue areas.

The proposed Project would have less than significant impacts related to degrading the existing quality of the site and its surroundings during the construction phase as well as potential new sources of glare during the construction and operational phases. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to degrading the existing visual quality of the site substantially and as new sources of glare. The cumulative study area considered for the aesthetics cumulative analysis includes the Project site, Harbor Island, SDIA, and nearby projects in Point Loma.

Past, Present, and Reasonably Foreseeable Future Projects

Past projects are developed and operational and do not degrade the existing quality of the site or its surroundings because they are consistent with the existing visual character of the area, nor do they result in substantial light and glare. Present projects would have varying degrees of construction-related aesthetic impacts; however, the presence of construction equipment and vehicles is not uncommon in the urban setting, nor are they considered elements that produce a substantial amount of glare during the day or light during the night. Once operational, all projects are expected to result in little or no change to the surrounding aesthetics. If reasonably foreseeable future projects are approved, the construction and operation of these projects would also be consistent with the existing visual character. Therefore, the impact on aesthetic resources from past, present, and reasonably foreseeable future projects is not cumulatively significant.

Proposed Project

As described in Section I, *Aesthetics*, the proposed Project's aesthetic impacts would be limited to the presence of the construction equipment, which would not be visually obtrusive. Construction equipment would be moved around the site and then removed from the site when no longer needed. Therefore, the proposed Project's incremental cumulative contribution to the cumulative aesthetic impact would not be cumulatively considerable.

Air Quality

The proposed Project would have no impacts related to conflicts with the applicable air quality plan. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to this issue area.

The proposed Project would have less than significant impacts related to air quality standards, health risk, and odors during Project construction and operations. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to air quality standards and the nonattainment status of criteria pollutants.

The entirety of the SDAB, which is contiguous with San Diego County, represents the cumulative geographic scope for air quality impacts related to consistency with air quality plans and air quality threshold levels because plans and thresholds are established at the air basin–wide level. Cumulative health impacts on sensitive receptors and odors are considered at a more localized level because of the more limited area of dispersion and include the surrounding neighborhoods and areas within proximity to the source of the odor, respectively.

Past, Present, and Reasonably Foreseeable Future Projects

The SDAB is currently in nonattainment for ozone under NAAQS as well as ozone, PM10, and PM2.5 under CAAQS. Therefore, the emissions of concern are ozone precursors (ROG and NO_X), PM10, and PM2.5. The nonattainment status for the entire County is a consequence of past and present projects and will be further impeded by reasonably foreseeable future projects, such as those listed in Table 37. The past, present, and reasonably foreseeable future projects that could contribute cumulative impacts on localized air quality conditions generally include construction related to the following nearby projects: San Diego International Airport Master Plan – Parking Plaza (#2), Lockheed Martin Company Marine Terminal Demolition Project (#12), and the Harbor Island East Basin Industrial Subarea Redevelopment and Port Master Plan Amendment Project (#19). Air quality impacts from past, present, and probable future projects would be cumulatively significant because of this non-attainment status.

Proposed Project

Construction of the proposed Project is expected to begin in 2020 and finish in the summer of 2022. As discussed under *Air Quality*, response III.b., and shown in Tables 6 and 7, criteria pollutant emissions are expected to be below San Diego County's SLTs for all nonattainment criteria pollutants and their precursors during construction. Moreover, once constructed, operational emissions would be reduced for all criteria pollutants, relative to existing conditions, due to the reduction in total building area and number of boat slips, thereby resulting in no impact on air quality. Because the proposed Project would result in less than significant impacts during construction and would have no impact during the operational phase as discussed under response III.b, the Project's operation would have no potential to contribute to cumulative air quality impacts, including cumulative health risk impacts. However, it is still possible that the proposed Project, when combined with current, proposed, or reasonably foreseeable construction projects, could result in localized air quality and health risk impacts because of the effects from dust-generating activity (i.e., demolition, grading) and construction equipment operations associated with diesel exhaust. The cumulative projects that could contribute cumulative impacts to localized air quality and health risk conditions generally include construction of the closest projects (i.e. #5 and #12). The concept for Projects #5, #12, and #17 have been proposed, but no development schedule have been proposed for these projects. Thus, it is likely construction for these three projects would occur after the proposed Project construction is complete. Moreover, each current, proposed, or foreseeable construction project is subject to the same SDAPCD rules and regulations that would reduce emissions from the proposed Project, including fugitive dust control per Rule 55. Additionally, the proposed Project would conform to SDAPCD's relevant air quality plan and would not cause congestion on nearby roadways. Thus, because the proposed Project would not exceed relevant mass emissions thresholds (San Diego County's SLTs), its incremental effect on regional air quality is not expected to result in a cumulatively considerable net increase in a nonattainment pollutant, and the proposed Project's cumulative contribution would not be cumulatively considerable.

Biological Resources

The proposed Project would have no impacts on wetlands, fish, or wildlife movement; local policies protecting biological resources; or habitat conservation plans. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to these issue areas.

The proposed Project would have less than significant impacts after mitigation is incorporated on noise effects on marine mammals, sea turtles, and fish from pile driving, and on eelgrass habitat from the dock reconfiguration. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to noise effects on marine mammals, sea turtles, and fish from pile driving, and on eelgrass habitat. The cumulative study area considered for the biological resources cumulative analysis includes the Project site and surrounding area out to a 0.5-mile radius.

Past, Present, and Reasonably Foreseeable Future Projects

Several of the cumulative projects would have potential impacts on migratory bird nesting, including any of the projects that have on-site trees or structures. Projects sites in the area also support least tern foraging and eelgrass habitat. However, mitigation that avoids or replaces impacts on eelgrass; implements soft-start and silt curtains, and a monitor during pile driving would reduce cumulative impacts to less than significant. Initiation of Project construction that would impact birds nesting in on-site trees would occur outside the peak nesting season. Therefore, the impact on biological resources from past, present, and reasonably foreseeable future projects is not cumulatively significant.

Proposed Project

As described in Section IV, *Biological Resources*, the waterside portion of the Project site provides eelgrass habitat for fish and other marine wildlife species. Mitigation is required to ensure that direct and indirect impacts on the eelgrass habitat would not be significant (see **MM-BIO-4**). In addition, the effects of noise generated by pile driving on marine wildlife would be significant if the pile driving caused harm to marine species such as East Pacific green sea turtle, managed fish species under the Coastal Pelagic Species FMP and Pacific Coast Groundfish FMP, California least tern, and marine mammals. Mitigation would require pile-driving to use a soft-start method to allow animals to leave the area prior to full impact hammering (see **MM-BIO-2**) and would require monitoring by a qualified biologist during all pile-driving activities (see **MM-BIO-1**). In addition, initiation of construction activities would be timed to minimize potential impacts to nesting birds as ensured through **MM-BIO-3**. Potential turbidity impacts to foraging birds would be reduced to less than significant through implementation of **MM-HWQ-1** through **MM-HWQ-3**. None of the proposed Project's impacts on biological resources would be considered significant when considered in connection with cumulative impacts from past, present, and reasonably foreseeable future projects. Therefore, the proposed Project's incremental contribution to cumulative biological resource impacts would not be cumulatively considerable.

Cultural Resources

The proposed Project would have no impacts on historical resources. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to this issue area.

The proposed Project would have less than significant impacts related to archaeological resources and human remains. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to disturbing archaeological resources or human remains. The cumulative study area considered for the cultural resources cumulative analysis includes the projects identified on Figure 20.

Past, Present, and Reasonably Foreseeable Future Projects

Projects that propose ground disturbing activities would have the potential to disturb archaeological resources and human remains, which include most of the projects identified in Table 37. However, based on the previous development within the cumulative study area, it is unlikely that present or future projects would encounter human remains. Present and future projects could result in impacts to archaeological resources; however, monitoring would likely reduce impacts to less than significant levels. Therefore, the impact on cultural resources from past, present, and reasonably foreseeable future projects is not cumulatively significant.

Proposed Project

As described in Section V, *Cultural Resources*, the proposed Project's cultural resources impacts would be limited to the low probability that ground disturbing activities would disturb archaeological resources or human remains. A review of historic maps shows that the Project area is situated on an artificial landform area created by bay infill and is within a highly developed environment that has been severely disturbed by development; thus, the potential for any buried resources to exist on the Project site is low. Therefore, the proposed Project's incremental cumulative contribution to the cumulative cultural resources impact would not be cumulatively considerable.

Energy

The proposed Project would have no conflicts with or obstruct state or local plans for renewable energy or energy efficiency. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to these issue areas.

The proposed Project would have less than significant impacts related to wasteful, inefficient, or unnecessary consumption of energy resources during project construction, and no impacts during project operation. The cumulative study area includes the SDG&E service area, as discussed in Section XIX, *Utilities and Service Systems*.

Past, Present, and Reasonably Foreseeable Future Projects

The past, present, and reasonably foreseeable future projects that could contribute cumulative impacts on energy consumption during construction are projects with overlapping construction schedules, such as the Bayside Performance Park Enhancement Project (#25). This project involves the replacement and enhancement of existing structures and new facilities, which would likely require the use of fuel and electricity to power construction equipment. This represents a minor increase in energy consumption that would cease upon completion of the project. Therefore, the impact on energy consumption from past, present, and reasonably foreseeable future projects is not cumulatively significant.

Proposed Project

As described in Section VI, *Energy*, the proposed Project operation would result in reduced energy demands from current usage as all light fixtures would be replaced with LED lights, low flow fixtures and appliances would be used and all new appliances would be Energy-Star qualified and irrigation of new drought-tolerant landscaped areas would be efficient. Project construction would result in a minor and temporary increase in consumption of fuel and electricity, primarily to power construction equipment. Therefore, the proposed Project's incremental contribution to energy consumption would not be cumulatively considerable.

Geology and Soils

The proposed Project would have no impacts related to faults, landslides, expansive soils, and septic/alternative waste disposal systems. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to these issue areas.

The proposed Project would have less than significant impacts after mitigation is incorporated from ground shaking, liquefaction, and lateral spreading, and less than significant impacts from erosion. The proposed Project would also have less than significant impacts related to paleontological resources. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to ground shaking, liquefaction, lateral spreading, erosion, and paleontological resources. The cumulative study area considered for the geology and soils cumulative analysis includes the Project site, Harbor Island, SDIA, and portions of the community of Point Loma, approximately 0.5 mile from the Project site.

Past, Present, and Reasonably Foreseeable Future Projects

None of the present or reasonably foreseeable cumulative projects would increase potential hazards associated with geology and soils because they would not cumulatively exacerbate the potential for harm to people or damage to structures by their implementation. All projects that include habitable elements incorporate the geotechnical and structural requirements of the current California Building Code, which has incorporated recommendations from the Uniform Building Code, now referred to as the International Building Code. These measures would reduce damage from geologic hazards, such as ground shaking, liquefaction, soil erosion, and lateral spreading, by ensuring that soils would be suitable for a building foundation and requiring the use of materials and techniques that significantly reduce the potential for serious damage to new structures.

Several projects in the cumulative study area are located on underlying formations (e.g., Bay Point Formation) that have high potential for containing paleontological resources. Projects such as #14 propose cut depths into the underlying formation would have potentially significant impacts on fossil resources. Mitigation that requires monitoring would reduce impacts on paleontological resources to less than significant; on the cumulative level, impacts on paleontological resources would not be significant because impacts would largely be avoided through mitigation or because Project grading and excavation would not reach depths great enough to have a significant impact. Therefore, at the cumulative level, geologic and soil impacts from past, present, and reasonably foreseeable future projects are not significant.

Proposed Project

As discussed in Section VII, *Geology and Soils*, the proposed Project would have a less than significant impact with mitigation related to geology and soils because it would not substantially increase the risk of geologic or soil hazards, and it would comply with existing grading requirements, the recommendations contained in the Project-specific landside and waterside geotechnical studies (see **MM-GEO-1**), and the California Building Code. In addition, the landside excavation activities would not extend below the artificial fill and into the Bay Point Formation, and waterside activities would not require the removal of sediments. None of the proposed Project's impacts on geology and soils would be considered significant when considered in connection with cumulative impacts from past, present, and reasonably foreseeable future projects. Therefore, the proposed Project's incremental contribution to geology and soils impacts would not be cumulatively considerable.

Greenhouse Gas Emissions and Climate Change

The proposed Project would have a less than significant impact related to GHG emissions, would not conflict with the District's Climate Action Plan, AB 32, Executive Order S-03-05, or Executive Order B-29-15less than significant impact. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to GHG emissions. GHG emissions and the effects of climate change are a cumulative global issue and accumulate in the earth's atmosphere for many years. Therefore, the cumulative study area is the entire globe.

Past, Present, and Reasonably Foreseeable Future Projects

All of the cumulative projects would contribute varying amounts of GHG emissions, which, when combined, would be considered cumulatively significant.

Proposed Project

As discussed under response VII.a, GHG emissions associated with the proposed Project would be reduced relative to existing conditions. As shown in Tables 14 and 15, emissions would be reduced and thus far below the chosen threshold level which demonstrates the Project's fair share of the reductions consistent with AB 32. The proposed Project is also consistent with the District's CAP reduction targets and measures, including EB6 (efficient lighting), EH3 (water conservation), and SW1 (debris recycling). Moreover, the proposed Project would exhibit "substantial progress" towards post-2020 goals by reducing total building area and number of slips relative to existing conditions, resulting in a reduction in GHG emissions from the Project site over the long-term, as there would also be a decrease in energy or water consumption relative to existing conditions. Long-term visitation (vehicle trips and boating) is expected to remain unchanged, but emissions associated with vehicle trips, building energy use, water use, and boating reduce over time as vehicle statewide and CAP measures continue to be implemented and newer post-2020 measures are proposed. The analysis compares Project emissions to existing conditions under the assumption that existing emissions would remain similar into 2020 and beyond and does not take into account emission reductions implemented by the state and through the District's CAP that would reduce GHG emissions over time. Therefore, the proposed Project would not generate GHG emissions, either directly or indirectly, that could have a significant impact on the environment. The proposed Project's contribution to cumulative GHG emissions during construction and its 40-year operation would not be cumulatively considerable.

Hazards and Hazardous Materials

The proposed Project would have no impact related to handling hazardous materials within proximity to a school, interference with an emergency evacuation plan, or the potential for wildland fires. In addition, it would not create a hazard associated with a private airstrip. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to these issue areas.

The proposed Project would have less than significant impacts with mitigation related to the routine transport, use, or disposal of hazardous materials; reasonably foreseeable upset conditions involving hazardous wastes; being included on the Cortese List (closed case); and being located within 0.5 mile of SDIA. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to these issues. The cumulative study area considered for the hazards and hazardous materials cumulative analysis includes the Project site, Harbor Island, SDIA, and portions of the community of Point Loma, approximately 0.5 mile from the Project site.

Past, Present, and Reasonably Foreseeable Future Projects

Cumulative projects would require the routine transport, use, or disposal of hazardous materials; however, none of the projects use or would use acutely hazardous materials or materials that are more hazardous than commonly used hazardous materials, such as petroleum and related products, cleaners, herbicides, and pesticides. Moreover, none of the projects would result in reasonably foreseeable upset conditions involving hazardous wastes that would not be mitigated to avoid a significant impact. Moreover, all sites that are on the Cortese List would require remediation and/or capping before being deemed suitable for occupancy. Finally, all of the projects are within 2 miles of SDIA; however, it is expected all present and future projects would comply with the existing ALUCP, which would avoid a cumulatively significant impact.

Proposed Project

The proposed Project would comply with all hazardous material regulations involving the transport, use, and disposal of hazardous materials, including existing regulations that require proper removal and disposal of ACM and lead-based paints. In addition, **MM-HAZ-1** would be implemented to avoid hazards to the public and environment associated with any disturbed, impaired sediments. Although the Project site once had two open site contamination cases, both have been remediated and given a closed status by the San Diego County DEH. Their successful remediation combined with the consideration that the proposed Project would not directly excavate in the immediate area of the former contamination sites, supports the determination that the proposed Project would not contribute to a cumulatively considerable hazardous materials impact.

The proposed Project would also comply fully with the applicable ALUCP. It would not introduce a substantial number of people to safety hazards or create any new safety hazards from its design. Therefore, because the proposed Project would be fully compliant with existing hazardous materials regulations and the ALUCP and because there would be a very low potential to encounter on-site contamination, the proposed Project's contributions to cumulative impacts related to hazards and hazardous materials would not be cumulatively considerable.

Hydrology and Water Quality

The proposed Project would have no impact related to the depletion of groundwater supplies or an exceedance of existing stormwater capacity. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to these issue areas.

The proposed Project would have less than significant impacts, some with mitigation incorporated, related to violating water quality standards; altering drainage, which could lead to erosion; or risking release of pollutants due to project inundation. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to water quality standards, erosion, and pollutant release. The cumulative study area considered for the hydrology and water quality cumulative analysis includes the Project site, Harbor Island, SDIA, portions of the community of Point Loma, and the San Diego Bay as a receiving water. Additionally, the proposed Project would have a less than significant impact related to sea-level rise. The cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to sea level rise.

Past, Present, and Reasonably Foreseeable Future Projects

Past projectsas well as present and future projects have been and will continue to be required to prepare water quality management plans, such as SWPPPs and USMPs, and comply with the requirements of their respective jurisdictions. San Diego Bay is a 303(d) impaired water body; however, regulations are having positive effects on water quality. Although future projects will be sources of additional polluted runoff and capable of causing erosion, such plans will ensure that runoff is contained on-site or treated prior to being discharged into the storm drainage system and erosion is minimized through the use of stabilizing measures. The cumulative effects from projects #1 through #25 are not cumulatively significant.

Regarding SLR, projects would not combine to increase the effects of SLR (i.e., greater SLR) as SLR would be an effect of the environment on cumulative projects that would not be affected by a single project or even several projects. Thus, the impact on SLR from cumulative projects would not be cumulatively significant.

Proposed Project

The proposed Project would prepare a SWPPP during the construction phase and a SWQMP for post-construction. These two plans would specify BMPs to ensure that the proposed Project would not result in an adverse cumulative contribution to cumulative water quality in the area, including the bay. Moreover, in-water work, such as the pile removal and pile driving, would stir sediments along the floor of the bay. However, this activity would be localized and would not combine with the cumulative impacts of other projects, and **MM-HWQ-1** through **MM-HWQ-3** would be implemented to ensure that no nuisance turbidity affects water quality. Therefore, the proposed Project's incremental contribution to cumulative impacts would not be cumulatively considerable.

The cumulative effect of SLR on the proposed Project would not be substantially worsened by the cumulative projects. While all of the cumulative projects may face SLR beyond 2100, the effect of SLR on one or more of the cumulative projects would not worsen the effect of SLR on the Project site. Similarly, the fact that the Project site may be inundated at a time beyond 2100 (assuming no adaption measures are implemented at a future date) would not mean the Project's contribution to cumulative SLR impacts would be cumulatively considerable as the proposed Project's inundation would not cause more cumulative projects to be inundated. In any case, SLR beyond 2100 is beyond the scope of the proposed Project, which only requests a 40 year operational lease. Considering sea level rise, at the end of the lease (2060) the low point of the Project site is projected to remain 4.1-5.2 feet above the 100-year storm surge water level. Therefore, over the lease of the Project, the Project site is not expected to experience any permanent or temporary inundation.

Even when looking out to 2100, the site would remain 3.2 feet above a 2100 100-year storm surge if the low risk aversion sea level projections come to pass. If the medium-high risk aversion sea level projections materialize, the site could be inundated by up to 0.2 feet (2.4 inches) of water during a 100-year storm surge in the year 2100. However, given the range of projections and the uncertainty in the 2100 time period, no actions are necessary at this time and it is anticipated that the proposed Project's contribution to cumulative SLR would not be cumulatively considerable.

Land Use and Planning

The proposed Project would have no impact related to the division of an established community and would not conflict with any applicable habitat conservation plans. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to these issue areas.

The proposed Project would have a less than significant impact related to a potential conflict with adopted plans and policies. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to potential conflicts with adopted plans and policies. The cumulative study area considered for the land use and planning cumulative analysis includes the Project site and Harbor Island.

Past, Present, and Reasonably Foreseeable Future Projects

Past, present, and future projects within the cumulative study area are consistent with the surrounding land and water uses (i.e., Commercial Recreation, Recreational Boat Berthing, Fueling Dock, and Sanitary Pump Dock). These projects either assist with public access and recreation at the waterfront or support existing uses that do so. Therefore, these projects are consistent with applicable plans and policies, such as the guidance provided by the PMP and the regulations associated with Chapters 3 and 8 of the California Coastal Act. Impacts from these projects would not be cumulatively significant.

Proposed Project

The proposed Project would be consistent with the applicable plans and policies, such as the PMP and California Coastal Act. The proposed Project would continue to operate as a recreational marina with visitor-serving uses such as a restaurant and marine-related businesses. The proposed Project would also construct a public promenade for the general public's use and enjoyment; it would also redevelop the existing viewing deck for public use. The waterside portion of the Project would redevelop the existing dock and improve the general safety of the marina, maintaining consistency with the Recreational Boat Berthing designation of the PMP. None of the proposed Project related actions would impede coastal access, including public access to the waterfront. In addition, the building would be reduced in size to address market demand. Therefore, the proposed Project's contribution to cumulative impacts would not be cumulatively considerable.

Noise and Vibration

The proposed Project would have no impacts related to creating a substantial permanent increase in ambient noise or exposing people at the Project site to excessive noise levels from private airstrips. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to these issue areas.

The proposed Project would have less than significant impacts related to generating noise levels during the construction phase that would be in excess of standards, exposing persons to excessive ground-borne vibration during the construction phase (primarily related to pile driving), temporary increases in ambient noise during the construction phase, or exposing people to noise from nearby airports (SDIA and Naval Air Station North Island). Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to these issues. The cumulative study area considered for the noise and vibration cumulative analysis includes the Project site and a radius of approximately 0.25 mile from the site.

Past, Present, and Reasonably Foreseeable Future Projects

The cumulative projects all have (or had) construction phases that generated noise and vibration. Projects that overlap during the construction phase may cause a cumulatively significant impact. However, the cumulative projects are fairly spaced out from one another, and noise quickly dissipates over distance. Thus, construction noise generated from the east side of SDIA (#11) would be too far from development on Harbor Island to result in a cumulative noise impact. Moreover, although several of the projects are within the AIA of SDIA, the noise exposure for people working at these project locations is not excessive. Modern building standards ensure that noise levels within buildings are acceptable (generally 45 dBA or less) and outside areas, particularly at project sites that are farther away from the airport, are only intermittently interrupted by airport noise. The interruptions are not excessive and not to a level that causes extreme annoyance or health issues. Therefore, because only a few project construction schedules overlap, the projects are far enough away from one another to avoid increased noise in the aggregate, and the projects do not expose people to harmful noise levels, the combined noise impacts from past, present, and future projects are not cumulatively significant.

Proposed Project

The proposed Project would generate temporary noise and vibration associated with construction activities. However, no sensitive receptors (e.g., residential, health care, or educational facilities) would be affected. Noise from construction, particularly Phase 1, would occasionally produce loud noises at adjacent District parks (i.e., Spanish Landing Park West and Harbor Island Park) in the range of 67 to 70 dBA over a 12-hour period. Although noise would be present at these locations, it would be temporary, and park users would be able to relocate farther away from the site. The worst-case noise increases would be limited to the noisiest (i.e., closest) periods of Phase I construction only and would cease as soon as pile driving activities stop. Furthermore, all construction noise levels would be below the City of San Diego's construction noise standard of 75 dBA 12-hour L_{eq}. Therefore the temporary ambient noise increase impacts associated with these receptors would not be cumulatively considerable.

The proposed Project would replace existing facilities with similar facilities, but on a smaller scale, and would retain the existing function of the marina. As such, operation of the proposed Project would not introduce new noise sources and operational noise that does occur would be similar to or less than the existing condition given the reduced size of the marina. Therefore, the proposed Project's contribution to cumulative noise impacts would not be cumulatively considerable.

Population and Housing

The proposed Project would have no impact related to displacing housing or people. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to either of these issue areas.

The proposed Project would have less than significant impacts related to inducing substantial population growth. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to substantial population growth. The cumulative study area considered for the population and housing cumulative analysis includes an approximately 0.5-mile radius around the Project site.

Past, Present, and Reasonably Foreseeable Future Projects

Cumulative projects at SDIA are growth-accommodating projects because they would allow more efficient air travel to and from San Diego and would be able to process more air travelers. The hotel projects are also growth accommodating because they would allow more visitors to access the San Diego waterfront. However, the projects are not growth inducing. For instance, the additional parking at SDIA would not lead more people to want to move to San Diego. Similarly, the hotel projects may encourage tourism and business travel to San Diego, but the presence of the hotel would not result in more people relocating to San Diego. Therefore, the impact on population and housing resources from past, present, and reasonably foreseeable future projects is not cumulatively significant.

Proposed Project

As discussed in Section XIV, *Population and Housing*, the proposed Project would have a less than significant impact on population and housing because it would not substantially induce population growth in the area. Although the proposed Project would create a need for temporary construction workers, the introduction of additional employees would not result in a significant increase in the local population and would not induce substantial population growth because the additional jobs would be filled by residents who currently live in the San Diego region. Therefore, the proposed Project's incremental contribution to cumulative population and housing impacts would not be cumulatively considerable.

Public Services

The proposed Project would have no impacts related the construction of new or expanded schools and other public facilities. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to either of these issue areas.

The proposed Project would have a less than significant impact related to the construction of new or expanded fire protection, police protection, and park facilities. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to these issues. The cumulative study area considered for the public services cumulative analysis includes the service areas for the San Diego Harbor Police Department, SDFRD, and SDPD.

Past, Present, and Reasonably Foreseeable Future Projects

None of the past, present, or reasonably foreseeable cumulative projects would significantly affect public services. Fire and police protection services already provide service to the cumulative study area. The addition of the cumulative projects would not represent a substantial increase in population or the need for substantially more fire or police protection. Moreover, as the population increases in the city as a whole, the City of San Diego will be tasked with providing sufficient fire and police protection pursuant to the City of San Diego's constitutional obligation. Similar to police and fire protection services, park services would not be significantly affected by the cumulative projects. Projects involving parking, demolition, and airport expansion would have little to no effect on parks given the nature of the projects. The hotel projects could increase demand for recreational uses, but would provide several recreational amenities to offset any cumulative impact on park facilities (e.g., Project #4 includes a 1.9-acre public park at the corner of Broadway and Harbor Drive).

Therefore, because the cumulative projects are located in an urban setting, are currently served by public services, require little to no additional public services, and require no physical expansion of any public service facilities that would result in significant environmental impacts, impacts on public services from past, present, and reasonably foreseeable future projects are not cumulatively significant.

Proposed Project

As discussed in Section XV, *Public Services*, the proposed Project would have a less than significant impact on public services. Although the proposed Project may result in a modest increase in fire protection, police protection, and park use, the proposed Project would not require new or expanded public service facilities. None of the proposed Project's impacts on public services would be considered significant when considered in connection with cumulative impacts from past, present, and reasonably foreseeable future projects. Therefore, no physical changes to the environment would occur, and the proposed Project's incremental contribution to cumulative public service impacts would not be cumulatively considerable.

Recreation

The proposed Project would have less than significant impacts related to the use of parks and other recreational facilities and less than significant impacts with mitigation incorporated for the proposed Project's construction of recreational facilities, including the marina and vessel slips. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to recreational resources. The cumulative study area considered for the recreation cumulative analysis includes the Project site and the area within 0.5 mile of the Project site.

Past, Present, and Reasonably Foreseeable Future Projects

None of the past, present, or reasonably foreseeable cumulative projects would affect recreational resources in a significant and adverse manner. Cumulative projects #3, #4, #11, #14, #16, #18, and #19 would improve recreational resources in the Project site and its surroundings. Therefore, the impact on recreational resources from past, present, and reasonably foreseeable future projects is not cumulatively significant.

Proposed Project

The discussion in Section XVI, *Recreation*, includes the potential for increased demand for recreational facilities and the potential to affect existing recreational opportunities. The proposed Project has recreational components (marina, recreational vessel slips, and restaurant) that would be improved or added. Moreover, the proposed Project would not hinder access to the closest recreational facilities (Harbor Island Park and Spanish Landing Park West). Consequently, none of the proposed Project's impacts on recreation would be considered significant when considered in connection with cumulative impacts from past, present, and reasonably foreseeable future projects. Therefore, the proposed Project's incremental contribution to cumulative recreation impacts would not be cumulatively considerable.

Transportation

The proposed Project would have no impact related hazardous design features or incompatible uses, inadequate emergency access, or conflicts with public transit, bicycle, or pedestrian policies, plans, or programs. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to any of these issue areas.

The proposed Project would have less than significant impacts on the congestion management program during Project construction and less than significant impacts related to changes in air traffic patterns; the proposed Project's impact related to construction traffic would be less than significant as well. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to these issues. The cumulative study area considered for the transportation and parking cumulative analysis includes the Project site and the area within 0.5 mile of the Project site.

Past, Present, and Reasonably Foreseeable Future Projects

All of the past, present, or reasonably foreseeable cumulative projects would increase traffic to varying degrees. The projects closest to the Project site are the parking plaza at SDIA (#2), Navy Miramar Pipeline Repair and Relocation (#10), Lockheed Martin Company Marine Terminal Demolition Project (#12), and Harbor Island East Basin Industrial Subarea Redevelopment and Port Master Plan Amendment Project (#19) would temporarily increase traffic associated with construction. However, none of these projects would overlap for significant periods of time. In addition, with the exception of Project #19, these projects would result in minimal or no increase in operational traffic. Other projects that include restaurant, hotel, condominium, or apartments would not overlap during construction, but they would result in a permanent increase in operational traffic. As indicated in Section XVII, *Transportation*, there are segments of North Harbor Drive that currently fail with respect to LOS. Therefore, the addition of more traffic from the introduction of new operational land uses would be cumulatively significant. Cumulative impacts on parking, however, are not cumulatively significant. No parking would be needed for several of the cumulative projects, such as #10, #12, and #21. Moreover, several projects include adequate parking, such as #2, #3, and #4.

Proposed Project

The discussion in Section XVII, *Transportation*, notes that proposed Project traffic during the operational phase would be less than the existing traffic at the Project site due to the reduction in building square footage and number of boat slips. Thus, the proposed Project would not contribute to a significant cumulative impact once operational. During the construction phase, Project traffic would temporarily increase by up to 171 ADTs during the peak construction phases from construction workers' commute trips (one trip in and one trip out per worker) and truck haul trips and material deliveries. Overall, the amount of traffic would be relatively small and would occur in the near future (summer 2020 to summer 2022), thus avoiding long-term cumulative traffic levels in the Project area. Finally, sufficient parking would be provided for the proposed Project, which would ensure the Project's demand for parking would not contribute to a significant cumulative impact. Consequently, the proposed Project's contribution to significant transportation and parking cumulative impacts would not be cumulatively considerable.

Tribal Cultural Resources

The proposed Project would have less than significant impacts related to tribal cultural resources. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to disturbing tribal cultural resources. The cumulative study area considered for the tribal cultural resources cumulative analysis includes the projects identified on Figure 20.

Past, Present, and Reasonably Foreseeable Future Projects

Projects that propose ground disturbing activities would have the potential to disturb tribal cultural resources, which include most of the projects identified in Table 37. Present and future projects could result in impacts to tribal cultural resources; however, monitoring would likely reduce impacts to less than significant levels. Therefore, the impact on tribal cultural resources from past, present, and reasonably foreseeable future projects is not cumulatively significant.

Proposed Project

As described in Section XVIII, *Tribal Cultural Resources*, the proposed Project's tribal cultural resources impacts would be limited to the low probability that ground disturbing activities would disturb tribal cultural resources. A review of historic maps shows that the Project area is situated on an artificial landform area created by bay infill and is within a highly developed environment that has been severely disturbed by development; thus, the potential for any buried resources to exist on the Project site is low. Therefore, the proposed Project's incremental cumulative contribution to the cumulative tribal cultural resources impact would not be cumulatively considerable.

Utilities and Service Systems

The proposed Project would not exceed wastewater treatment requirements, require construction of water and wastewater infrastructure that would result in significant impacts on the environment, or conflict with federal, state, and local solid water statutes and regulations. As a result, the proposed Project would not contribute to any potentially significant cumulative impacts related to any of these issue areas.

The proposed Project would have less than significant impacts related to the construction of storm drain facilities, water supply and conservation, adequate wastewater treatment capacity, sufficient landfill capacity, and energy use. Therefore, the cumulative analysis below considers the cumulative impacts of past, present, and probable future projects as they relate to these issues.

The cumulative study area considered for the utilities and service systems cumulative analysis includes the utility service areas of the City of San Diego's Public Utilities Department wastewater branch for wastewater conveyance, the PLWTP for wastewater treatment, the City of San Diego's Public Utilities Department for water conveyance and supply, and the City of San Diego's landfills for solid waste. SDG&E provides electricity and gas service to the Project site and the cumulative study area.

Past, Present, and Reasonably Foreseeable Future Projects

None of the present or reasonably foreseeable cumulative projects would affect utilities in a significant and adverse manner. Although several of the projects at SDIA would expand its current capacity for air travel, the projects have been designed with "green" sustainable measures. Projects within the District's jurisdiction would also improve utility use on-site; however, the projects involving restaurants, hotels, condominiums, and apartments would result in greater utility (water, wastewater, solid waste) and energy use because they would provide visitor-serving uses that do not currently exist. Although several of the cumulative projects would require few additional utilities and be designed to be highly efficient, the introduction of new uses would increase the demand for water, wastewater, solid waste, and energy. Therefore, the impact on utilities from past, present, and reasonably foreseeable future projects is considered cumulatively significant.

Proposed Project

As discussed in Section XIX, *Utilities and Service Systems*, Project operation would not increase utility demands at the Project site. Instead, the proposed Project would upgrade existing utilities to be more energy and water efficient, resulting in less wastewater being produced and less water being consumed. During construction, water use would be required for dust suppression, in accordance with SDAPCD rules; however, the water would be brought in by water truck and would only be required for a few months of construction that is associated with the grading phase. Moreover, little wastewater would be generated during construction as a result of the limited water use during construction and as a result of the water used on-site being absorbed into the soils (from spraying exposed soil for dust control). The use of portable toilets and the stormwater containment measures provided by the SWPPP would ensure that the amount of wastewater generated on-site would be minimal and would not contribute to a cumulative impact. In addition, the proposed Project is anticipated to recycle any concrete material exported off-site during construction as well as wood, steel, glass, aluminum, and other metals. ACM and lead-based paint would be removed and disposed of in accordance with existing regulations. The proposed Project would generate very small amounts of non-hazardous, non-recyclable solid waste, which would primarily be associated with the additional 37 construction employees. This waste would consist mostly of food and beverage containers from lunch breaks. Consequently, none of the proposed Project's impacts on utilities would be considered significant when considered in connection with cumulative impacts from past, present, and reasonably foreseeable future projects. Therefore, the proposed Project's incremental contribution to utilities and service systems would not be cumulatively considerable.

c. Does the project have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?

Less Than Significant Impact with Mitigation Incorporated. As analyzed in Sections I through XX the proposed Project would not result in potentially significant impacts that could cause substantial adverse effects on human beings, either directly or indirectly. Impacts from air quality and health risk, greenhouse gas emissions and climate change, and noise would all be less than significant and would not cause a substantial adverse effect on humans. Impacts related to geology and soils, hazards and hazardous materials, and water quality and hydrology would also not cause a substantial adverse effect on humans because mitigation measures MM-GEO-1, MM-HAZ-1, and MM-HWQ-1 through MM-HWQ-3 would reduce impacts to less than significant levels.

Section 5 List of Preparers and Agencies Consulted

Consistent with State CEQA Guidelines Section 15063 (d) (6), the following section provides a listing of the persons who prepared this Initial Study as well as those persons who contributed project information.

5.1 San Diego Unified Port of San Diego

Wileen Manaois - Director, Development Services

Joseph Smith - Department Manager, Development Service

Megan Hamilton - Associate Planner, Development Services

Sean Jones - Asset Manager, Real Estate

Eileen Maher – Director, Environmental Conservation

Paul Brown - Program Manager, Planning & Green Port

5.2 CEQA Consultants

Charlie Richmond - Project Director

Elyssa Figari - Project Manager

Tristan Evert - Senior Environmental Planner

Emily Seklecki - Environmental Planner

Matt McFalls - Air Quality and Greenhouse Gas Specialist

Jonathan Higginson, INCE - Noise Specialist

Laura Rocha - Water Quality Specialist

Tim Yates, Ph.D - Historian

Karen Crawford, MA, RPA - Senior Archaeologist

5.3 Technical Consultants

Robert Mooney - Ph.D, Marine Biology

5.4 Agencies, Organizations, and Persons Consulted

Agency/Company Name	**Contact**
San Diego County Regional Airport Authority	Ed Gowens, Senior Airport Planner

Section 6 References

6.1 Project Description References

Harbor Island West (HIW). 2018. Project Information Provided by Applicant.

San Diego Unified Port District (District). 2017. *Port Master Plan*. Available: https://www.portofsandiego.org/document/environment/land-use-planning/4729-port-master-plan-1/file.html. Accessed: August 12, 2019.

TerraCosta Consulting Group. 2012. *Guide Pile and Approach Pier/Gangway Foundation Design Criteria.* Draft.

6.2 Aesthetics References

California Department of Public Transportation (Caltrans). 2017. *List of Eligible and Officially Designated State Scenic Highways.* Available: https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways. Accessed: August 29, 2019.

San Diego Unified Port District (District). 2017a. *Port Master Plan*. Available: https://www.portofsandiego.org/document/environment/land-use-planning/4729-port-master-plan-1/file.html. Accessed: April 9, 2018.

6.3 Agricultural Resources References

Department of Conservation (DOC). 1997. *California Agricultural Land Evaluation and Site Assessment Model*.

———. 2013. San Diego County Williamson Act Lands Map. 2013. *Division of Land Resources Protection*. Sacramento, CA.

———. 2016. *San Diego County Important Farmland Finder.* Available: https://maps.conservation.ca.gov/DLRP/CIFF/. Accessed: April 9, 2019.

San Diego Unified Port District (District). 2017a. *Port Master Plan*. Available: https://www.portofsandiego.org/document/environment/land-use-planning/4729-port-master-plan-1/file.html. Accessed: August 12, 2019.

6.4 Air Quality References

California Air Resources Board (CARB). 2005. *Air Quality and Land Use Handbook: A Community Health Perspective*. Available: http://www.arb.ca.gov/ch/landuse.htm. April.

———. 2010. *Harborcraft Emission Inventory Methodology*. May. Available: https://www.arb.ca.gov/regact/2010/chc10/appc.pdf.

———. 2016. *Ambient Air Quality Standards*. Available: https://www.arb.ca.gov/research/aaqs/aaqs2.pdf. Accessed: August 22, 2019.

———. 2019. *Meteorological Files*. Available: https://ww3.arb.ca.gov/toxics/harp/metfiles2.htm. Accessed: November 15, 2019.

Resitoglu, Ibrahim. 2018. *NO_X Pollutants from Diesel Vehicles and Trends in the Control Technologies.* Available: https://www.intechopen.com/online-first/nox-pollutants-from-diesel-vehicles-and-trends-in-the-control-technologies. Accessed: August 22, 2019.

SCAQMD. 2019. South Coast AQMD Air Quality Significance Thresholds. Available: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf. April.

San Diego Air Pollution Control District (SDAPCD). 2016a.. 2008 Eight-Hour Ozone Attainment Plan for San Diego County: Available: https://www.sandiegocounty.gov/content/sdc/apcd/en/air-quality-planning.html. December.

_______. 2016b. Revision of the Regional Air Quality Strategy for San Diego County. Available: https://www.sandiegocounty.gov/content/sdc/apcd/en/air-quality-planning.html. December.

________. 2016c. *Rule 20.2, New Source Review, Non-major Stationary Sources*. Available: https://www.sdapcd.org/content/dam/sdc/apcd/PDF/Rules_and_Regulations/Permits/APCD_20.2-2016.pdf. Accessed: November 15, 2019.

San Diego Unified Port District (District). 2018a. *2016 Maritime Air Emissions Inventory*. June.

U.S. Environmental Protection Agency (EPA). 2014. *Health Risk and Exposure Assessment for Ozone.* Final Report. Available: https://www3.epa.gov/ttn/naaqs/standards/ozone/data/20140829healthreasummary.pdf. Accessed: August 29, 2019.

———. 2018. *Greenhouse Gas Equivalencies Calculator*. Available: https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator. Accessed: August 29, 2019.

6.5 Biological Resources References

Bartholomew, G. A. 1967. Seal and Sea Lion Populations of the California Islands. Pages 227–244 in R. N. Philbrick (ed.), *Proceedings of the Symposium on the Biology of the California Islands.* Santa Barbara Botanic Garden, Santa Barbara, Calif.

David, J. A. 2006. Likely Sensitivity of Bottlenose Dolphins to Pile-driving Noise. *Water and Environment Journal* 20 (2006):48–54.

Illinworth & Rodkin. 2007. *Compendium of Pole Driving Sound Data.* September 27, 2007.

Joint Nature Conservation Committee. 2004. *Guidelines for Minimising Acoustic Disturbance to Marine Mammals from Acoustic Surveys*. Joint Nature Conservation Committee, Aberdeen. Available: www.jncc.gov.uk/marine.

McCain, B. B. 2003. Essential *Fish Habitat West Coast Groundfish Draft Revised Appendix*. Seattle, WA: National Marine Fisheries Service, Northwest Fisheries Science Center.

Mooney, Robert. Memorandum of Observations from Robert Mooney. 2019.

National Marine Fisheries Service (NMFS). 2014. *California Eelgrass Mitigation Policy and Implementing Guidelines*.

Naval Facilities Engineering Command Southwest (NAVFAC SW). 2018. *Monitoring Report for Fuel Pier Replacement Project (P-151) Naval Base Point Loma, San Diego, CA 1 May 2017 to 7 October 2017, Addendum.*

National Oceanic and Atmospheric Administration (NOAA). 2016. *Taking of Marine Mammals Incidental to Specified Activities; Construction of the East Span of the San Francisco-Oakland Bay Bridge.* 81 FR 48745.

———. 2017. *Incidental Harassment Authorization for the Pier Replacement Project in San Diego Bay at Naval Base Point Loma, California*. 50 CFR 216.107.

Pacific Fishery Management Council (PFMC). 2005. *Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery. Appendix B; Part 2: Groundfish Life History Descriptions*. Pacific Fishery Management Council, Portland, OR.

———. 2016. *Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery*. Pacific Fishery Management Council, Portland, OR.

———. 2019. *Coastal Pelagic Species Fishery Management Plan as Amended through Amendment 17*. Pacific Fishery Management Council, Portland, OR.

San Diego Unified Port District (District) 2018b. *San Diego Bay Avian Surveys 2016–2017*. April 2018.

U.S. Fish and Wildlife Service (USFWS). 2006. *California Least Tern (*Sternula antillarum browni*) 5-Year Review Summary and Evaluation.* U.S. Fish and Wildlife Service Carlsbad Fish and Wildlife Office Carlsbad, California. September 2006.

U.S. Navy and the San Diego Unified Port District (District). 2013. *Integrated Natural Resources Management Plan*. September 2013.

Williams, J.P., D.J. Pondella, C.M. Williams, M.J. Robart. 2016. *Fisheries Inventory and Utilization of San Diego Bay, San Diego, California for Surveys Conducted in April and July 2016*. Prepared for the Port of San Diego. November 2016. 68 pp.

6.6 Cultural Resources References

California State Lands Commission. 2015. Shipwreck Database. Available: http://www.slc.ca.gov/Info/Shipwrecks/ShipwreckInfo.pdf. Accessed: March 21, 2018.

Irwin, Wayne Ray. 1970. *The Port of San Diego: An Economic Geography of Waterborne Trade.* Master's Thesis in Geography, San Diego State College.

NETR. 1972. Aerial Photograph of Harbor Island, San Diego, CA. Available: http://www.historicaerials.com/. Accessed: February 27, 2015.

San Diego Unified Port District (District). 1974. History and Development of the Port of San Diego. Unpublished Pamphlet on File at the San Diego Public Library, Ninth Floor San Diego Heritage Room.

United States Geological Survey (USGS). 1953. Point Loma, California. 7.5-minute Series (1:24000). Topographic Quadrangle Map.

———. 1975. Point Loma, California. 7.5-minute Series (1:24000). Topographic Quadrangle Map. Surveyed 1967, Photo-revised 1975.

6.7 Geology and Soils References

California Department of Conservation (DOC). 2015. *Search for Regulatory Maps.* Available: http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm. Accessed: February 16, 2015.

California Seismic Safety Commission. 2005. *Homeowner's Guide to Earthquake Safety*. Available: http://www.seismic.ca.gov/pub/CSSC_2005-01_HOG.pdf. Accessed: February 16, 2015.

City of San Diego. 2008. *Seismic Safety Study – Geologic Hazards and Faults.* Available: http://archive.sandiego.gov/development-services/industry/hazards/pdf/geo16.pdf. Accessed: April 10, 2018.

———. 2016. *California Environmental Quality Act Significance Determination Thresholds*. July 2016.

TerraCosta Consulting Group. 2012. *Guide Pile and Approach Pier/Gangway Foundation Design Criteria.* Draft.

———. 2015. *Geotechnical Investigation Landside Improvements. Harbor Island West Marina, San Diego, California.* Prepared for Harbor Island West Marina, San Diego, California. January 28, 2015.

6.8 Greenhouse Gas Emissions References

California Air Resources Board (CARB). 2010. *Harborcraft Emission Inventory Methodology.* May. Available: https://www.arb.ca.gov/regact/2010/chc10/appc.pdf.

San Diego Unified Port District (District). 2013a. *Climate Action Plan*.

———. 2018a. *2016 Maritime Air Emissions Inventory*. June.

U.S. Environmental Protection Agency (EPA). 2018. *Greenhouse Gas Equivalencies Calculator*. Last Revised: November 14, 2019. Available: http://www.epa.gov/cleanenergy/energy-resources/calculator.html#results.

6.9 Hazards References

Buchman, Michael F. 2008. Screen Quick Reference Tables (SQuiRTs). Available: https://repository.library.noaa.gov/view/noaa/9327. Accessed: November 15, 2019.

City of San Diego. 2009. *Very High Fire Hazard Severity Zone Map, Sheet 14.* Available: https://www.sandiego.gov/sites/default/files/legacy/fire/pdf/maps/grid14.pdf. Accessed: April 10, 2018.

County of San Diego. 2018. *San Diego County Emergency Operations Plan*. Available: https://www.sandiegocounty.gov/content/sdc/oes/emergency_management/oes_jl_oparea.html.

Department of Toxic Substances Control (DTSC). 2018. *EnviroStor Map.* Available: http://www.envirostor.dtsc.ca.gov/?surl=maezx. Accessed: April 10, 2018.

San Diego County Regional Airport Authority (SDCRAA). 2014. *San Diego International Airport Land Use Compatibility Plan.* Available: http://www.san.org/Portals/0/Documents/Land%20Use%20Compatibility/SDIA/SDIA%20ALUCP%20Ch%201-6%20(May%202014).pdf. Accessed: April 10, 2018.

State Water Resources Control Board (SWRCB). 1989. *GeoTracker Case Summary*. Available: https://geotracker.waterboards.ca.gov/case_summary?global_id=T0607300123. Accessed: April 10, 2018.

———. 1993. *GeoTracker Case Summary.* Available: https://geotracker.waterboards.ca.gov/case_summary?global_id=T0607301216. Accessed: April 10, 2018.

———. 2009. *Water Quality Control Plan for Enclosed Bays Estuaries*. August 25, 2009. Available: https://www.waterboards.ca.gov/water_issues/programs/bptcp/docs/sediment/sed_qlty_part1.pdf. Accessed: November 15, 2019.

6.10 Hydrology and Water Quality References

California Department of Conservation. 2009. *California Emergency Management Agency Tsunami Inundation Maps: San Diego County*. Available: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/SanDiego/Documents/Tsunami_Inundation_PointLoma_Quad_SanDiego.pdf. Accessed: April 10, 2018.

California Department of Water Resources. 2019. *SGMA Groundwater Management.* Available: https://water.ca.gov/Programs/Groundwater-Management/SGMA-Groundwater-Management. Accessed: October 29, 2019.

California State Parks Division of Boating and Waterways. 2017. *Clean and Green Program.* Available: https://dbw.parks.ca.gov/?page_id=28767. Accessed: November 1, 2017.

County of San Diego. 2011. *San Diego County General Plan Update EIR. Section 2.8, Hydrology and Water Quality.* Available: http://www.sdcounty.ca.gov/pds/gpupdate/docs/BOS_Aug2011/EIR/FEIR_2.08_-_Hydrology_2011.pdf. Accessed: April 14, 2014.

———. 2019. *About the Sustainable Groundwater Management Act (SGMA)*. Available: https://www.sandiegocounty.gov/pds/SGMA.html. Accessed: October 29, 2019.

Federal Emergency Management Agency (FEMA). 2012. *FEMA Flood Map Service*. Available: https://msc.fema.gov/portal/search?AddressQuery=san%20diego#searchresultsanchor, Accessed: April 9, 2018

Project Clean Water. 2016. *San Diego Bay Watershed Management Act*. Available: https://www.projectcleanwater.org/san-diego-bay-wma/ . Accessed: April 9, 2018.

San Diego Unified Port District (District). 2006. *San Diego Bay Boater's Guide*.

———. 2015. *Jurisdictional Runoff Management Program*. June 2015.

———. 2018b. *Port Best Management Practice (BMP) Design Manual*. January 2018.

———. 2019. *Best Management Practices and Environmental Standards for Overwater Structural Repair and Maintenance Activities for Existing Port Facilities Conducted by the San Diego Unified Port District*. Adopted June 18, 2019.

State Water Resources Control Board (SWRCB). 2018. Final 2014/2016 California Integrated Report. Available at: https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2014_2016.shtml. Accessed: April 25, 2018.

6.11 Land Use and Planning

San Diego Unified Port District (District). 2017a. *Port Master Plan*. Available: https://www.portofsandiego.org/document/environment/land-use-planning/4729-port-master-plan-1/file.html. Accessed: August 12, 2019.

6.12 Minerals References

City of San Diego. 2008. *City of San Diego General Plan. Conservation Element*. Figure CE-6.

6.13 Noise References

Airport Land Use Commission, San Diego County Regional Airport Authority. 2014. *San Diego International Airport Land Use Compatibility Plan.* Amended May 1, 2014.

California Department of Transportation (Caltrans). 2013. *Transportation and Construction Vibration Guidance Manual.* September 2013.

City of San Diego. 2008. *City of San Diego General Plan. Noise Element*.

Onyx Group. 2011. *Air Installations Compatible Use Zones (AICUZ) Update, Naval Air Station North Island and Naval Outlying Landing Field Imperial Beach*.

6.14 Transportation References

City of San Diego. 2016a. *California Environmental Quality Act Significant Determination Thresholds*. Available: https://www.sandiego.gov/sites/default/files/july_2016_ceqa_thresholds_final_0.pdf Accessed: April 10, 2018.

City of San Diego. 2019. Point Loma Wastewater Treatment Plant. Available: https://www.sandiego.gov/public-utilities/customer-service/water-wastewater-facilities/point-loma. Accessed: November 18, 2019.

Harbor Island Associates (HIW), LP. 2018. *Harbor Island West Marina Daily Vehicle Count 2004-2018*.

San Diego Unified Port District (District). 2001. Tidelands Parking Guidelines. January 5, 2001.

6.15 Utilities References

California Department of Resources Recycling and Recovery (CalRecycle). 2015. *Facility/Site Summary Details: West Miramar Sanitary Landfill.* Available: http://www.calrecycle.ca.gov/SWFacilities/Directory/37-AA-0020/Detail/, Accessed: April 9, 2018.

City of San Diego. 2016b. *Urban Water Management Plan*. Available: https://www.sandiego.gov/sites/default/files/2015_uwmp_report.pdf, accessed April 9, 2018.

———. 2018. *Point Loma Wastewater Treatment Plant*. Available: https://www.sandiego.gov/mwwd/facilities/ptloma, Accessed: April 9, 2018.

San Diego Gas & Electric. 2016. *Company Facts*. Available: http://webarchive.sdge.com/aboutus. Accessed: April 9, 2018.

San Diego Unified Port District (District). 2013b. *Environmental Application.* Form. July 8, 2013.

———. 2017b. Copper Reduction Program. Available: https://www.portofsandiego.org/environment/environmental-protection/copper-reduction-program. Accessed: November 18, 2019.

6.16 Wildfire References

California Department of Forestry and Fire Protection (CAL FIRE). 2009. *San Diego Very High Fire Hazard Severity Zones in LRA as Recommended by CAL FIRE.* June 11, 2009. Available: https://osfm.fire.ca.gov/media/5969/san_diego.pdf. Accessed: August 16, 2019.

Harbor Island West Marina Redevelopment Project

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Appendix A
Air Quality and Greenhouse Gas Calculations

Construction

Schedule

Phase	Code	Start Date	End Date	Working Days	2019	2020
Waterside - Demo docks	HBIW_1	1/1/2019	12/31/2019	262	262	
Waterside - Install docks	HBIW_2	1/1/2019	12/31/2019	262	262	
Landside - Building Demo I	HBIW_3	9/2/2019	10/2/2019	23	23	
Landside - Parking Lot Demo I	HBIW_4	9/2/2019	12/31/2019	88	88	
Landside - Landscape Demo I	HBIW_5	12/2/2019	12/31/2019	23	23	
Landside - Building Construction I	HBIW_6	9/2/2019	10/2/2019	23	23	
Landside - Parking Lot Paving I	HBIW_7	10/2/2019	12/31/2019	66	66	
Landside - Parking Lot Demo II	HBIW_8	1/2/2020	2/1/2020	22		22
Landside - Building Demo II	HBIW_9	1/2/2020	3/2/2020	43		43
Landside - Landscape Demo II	HBIW_10	12/1/2020	12/31/2020	23		23
Landside - Building Construction II	HBIW_11	1/2/2020	3/2/2020	43		43
Landside - Landscape Install	HBIW_12	3/3/2020	1/31/2020	239		239
Landside - Parking Lot Paving II	HBIW_13	12/1/2020	12/31/2020	23		23

Offroad Equipment

Code	Year	Days	Equip	#/day	hrs/day	HP	LF	g/hp-hr (CalEEMod)									Pounds per day						Metric tons per day			
								ROG	NOX	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	ROG	NOX	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
HBIW_2	2019	262	Bore/Drill Rigs	1	8	221	0.503	0.1	1.9	1.1	0.1	0.0	0.0	475.8	0.2	0.0	0.3	3.7	2.1	0.1	0.1	0.0	0.42	0.0	0.0	0.4
HBIW_2	2019	262	Cranes	1	8	231	0.288	0.4	5.1	1.9	0.2	0.2	0.0	483.5	0.2	0.0	0.5	6.0	2.3	0.3	0.2	0.0	0.3	0.0	0.0	0.3
HBIW_3	2019	23	Excavators	1	8	158	0.382	0.2	2.5	3.1	0.1	0.1	0.0	482.7	0.2	0.0	0.3	2.7	3.3	0.1	0.1	0.0	0.2	0.0	0.0	0.2
HBIW_3	2019	23	Graders	1	8	187	0.409	0.6	6.0	3.7	0.3	0.3	0.0	489.0	0.2	0.0	0.8	8.1	4.9	0.5	0.4	0.0	0.3	0.0	0.0	0.3
HBIW_3	2019	23	Skid Steer Loaders	1	8	65	0.369	0.2	2.7	3.3	0.1	0.1	0.0	482.4	0.2	0.0	0.1	1.1	1.4	0.1	0.0	0.0	0.1	0.0	0.0	0.1
HBIW_4	2019	88	Excavators	1	8	158	0.382	0.2	2.5	3.1	0.1	0.1	0.0	482.7	0.2	0.0	0.3	2.7	3.3	0.1	0.1	0.0	0.2	0.0	0.0	0.2
HBIW_4	2019	88	Skid Steer Loaders	1	8	65	0.369	0.2	2.7	3.3	0.1	0.1	0.0	482.4	0.2	0.0	0.1	1.1	1.4	0.1	0.0	0.0	0.1	0.0	0.0	0.1
HBIW_4	2019	88	Tractors/Loaders/Backhoes	1	7	97	0.369	0.4	3.7	3.6	0.2	0.2	0.0	485.9	0.2	0.0	0.2	2.0	2.0	0.1	0.1	0.0	0.1	0.0	0.0	0.1
HBIW_4	2019	88	Other Construction Equipment	1	8	172	0.415	0.4	4.4	3.3	0.2	0.2	0.0	480.5	0.2	0.0	0.5	5.6	4.1	0.3	0.3	0.0	0.3	0.0	0.0	0.3
HBIW_4	2019	88	Tractors/Loaders/Backhoes	1	8	97	0.369	0.4	3.7	3.6	0.2	0.2	0.0	485.9	0.2	0.0	0.2	2.3	2.3	0.2	0.1	0.0	0.1	0.0	0.0	0.1
HBIW_6	2019	23	Air Compressors	2	6	78	0.48	0.5	3.7	3.7	0.3	0.3	0.0	568.3	0.0	0.0	0.5	3.7	3.7	0.3	0.3	0.0	0.3	0.0	0.0	0.3
HBIW_6	2019	23	Tractors/Loaders/Backhoes	1	8	97	0.369	0.4	3.7	3.6	0.2	0.2	0.0	485.9	0.2	0.0	0.2	2.3	2.3	0.2	0.1	0.0	0.1	0.0	0.0	0.1
HBIW_7	2019	66	Graders	1	8	187	0.409	0.6	6.0	3.7	0.3	0.3	0.0	489.0	0.2	0.0	0.8	8.1	4.9	0.5	0.4	0.0	0.3	0.0	0.0	0.3
HBIW_7	2019	66	Pavers	1	8	130	0.415	0.5	4.7	3.6	0.3	0.3	0.0	480.3	0.2	0.0	0.5	4.4	3.4	0.3	0.3	0.0	0.2	0.0	0.0	0.2
HBIW_7	2019	66	Paving Equipment	1	8	132	0.355	0.4	4.0	3.6	0.3	0.3	0.0	484.4	0.2	0.0	0.4	3.3	3.0	0.2	0.2	0.0	0.2	0.0	0.0	0.2
HBIW_7	2019	66	Plate Compactors	1	8	8	0.43	0.7	4.1	3.5	0.2	0.2	0.0	568.3	0.1	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HBIW_7	2019	66	Rollers	1	6	80	0.375	0.4	4.2	3.6	0.3	0.3	0.0	484.3	0.2	0.0	0.2	1.7	1.4	0.1	0.1	0.0	0.1	0.0	0.0	0.1
HBIW_7	2019	66	Rubber Tired Loaders	2	8	203	0.362	0.3	3.7	1.3	0.1	0.1	0.0	480.1	0.2	0.0	0.8	9.7	3.4	0.3	0.3	0.0	0.6	0.0	0.0	0.6
HBIW_8	2020	22	Excavators	1	8	158	0.382	0.2	2.3	3.1	0.1	0.1	0.0	472.3	0.2	0.0	0.2	2.4	3.3	0.1	0.1	0.0	0.2	0.0	0.0	0.2
HBIW_8	2020	22	Skid Steer Loaders	2	8	65	0.369	0.2	2.5	3.3	0.1	0.1	0.0	471.9	0.2	0.0	0.2	2.1	2.8	0.1	0.1	0.0	0.2	0.0	0.0	0.2
HBIW_8	2020	22	Tractors/Loaders/Backhoes	1	8	97	0.369	0.3	3.3	3.6	0.2	0.2	0.0	475.2	0.2	0.0	0.2	2.1	2.3	0.1	0.1	0.0	0.1	0.0	0.0	0.1
HBIW_9	2020	43	Excavators	2	8	158	0.382	0.2	2.3	3.1	0.1	0.1	0.0	472.3	0.2	0.0	0.5	4.8	6.6	0.2	0.2	0.0	0.5	0.0	0.0	0.5
HBIW_9	2020	43	Graders	1	8	187	0.409	0.6	5.5	3.6	0.3	0.3	0.0	478.0	0.2	0.0	0.8	7.5	4.9	0.4	0.4	0.0	0.3	0.0	0.0	0.3
HBIW_9	2020	43	Skid Steer Loaders	2	8	65	0.369	0.2	2.5	3.3	0.1	0.1	0.0	471.9	0.2	0.0	0.2	2.1	2.8	0.1	0.1	0.0	0.2	0.0	0.0	0.2
HBIW_10	2020	23	Other Construction Equipment	1	8	172	0.415	0.4	4.1	3.2	0.2	0.2	0.0	470.0	0.2	0.0	0.5	5.2	4.1	0.3	0.3	0.0	0.3	0.0	0.0	0.3
HBIW_10	2020	23	Tractors/Loaders/Backhoes	1	8	97	0.369	0.3	3.3	3.6	0.2	0.2	0.0	475.2	0.2	0.0	0.2	2.1	2.3	0.1	0.1	0.0	0.1	0.0	0.0	0.1
HBIW_11	2020	43	Aerial Lifts	2	8	63	0.308	0.2	3.0	3.1	0.0	0.0	0.0	525.1	0.2	0.0	0.1	2.0	2.1	0.0	0.0	0.0	0.2	0.0	0.0	0.2
HBIW_11	2020	43	Air Compressors	4	6	78	0.48	0.5	3.4	3.7	0.2	0.2	0.0	568.3	0.0	0.0	1.0	6.7	7.3	0.4	0.4	0.0	0.5	0.0	0.0	0.5
HBIW_11	2020	43	Cranes	1	8	231	0.288	0.4	4.6	1.8	0.2	0.2	0.0	472.9	0.2	0.0	0.5	5.4	2.1	0.2	0.2	0.0	0.3	0.0	0.0	0.3
HBIW_11	2020	43	Forklifts	2	8	89	0.201	0.5	4.1	3.8	0.3	0.3	0.0	471.5	0.2	0.0	0.3	2.6	2.4	0.2	0.2	0.0	0.1	0.0	0.0	0.1
HBIW_12	2020	239	Cranes	0	0	231	0.288	0.4	4.6	1.8	0.2	0.2	0.0	472.9	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HBIW_13	2020	23	Graders	1	8	187	0.409	0.6	5.5	3.6	0.3	0.3	0.0	478.0	0.2	0.0	0.8	7.5	4.9	0.4	0.4	0.0	0.3	0.0	0.0	0.3
HBIW_13	2020	23	Pavers	2	8	130	0.415	0.5	4.4	3.6	0.3	0.3	0.0	469.9	0.2	0.0	0.9	8.4	6.9	0.6	0.6	0.0	0.4	0.0	0.0	0.4
HBIW_13	2020	23	Paving Equipment	1	6	132	0.355	0.4	3.8	3.6	0.3	0.2	0.0	473.3	0.2	0.0	0.2	2.3	2.2	0.2	0.1	0.0	0.1	0.0	0.0	0.1
HBIW_13	2020	23	Plate Compactors	1	8	8	0.43	0.7	4.1	3.5	0.2	0.2	0.0	568.3	0.1	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
HBIW_13	2020	23	Rollers	2	6	80	0.375	0.4	3.9	3.5	0.2	0.2	0.0	473.9	0.2	0.0	0.3	3.1	2.8	0.2	0.2	0.0	0.2	0.0	0.0	0.2
HBIW_13	2020	23	Rubber Tired Loaders	2	8	203	0.362	0.3	3.4	1.3	0.1	0.1	0.0	469.5	0.2	0.0	0.8	8.9	3.3	0.3	0.3	0.0	0.6	0.0	0.0	0.6

Employee Vehicles

Code	Year	Days	Trips/ Day	Mi/Trip	Running g/mi (EMFAC, AP 42)											Process g/trip (EMFAC)											Pounds per day								Metric tons per day			
					ROG	NOX	CO	PM10	PM2.5	PM10 D	PM2.5 D	SO2	CO2	CH4	N2O	ROG	NOX	CO	PM10	PM2.5	PM10 D	PM2.5 D	SO2	CO2	CH4	N2O	ROG	NOX	CO	PM10	PM2.5	PM10 D	PM2.5 D	SO2	CO2	CH4	N2O	CO2e
HBIW_1	2019	262	24	10.8	0.0	0.1	0.9	0.0	0.0	0.9	0.2	0.0	311	0.0	0.0	1.0	0.3	2.5	0.0	0.0	0.0	0.0	0.0	64	0.1	0.0	0.1	0.1	0.6	0.0	0.0	0.5	0.1	0.0	0	0.0	0.0	0
HBIW_2	2019	262	24	10.8	0.0	0.1	0.9	0.0	0.0	0.9	0.2	0.0	311	0.0	0.0	1.0	0.3	2.5	0.0	0.0	0.0	0.0	0.0	64	0.1	0.0	0.1	0.1	0.6	0.0	0.0	0.5	0.1	0.0	0	0.0	0.0	0
HBIW_3	2019	23	8	10.8	0.0	0.1	0.9	0.0	0.0	0.9	0.2	0.0	311	0.0	0.0	1.0	0.3	2.5	0.0	0.0	0.0	0.0	0.0	64	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0	0.0	0.0	0
HBIW_4	2019	88	8	10.8	0.0	0.1	0.9	0.0	0.0	0.9	0.2	0.0	311	0.0	0.0	1.0	0.3	2.5	0.0	0.0	0.0	0.0	0.0	64	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0	0.0	0.0	0
HBIW_5	2019	23	6	10.8	0.0	0.1	0.9	0.0	0.0	0.9	0.2	0.0	311	0.0	0.0	1.0	0.3	2.5	0.0	0.0	0.0	0.0	0.0	64	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0	0.0	0.0	0
HBIW_6	2019	23	12	10.8	0.0	0.1	0.9	0.0	0.0	0.9	0.2	0.0	311	0.0	0.0	1.0	0.3	2.5	0.0	0.0	0.0	0.0	0.0	64	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.1	0.0	0	0.0	0.0	0
HBIW_7	2019	66	6	10.8	0.0	0.1	0.9	0.0	0.0	0.9	0.2	0.0	311	0.0	0.0	1.0	0.3	2.5	0.0	0.0	0.0	0.0	0.0	64	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0	0.0	0.0	0
HBIW_8	2020	22	8	10.8	0.0	0.1	0.8	0.0	0.0	0.9	0.2	0.0	302	0.0	0.0	0.9	0.3	2.4	0.0	0.0	0.0	0.0	0.0	62	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0	0.0	0.0	0
HBIW_9	2020	43	20	10.8	0.0	0.1	0.8	0.0	0.0	0.9	0.2	0.0	302	0.0	0.0	0.9	0.3	2.4	0.0	0.0	0.0	0.0	0.0	62	0.1	0.0	0.0	0.0	0.5	0.0	0.0	0.4	0.1	0.0	0	0.0	0.0	0
HBIW_10	2020	23	12	10.8	0.0	0.1	0.8	0.0	0.0	0.9	0.2	0.0	302	0.0	0.0	0.9	0.3	2.4	0.0	0.0	0.0	0.0	0.0	62	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.1	0.0	0	0.0	0.0	0
HBIW_11	2020	43	32	10.8	0.0	0.1	0.8	0.0	0.0	0.9	0.2	0.0	302	0.0	0.0	0.9	0.3	2.4	0.0	0.0	0.0	0.0	0.0	62	0.1	0.0	0.1	0.1	0.8	0.0	0.0	0.7	0.2	0.0	0	0.0	0.0	0
HBIW_12	2020	239	12	10.8	0.0	0.1	0.8	0.0	0.0	0.9	0.2	0.0	302	0.0	0.0	0.9	0.3	2.4	0.0	0.0	0.0	0.0	0.0	62	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.3	0.1	0.0	0	0.0	0.0	0
HBIW_13	2020	23	8	10.8	0.0	0.1	0.8	0.0	0.0	0.9	0.2	0.0	302	0.0	0.0	0.9	0.3	2.4	0.0	0.0	0.0	0.0	0.0	62	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.2	0.0	0.0	0	0.0	0.0	0

Trucks

Code	Year	Vehicle	Days	Trip/Day	Mi/Trip	Running g/mi (EMFAC, AP 42)											Process g/trip (EMFAC)											Pounds per day								Metric tons per day			
						ROG	NOX	CO	PM10	PM2.5	PM10 D	PM2.5 D	SO2	CO2	CH4	N2O	ROG	NOX	CO	PM10	PM2.5	PM10 D	PM2.5 D	SO2	CO2	CH4	N2O	ROG	NOX	CO	PM10	PM2.5	PM10 D	PM2.5 D	SO2	CO2	CH4	N2O	CO2e
HBIW_1	2019	Vendor	262	0	7.3	0.3	4.2	0.7	0.1	0.1	1.0	0.3	0.0	1070	0.0	0.2	0.0	1.7	0.2	0.0	0.0	0.0	0.0	0.0	58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_2	2019	Vendor	262	8	7.3	0.3	4.2	0.7	0.1	0.1	1.0	0.3	0.0	1070	0.0	0.2	0.0	1.7	0.2	0.0	0.0	0.0	0.0	0.0	58	0.0	0.0	0.0	0.6	0.1	0.0	0.0	0.1	0.0	0.0	0	0.0	0.0	0
HBIW_3	2019	Vendor	23	0	7.3	0.3	4.2	0.7	0.1	0.1	1.0	0.3	0.0	1070	0.0	0.2	0.0	1.7	0.2	0.0	0.0	0.0	0.0	0.0	58	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_4	2019	Vendor	88	0	7.3	0.3	4.2	0.7	0.1	0.1	1.0	0.3	0.0	1070	0.0	0.2	0.0	1.7	0.2	0.0	0.0	0.0	0.0	0.0	58.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_5	2019	Vendor	23	0	7.3	0.3	4.2	0.7	0.1	0.1	1.0	0.3	0.0	1070	0.0	0.2	0.0	1.7	0.2	0.0	0.0	0.0	0.0	0.0	58.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_6	2019	Vendor	23	1	7.3	0.3	4.2	0.7	0.1	0.1	1.0	0.3	0.0	1070	0.0	0.2	0.0	1.7	0.2	0.0	0.0	0.0	0.0	0.0	58.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_7	2019	Vendor	66	1	7.3	0.3	4.2	0.7	0.1	0.1	1.0	0.3	0.0	1070	0.0	0.2	0.0	1.7	0.2	0.0	0.0	0.0	0.0	0.0	58.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_1	2019	Haul	262	1	20	0.8	9.0	1.8	0.2	0.2	0.9	0.2	0.0	1910	0.0	0.3	0.4	7.9	3.6	0.0	0.0	0.0	0.0	0.0	713.2	0.0	0.1	0.0	0.5	0.1	0.0	0.0	0.1	0.0	0.0	0	0.0	0.0	0
HBIW_2	2019	Haul	262	0	20	0.8	9.0	1.8	0.2	0.2	0.9	0.2	0.0	1910	0.0	0.3	0.4	7.9	3.6	0.0	0.0	0.0	0.0	0.0	713.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_3	2019	Haul	23	0	20	0.8	9.0	1.8	0.2	0.2	0.9	0.2	0.0	1910	0.0	0.3	0.4	7.9	3.6	0.0	0.0	0.0	0.0	0.0	713.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_4	2019	Haul	88	1	20	0.8	9.0	1.8	0.2	0.2	0.9	0.2	0.0	1910	0.0	0.3	0.4	7.9	3.6	0.0	0.0	0.0	0.0	0.0	713.2	0.0	0.1	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_5	2019	Haul	23	0	20	0.8	9.0	1.8	0.2	0.2	0.9	0.2	0.0	1910	0.0	0.3	0.4	7.9	3.6	0.0	0.0	0.0	0.0	0.0	713.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_6	2019	Haul	23	0	20	0.8	9.0	1.8	0.2	0.2	0.9	0.2	0.0	1910	0.0	0.3	0.4	7.9	3.6	0.0	0.0	0.0	0.0	0.0	713.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_7	2019	Haul	66	0	20	0.8	9.0	1.8	0.2	0.2	0.9	0.2	0.0	1910	0.0	0.3	0.4	7.9	3.6	0.0	0.0	0.0	0.0	0.0	713.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_8	2020	Vendor	22	0	7.3	0.2	3.5	0.6	0.1	0.1	1.0	0.3	0.0	1050	0.0	0.2	0.0	1.8	0.2	0.0	0.0	0.0	0.0	0.0	57.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_9	2020	Vendor	43	0	7.3	0.2	3.5	0.6	0.1	0.1	1.0	0.3	0.0	1050	0.0	0.2	0.0	1.8	0.2	0.0	0.0	0.0	0.0	0.0	57.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_10	2020	Vendor	23	0	7.3	0.2	3.5	0.6	0.1	0.1	1.0	0.3	0.0	1050	0.0	0.2	0.0	1.8	0.2	0.0	0.0	0.0	0.0	0.0	57.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_11	2020	Vendor	43	1	7.3	0.2	3.5	0.6	0.1	0.1	1.0	0.3	0.0	1050	0.0	0.2	0.0	1.8	0.2	0.0	0.0	0.0	0.0	0.0	57.9	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_12	2020	Vendor	239	1	7.3	0.2	3.5	0.6	0.1	0.1	1.0	0.3	0.0	1050	0.0	0.2	0.0	1.8	0.2	0.0	0.0	0.0	0.0	0.0	57.9	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_13	2020	Vendor	23	1	7.3	0.2	3.5	0.6	0.1	0.1	1.0	0.3	0.0	1050	0.0	0.2	0.0	1.8	0.2	0.0	0.0	0.0	0.0	0.0	57.9	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_8	2020	Haul	22	4	20	0.5	7.5	1.3	0.1	0.1	0.9	0.2	0.0	1892	0.0	0.3	0.3	8.5	4.3	0.0	0.0	0.0	0.0	0.0	855.2	0.0	0.1	0.1	1.4	0.3	0.0	0.0	0.2	0.0	0.0	0	0.0	0.0	0
HBIW_9	2020	Haul	43	0	20	0.5	7.5	1.3	0.1	0.1	0.9	0.2	0.0	1892	0.0	0.3	0.3	8.5	4.3	0.0	0.0	0.0	0.0	0.0	855.2	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_10	2020	Haul	23	0	20	0.5	7.5	1.3	0.1	0.1	0.9	0.2	0.0	1892	0.0	0.3	0.3	8.5	4.3	0.0	0.0	0.0	0.0	0.0	855.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_11	2020	Haul	43	0	20	0.5	7.5	1.3	0.1	0.1	0.9	0.2	0.0	1892	0.0	0.3	0.3	8.5	4.3	0.0	0.0	0.0	0.0	0.0	855.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_12	2020	Haul	239	0	20	0.5	7.5	1.3	0.1	0.1	0.9	0.2	0.0	1892	0.0	0.3	0.3	8.5	4.3	0.0	0.0	0.0	0.0	0.0	855.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0
HBIW_13	2020	Haul	23	0	20	0.5	7.5	1.3	0.1	0.1	0.9	0.2	0.0	1892	0.0	0.3	0.3	8.5	4.3	0.0	0.0	0.0	0.0	0.0	855.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0

Workboat

Code	Year	Days	#/day	Hr/Day	Engine HP		Prop Engine (g/kw-hr)									Aux Engine (g/kw-hr)									Pounds per day						Metric tons per day			
					Prop	Aux	ROG	NOX	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	ROG	NOX	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	ROG	NOX	CO	PM10	PM2.5	SO2	CO2	CH4	N2O	CO2e
HBIW_2	2019	262	1	8	354	10	0.5	5.0	3.9	0.1	0.1	0.0	588	0.0	0.0	1.7	6.5	5.6	0.5	0.5	0.0	588	0.0	0.0	2.4	21.9	17.1	0.6	0.6	0.0	1	0.0	0.0	1

Earth Moving Calculations

Code	Year	Days	Grading (acres/day)	Cut/fill (cy/day)	Dozing (hour/day)	Emission Factor						Pounds per day	
						PM10 G (lb/acre)	PM2.5 G (lb/acre)	PM10 C/F (lb/ton)	PM2.5 C/F (lb/ton)	PM10 Doz (lb/hr)	PM2.5 Doz (lb/hr)	PM10 D	PM2.5 D
HBIW_5	2019	23	0.01	0	0	0.4	0.045	0.000	0.000	0.3	0.2	0.0	0.0
HBIW_10	2020	23	0.01	0	0	0.4	0.045	0.000	0.000	0.3	0.2	0.0	0.0
HBIW_12	2020	239	0.00	0	0	0.4	0.045	0.000	0.000	0.3	0.2	0.0	0.0

Demolition

Code	Year	Days	Demo (sf/day)	Emission Factor		Pounds per day	
				PM10 (lb/ton)	PM2.5 (lb/ton)	PM10 D	PM2.5 D
HBIW_1	2019	262	557	0.014	0.002	0.4	0.1
HBIW_2	2019	262	0	0.014	0.002	0.0	0.0
HBIW_3	2019	23	43	0.014	0.002	0.0	0.0
HBIW_4	2019	88	581	0.014	0.002	0.4	0.1
HBIW_8	2020	22	3130	0.014	0.002	2.0	0.3
HBIW_9	2020	43	512	0.014	0.002	0.3	0.0

Coating

Code	Year	Days	Coated (sf/day)	Emission Factor	Pounds
				ROG (lbs per sf)	ROG
HBIW_6	2019	23	0	0.0005	0.0
HBIW_11	2020	43	882	0.0005	0.4

Paving

Code	Year	Days	Paved (sf/day)	Emission Factor	Pounds per day
				ROG (lbs per acre)	ROG
HBIW_7	2019	66	1,303	2.6	0.1
HBIW_13	2020	23	1,303	2.6	0.1

Operation

Harbor Island West Existing Conditions

San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Health Club	22.00	1000sqft	0.51	22,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity	533.52	**CH4 Intensity**	0	**N2O Intensity**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2e emission factor from SDG&E
Vehicle Trips - Trip rate based on memo from traffic engineers
Energy Use - Consumption based on existing uitlity bills

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	2.83	16.20
tblEnergyUse	NT24E	4.27	24.44
tblEnergyUse	NT24NG	7.25	70.03
tblEnergyUse	T24E	1.21	6.93
tblEnergyUse	T24NG	4.31	41.63
tblProjectCharacteristics	CH4IntensityFactor	0.029	0
tblProjectCharacteristics	CO2IntensityFactor	720.49	533.52
tblProjectCharacteristics	N2OIntensityFactor	0.006	0
tblVehicleTrips	ST_TR	20.87	112.73
tblVehicleTrips	SU_TR	26.73	112.73
tblVehicleTrips	WD_TR	32.93	112.73

2.0 Emissions Summary

2.2 Overall Operational

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.1114	0	2.00E-04	0		0	0		0	0	0	3.90E-04	3.90E-04	0	0	4.20E-04
Energy	0.0133	0.1204	0.1012	7.20E-04		9.15E-03	9.15E-03		9.15E-03	9.15E-03	0	384.3568	384.3568	2.51E-03	2.40E-03	385.1359
Mobile	0.8098	3.1528	8.2271	0.0213	1.6153	0.0259	1.6413	0.4327	0.0244	0.4571	0	1,954.03	1,954.03	0.125	0	1,957.15
Waste						0	0		0	0	25.4551	0	25.4551	1.5044	0	63.0639
Water						0	0		0	0	0.4128	6.2442	6.657	0.0424	1.00E-03	8.0152
Total	**0.9345**	**3.2732**	**8.3285**	**0.022**	**1.6153**	**0.0351**	**1.6504**	**0.4327**	**0.0336**	**0.4663**	**25.8679**	**2,344.63**	**2,370.50**	**1.6743**	**3.40E-03**	**2,413.37**

4.0 Operational Detail - Mobile

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Health Club	2,479.99	2,479.99	2479.99	4,284,603	4,284,603
Total	2,479.99	2,479.99	2,479.99	4,284,603	4,284,603

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Health Club	0.574135	0.045525	0.189369	0.116519	0.019283	0.005646	0.014833	0.022073	0.001871	0.002173	0.006385	0.000739	0.001452

5.0 Energy Detail

Historical Energy Use: N

5.2 Energy by Land Use - NaturalGas

	NaturalGa	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Health Club	2.4566e+0	0.0133	0.1204	0.1012	7.2000e-		9.1500e-	9.1500e-		9.1500e-	9.1500e-	0.0000	131.0935	131.0935	2.5100e-	2.4000e-	131.8726

Total		**0.0133**	**0.1204**	**0.1012**	**7.2000e-**		**9.1500e-**	**9.1500e-**		**9.1500e-**	**9.1500e-**	**0.0000**	**131.0935**	**131.0935**	**2.5100e-**	**2.4000e-**	**131.8726**

5.3 Energy by Land Use - Electricity

	Electricity	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Health Club	1.04654e+	253.2633	0.0000	0.0000	253.2633
Total		**253.2633**	**0.0000**	**0.0000**	**253.2633**

6.0 Area Detail

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural	0.0255					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer	0.0859					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-	0.0000	2.0000e-	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.9000e-	3.9000e-	0.0000	0.0000	4.2000e-
Total	**0.1114**	**0.0000**	**2.0000e-**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**3.9000e-**	**3.9000e-**	**0.0000**	**0.0000**	**4.2000e-**

7.0 Water Detail

	Indoor/Out	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Health Club	1.30115 /	6.6570	0.0424	1.0000e-	8.0152
Total		**6.6570**	**0.0424**	**1.0000e-**	**8.0152**

8.0 Waste Detail

	Waste	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Health Club	125.4	25.4551	1.5044	0.0000	63.0639
Total		**25.4551**	**1.5044**	**0.0000**	**63.0639**

Harbor Island West Existing Conditions
San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Health Club	22.00	1000sqft	0.51	22,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018

Utility Company San Diego Gas & Electric

CO2 Intensity	533.52	**CH4 Intensity**	0	**N2O Intensity**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2e emission factor from SDG&E
Vehicle Trips - Trip rate based on memo from traffic engineers
Energy Use - Consumption based on existing uitlity bills

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	2.83	16.20
tblEnergyUse	NT24E	4.27	24.44
tblEnergyUse	NT24NG	7.25	70.03
tblEnergyUse	T24E	1.21	6.93
tblEnergyUse	T24NG	4.31	41.63
tblProjectCharacteristics	CH4IntensityFactor	0.029	0
tblProjectCharacteristics	CO2IntensityFactor	720.49	533.52
tblProjectCharacteristics	N2OIntensityFactor	0.006	0
tblVehicleTrips	ST_TR	20.87	112.73
tblVehicleTrips	SU_TR	26.73	112.73
tblVehicleTrips	WD_TR	32.93	112.73

2.0 Emissions Summary

2.2 Overall Operational

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.6107	2.00E-05	2.28E-03	0		1.00E-05	1.00E-05		1.00E-05	1.00E-05		4.81E-03	4.81E-03	1.00E-05		5.15E-03
Energy	0.0726	0.6598	0.5543	3.96E-03		0.0502	0.0502		0.0502	0.0502		791.8131	791.8131	0.0152	0.0145	796.5184
Mobile	4.7036	16.8262	45.2392	0.1222	9.0887	0.1417	9.2304	2.4299	0.1335	2.5634		12,367.76	12,367.76	0.7555		12,386.65
Total	**5.3869**	**17.4861**	**45.7957**	**0.1261**	**9.0887**	**0.1919**	**9.2806**	**2.4299**	**0.1837**	**2.6136**		**13,159.58**	**13,159.58**	**0.7707**	**0.0145**	**13,183.18**

4.0 Operational Detail - Mobile

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Health Club	2,479.99	2,479.99	2479.99	4,284,603	4,284,603
Total	2,479.99	2,479.99	2,479.99	4,284,603	4,284,603

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Health Club	0.574135	0.045525	0.189369	0.116519	0.019283	0.005646	0.014833	0.022073	0.001871	0.002173	0.006385	0.000739	0.001452

5.0 Energy Detail

Historical Energy Use: N

	NaturalGa	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Health Club	6.73041	0.0726	0.6598	0.5543	3.9600e-		0.0502	0.0502		0.0502	0.0502		791.8131	791.8131	0.0152	0.0145	796.5184
Total		**0.0726**	**0.6598**	**0.5543**	**3.9600e-**		**0.0502**	**0.0502**		**0.0502**	**0.0502**		**791.8131**	**791.8131**	**0.0152**	**0.0145**	**796.5184**

6.0 Area Detail

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural	0.1397					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer	0.4708					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	2.2000e-	2.0000e-	2.2800e-	0.0000		1.0000e-	1.0000e-		1.0000e-	1.0000e-		4.8100e-	4.8100e-	1.0000e-		5.1500e-
Total	**0.6107**	**2.0000e-**	**2.2800e-**	**0.0000**		**1.0000e-**	**1.0000e-**		**1.0000e-**	**1.0000e-**		**4.8100e-**	**4.8100e-**	**1.0000e-**		**5.1500e-**

Harbor Island West With Project
San Diego County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	380.00	Space	3.42	116,000.00	0
Health Club	15.68	1000sqft	0.36	15,682.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2021
Utility Company	San Diego Gas & Electric				
CO2 Intensity	533.52	**CH4 Intensity**	0	**N2O Intensity**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2e emission factor from SDG&E
Land Use - From PD
Vehicle Trips - Trip rate based on memo from traffic engineers
Energy Use - Consumption based on 48% improvement over existing

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	2.83	8.31
tblEnergyUse	LightingElect	0.35	0.00
tblEnergyUse	NT24E	4.27	12.53
tblEnergyUse	NT24NG	7.25	51.58
tblEnergyUse	T24E	1.21	3.55
tblEnergyUse	T24NG	4.31	30.66
tblLandUse	LandUseSquareFeet	152,000.00	116,000.00
tblLandUse	LandUseSquareFeet	15,680.00	15,682.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0

tblProjectCharacteristics	CO2IntensityFactor	720.49	533.52
tblProjectCharacteristics	N2OIntensityFactor	0.006	0
tblVehicleTrips	ST_TR	20.87	153.81
tblVehicleTrips	SU_TR	26.73	153.81
tblVehicleTrips	WD_TR	32.93	153.81

2.0 Emissions Summary

2.2 Overall Operational

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0913	3.00E-05	3.65E-03	0		1.00E-05	1.00E-05		1.00E-05	1.00E-05	0	7.07E-03	7.07E-03	2.00E-05	0	7.54E-03
Energy	6.95E-03	0.0632	0.0531	3.80E-04		4.80E-03	4.80E-03		4.80E-03	4.80E-03	0	161.3965	161.3965	1.32E-03	1.26E-03	161.8055
Mobile	0.6115	2.5	6.2037	0.019	1.5702	0.0166	1.5869	0.4205	0.0156	0.4361	0	1,750.07	1,750.07	0.1011	0	1,752.59
Waste						0	0		0	0	18.1433	0	18.1433	1.0722	0	44.9493
Water						0	0		0	0	0.2942	4.4504	4.7446	0.0302	7.10E-04	5.7127
Total	**0.7097**	**2.5633**	**6.2604**	**0.0194**	**1.5702**	**0.0215**	**1.5917**	**0.4205**	**0.0204**	**0.4409**	**18.4375**	**1,915.92**	**1,934.36**	**1.2049**	**1.97E-03**	**1,965.07**

4.0 Operational Detail - Mobile

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Health Club	2,411.69	2,411.69	2411.69	4,166,600	4,166,600
Parking Lot	0.00	0.00	0.00		
Total	2,411.69	2,411.69	2,411.69	4,166,600	4,166,600

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Health Club	0.593936	0.041843	0.182569	0.108325	0.016436	0.005513	0.015940	0.023523	0.001912	0.001972	0.006090	0.000748	0.001193
Parking Lot	0.593936	0.041843	0.182569	0.108325	0.016436	0.005513	0.015940	0.023523	0.001912	0.001972	0.006090	0.000748	0.001193

5.0 Energy Detail

Historical Energy Use: N

5.2 Energy by Land Use - NaturalGas

	NaturalGa	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Health Club	1.2897e+0	6.9500e-	0.0632	0.0531	3.8000e-		4.8000e-	4.8000e-		4.8000e-	4.8000e-	0.0000	68.8233	68.8233	1.3200e-	1.2600e-	69.2323
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**6.9500e-**	**0.0632**	**0.0531**	**3.8000e-**		**4.8000e-**	**4.8000e-**		**4.8000e-**	**4.8000e-**	**0.0000**	**68.8233**	**68.8233**	**1.3200e-**	**1.2600e-**	**69.2323**

5.3 Energy by Land Use - Electricity

	Electricity	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Health Club	382533	92.5732	0.0000	0.0000	92.5732
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Total		**92.5732**	**0.0000**	**0.0000**	**92.5732**

6.0 Area Detail

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural	0.0222					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer	0.0687					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.4000e-	3.0000e-	3.6500e-	0.0000		1.0000e-	1.0000e-		1.0000e-	1.0000e-	0.0000	7.0700e-	7.0700e-	2.0000e-	0.0000	7.5400e-
Total	**0.0913**	**3.0000e-**	**3.6500e-**	**0.0000**		**1.0000e-**	**1.0000e-**		**1.0000e-**	**1.0000e-**	**0.0000**	**7.0700e-**	**7.0700e-**	**2.0000e-**	**0.0000**	**7.5400e-**

7.0 Water Detail

	Indoor/Out	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Health Club	0.927365 /	4.7446	0.0302	7.1000e-	5.7127
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**4.7446**	**0.0302**	**7.1000e-**	**5.7127**

8.0 Waste Detail

	Waste	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Health Club	89.38	18.1433	1.0722	0.0000	44.9493
Parking Lot	0	0.0000	0.0000	0.0000	0.0000

Total		**18.1433**	**1.0722**	**0.0000**	**44.9493**

Harbor Island West With Project - San Diego County, Summer

Harbor Island West With Project
San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	380.00	Space	3.42	116,000.00	0
Health Club	15.68	1000sqft	0.36	15,682.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2021
Utility Company	San Diego Gas & Electric				
CO2 Intensity	533.52	**CH4 Intensity**	0	**N2O Intensity**	0

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CO2e emission factor from SDG&E
Land Use - From PD
Vehicle Trips - Trip rate based on memo from traffic engineers
Energy Use - Consumption based on 48% improvement over existing

Table Name	Column Name	Default Value	New Value
tblEnergyUse	LightingElect	2.83	8.31
tblEnergyUse	LightingElect	0.35	0.00
tblEnergyUse	NT24E	4.27	12.53
tblEnergyUse	NT24NG	7.25	51.58
tblEnergyUse	T24E	1.21	3.55
tblEnergyUse	T24NG	4.31	30.66
tblLandUse	LandUseSquareFeet	152,000.00	116,000.00
tblLandUse	LandUseSquareFeet	15,680.00	15,682.00
tblProjectCharacteristics	CH4IntensityFactor	0.029	0

tblProjectCharacteristics	CO2IntensityFactor	720.49	533.52
tblProjectCharacteristics	N2OIntensityFactor	0.006	0
tblVehicleTrips	ST_TR	20.87	153.81
tblVehicleTrips	SU_TR	26.73	153.81
tblVehicleTrips	WD_TR	32.93	153.81

2.0 Emissions Summary

2.2 Overall Operational

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.5021	3.70E-04	0.0406	0		1.50E-04	1.50E-04		1.50E-04	1.50E-04		0.0866	0.0866	2.30E-04		0.0923
Energy	0.0381	0.3464	0.291	2.08E-03		0.0263	0.0263		0.0263	0.0263		415.697	415.697	7.97E-03	7.62E-03	418.1673
Mobile	3.5693	13.4078	34.2783	0.1089	8.835	0.0911	8.9262	2.3614	0.0852	2.4465		11,070.37	11,070.37	0.6108		11,085.64
Total	**4.1095**	**13.7545**	**34.6098**	**0.111**	**8.835**	**0.1176**	**8.9527**	**2.3614**	**0.1116**	**2.473**		**11,486.16**	**11,486.16**	**0.619**	**7.62E-03**	**11,503.90**

4.0 Operational Detail - Mobile

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Health Club	2,411.69	2,411.69	2411.69	4,166,600	4,166,600
Parking Lot	0.00	0.00	0.00		
Total	2,411.69	2,411.69	2,411.69	4,166,600	4,166,600

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Health Club	0.593936	0.041843	0.182569	0.108325	0.016436	0.005513	0.015940	0.023523	0.001912	0.001972	0.006090	0.000748	0.001193
Parking Lot	0.593936	0.041843	0.182569	0.108325	0.016436	0.005513	0.015940	0.023523	0.001912	0.001972	0.006090	0.000748	0.001193

5.0 Energy Detail

Historical Energy Use: N

	NaturalGa	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Health Club	3.53342	0.0381	0.3464	0.2910	2.0800e-		0.0263	0.0263		0.0263	0.0263		415.6970	415.6970	7.9700e-	7.6200e-	418.1673
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0381**	**0.3464**	**0.2910**	**2.0800e-**		**0.0263**	**0.0263**		**0.0263**	**0.0263**		**415.6970**	**415.6970**	**7.9700e-**	**7.6200e-**	**418.1673**

6.0 Area Detail

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural	0.1217					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer	0.3767					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	3.7900e-	3.7000e-	0.0406	0.0000		1.5000e-	1.5000e-		1.5000e-	1.5000e-		0.0866	0.0866	2.3000e-		0.0923
Total	**0.5021**	**3.7000e-**	**0.0406**	**0.0000**		**1.5000e-**	**1.5000e-**		**1.5000e-**	**1.5000e-**		**0.0866**	**0.0866**	**2.3000e-**		**0.0923**

Harbor Island West Existing Conditions Phase I Trips

San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Health Club	1.00	1000sqft	0.02	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2018
Utility Company	San Diego Gas & Electric				
CO2 Intensity	533.52	**CH4 Intensity**	0	**N2O Intensity**	0

1.3 User Entered Comments & Non-Default Data

Vehicle Trips - Trip rate based on memo from traffic engineers.

Table Name	Column Name	Default Value	New Value
tblVehicleTrips	ST_TR	20.87	2,480.00
tblVehicleTrips	SU_TR	26.73	2,480.00
tblVehicleTrips	WD_TR	32.93	2,480.00

2.0 Emissions Summary

2.2 Overall Operational

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0	0	0	0		0	0		0	0		0	0	0	0	0
Energy	0	0	0	0		0	0		0	0		0	0	0	0	0
Mobile	4.7036	16.8263	45.2393	0.1222	9.0887	0.1417	9.2304	2.4299	0.1335	2.5634		12,367.79	12,367.794	0.7555		12,386.681

Total	**4.7036**	**16.8263**	**45.2393**	**0.1222**	**9.0887**	**0.1417**	**9.2304**	**2.4299**	**0.1335**	**2.5634**		**12,367.79**	**12,367.794**	**0.7555**	**0**	**12,386.681**

4.0 Operational Detail - Mobile

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Health Club	2,480.00	2,480.00	2480.00	4,284,613	4,284,613
Total	2,480.00	2,480.00	2,480.00	4,284,613	4,284,613

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Health Club	0.574135	0.045525	0.189369	0.116519	0.019283	0.005646	0.014833	0.022073	0.001871	0.002173	0.006385	0.000739	0.001452

Harbor Island West Phase I Trips

San Diego County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Health Club	1.00	1000sqft	0.02	1,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.6	**Precipitation Freq (Days)**	40
Climate Zone	13			**Operational Year**	2020
Utility Company	San Diego Gas & Electric				
CO2 Intensity	533.52	**CH4 Intensity**	0	**N2O Intensity**	0

1.3 User Entered Comments & Non-Default Data

Vehicle Trips - Trip rate based on memo from traffic engineers

Table Name	Column Name	Default Value	New Value
tblVehicleTrips	ST_TR	20.87	2,412.00
tblVehicleTrips	SU_TR	26.73	2,412.00
tblVehicleTrips	WD_TR	32.93	2,412.00

2.0 Emissions Summary

2.2 Overall Operational

	ROG	NOx	CO	SO2	Fugitive	Exhaust	PM10	Fugitive	Exhaust	PM2.5	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0	0	0	0		0.0000	0.0000		0.0000	0.0000		0	0	0.0000		0
Energy	0	0	0	0		0	0		0	0		0	0	0	0	0
Mobile	3.8488	14.3987	36.7835	0.1123	8.8367	0.1101	8.9468	2.3620	0.1033	2.4652		11,393.91	11,393.910	0.6452		11,410.038

Total	**3.8488**	**14.3987**	**36.7835**	**0.1123**	**8.8367**	**0.1101**	**8.9468**	**2.3620**	**0.1033**	**2.4652**		**11,393.91**	**11,393.910**	**0.6452**	**0**	**11,410.038**

4.0 Operational Detail - Mobile

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Health Club	2,412.00	2,412.00	2412.00	4,167,132	4,167,132
Total	2,412.00	2,412.00	2,412.00	4,167,132	4,167,132

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Health Club	9.50	7.30	7.30	16.90	64.10	19.00	52	39	9

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Health Club	0.588316	0.042913	0.184449	0.110793	0.017294	0.005558	0.015534	0.023021	0.001902	0.002024	0.006181	0.000745	0.001271

Recreational Boating, 2018

Boat	Pounds per Boat per Day								
	ROG	NOX	CO	PM10	PM2.5	SOx	CO2	CH4	N2O
Outboards, 25hp	0.137	0.006	0.219	0.006	0.004	0.000	0.801	0.000	0.000
Outboards, 50hp	0.343	0.024	0.651	0.019	0.014	0.000	2.685	0.000	0.000
Inboard/sterndrive, 120hp	0.021	0.069	0.031	0.002	0.001	0.000	3.887	0.000	0.000

Slip Range			Pounds per Day						Metric Tons Per Year			
	Vessel	Counts	ROG	NOX	CO	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
12 – 20 feet	Outboards, 25hp	0	0.0	0.0	0.0	0.0	0.0	0.0	0	0.000	0.000	0
21 – 25 feet	Outboards, 25hp	96	13.1	0.6	21.0	0.5	0.4	0.0	13	0.001	0.000	13
26 – 30 feet	Outboards, 25hp	111	15.2	0.7	24.3	0.6	0.5	0.0	15	0.001	0.000	15
31 – 35 feet	Outboards, 25hp	231	31.5	1.5	50.5	1.3	1.0	0.0	31	0.002	0.001	31
36 – 40 feet	Outboards, 25hp	106	14.5	0.7	23.2	0.6	0.4	0.0	14	0.001	0.000	14
41 – 45 feet	Outboards, 25hp	9	1.2	0.1	2.0	0.0	0.0	0.0	1	0.000	0.000	1
46 – 50 feet	Outboards, 50hp	44	15.1	1.1	28.6	0.8	0.6	0.0	20	0.001	0.000	20
Greater than 51 feet	Inboard/sterndrive, 120hp	23	0.5	1.6	0.7	0.0	0.0	0.0	15	0.000	0.001	15

Recreational Boating, 2020/2021

Boat	Pounds per Boat per Day								
	ROG	NOX	CO	PM10	PM2.5	SOx	CO2	CH4	N2O
Outboards, 25hp	0.132	0.006	0.221	0.005	0.004	0.000	0.811	0.000	0.000
Outboards, 50hp	0.322	0.024	0.641	0.018	0.014	0.000	2.705	0.000	0.000
Inboard/sterndrive, 120hp	0.021	0.069	0.031	0.002	0.001	0.000	3.888	0.000	0.000

Slip Range	Vessel	Counts	Pounds per Day						Metric Tons Per Year			
			ROG	NOX	CO	PM10	PM2.5	SOx	CO2	CH4	N2O	CO2e
12 – 20 feet	Outboards, 25hp	57	7.5	0.4	12.6	0.3	0.2	0.0	8	0.001	0.000	8
21 – 25 feet	Outboards, 25hp	106	13.9	0.7	23.4	0.5	0.4	0.0	14	0.001	0.000	14
26 – 30 feet	Outboards, 25hp	55	7.2	0.4	12.2	0.3	0.2	0.0	7	0.001	0.000	7
31 – 35 feet	Outboards, 25hp	174	22.9	1.1	38.5	0.9	0.7	0.0	23	0.002	0.001	24
36 – 40 feet	Outboards, 25hp	73	9.6	0.5	16.1	0.4	0.3	0.0	10	0.001	0.000	10
41 – 45 feet	Outboards, 25hp	28	3.7	0.2	6.2	0.1	0.1	0.0	4	0.000	0.000	4
46 – 50 feet	Outboards, 50hp	44	14.2	1.1	28.2	0.8	0.6	0.0	20	0.001	0.000	20
Greater than 51 feet	Inboard/sterndrive, 120hp	66	1.4	4.5	2.0	0.1	0.1	0.0	42	0.000	0.002	43

Appendix B
Eelgrass Resources Report

Harbor Island West Marina Updated Baseline Eelgrass Resources Report

Prepared for

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April 2, 2018 (Revised December 10, 2018)

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Harbor Island West Marina Updated Baseline Eelgrass Resources Report

April 2, 2018 (Revised December 10, 2018)

Introduction

Marine Taxonomic Services (MTS) was contracted by ICF International to provide an updated baseline eelgrass (*Zostera marina*) inventory at Harbor Island West Marina in San Diego, California. MTS has completed the survey of the eelgrass resources at Harbor Island West Marina and has prepared the following report on the findings. The survey was intended to support the environmental planning associated with proposed construction activities. As such the results of the inventory are discussed relative to potential impacts associated with planned construction activities at the marina.

Harbor Island West Marina is located in the northern portion of San Diego Bay along the northwestern shore of Harbor Island (Figure 1). The Harbor Island West Marina Renovation Project (Project) entails demolishing and replacing all existing buildings and structures as well as replacing landscaping, reconfiguring hardscape, modernizing utilities, modernizing lighting, renovating the parking lot, adding a public promenade, and improving view corridors. On the water, the docks will be replaced and slightly reconfigured. The replacement docks will follow the existing layout except that two extension dock/headwalks will be consolidated into a single dock/headwalk. This will reduce the current 11 dock/headwallks to 10 docks/headwalks and will reduce the over water coverage of the docks from 13,564 square meters (146,000 square feet) to 13,006 square meters (140,000 square feet). The number of slips will be reduced from 620 to 603 with adjustments made to the distribution of dock sizes within the marina.

Methods

A bathymetric survey was performed as part of the original baseline survey on November 29, 2014. Those data are still considered valid. The methods are reported below to maintain the completeness of this updated report. MTS staff Robert Mooney, Kees Schipper, and Angelica Lopez performed side-scan sonar and SCUBA-based surveys on March 26, 2018 to update the eelgrass distribution data. The side-scan sonar survey was performed to get a complete view of the seafloor for eelgrass mapping. The SCUBA survey was performed to visually verify the sonar record and provide independent transect-based coverage estimates.

Bathymetric Survey

The bathymetric survey was performed by using a survey-grade fathometer operating at 50 kHz. The fathometer data was integrated to the vessels differential GPS system via a laptop computer running Hypack hydrographic surveying software. Two transects were navigated

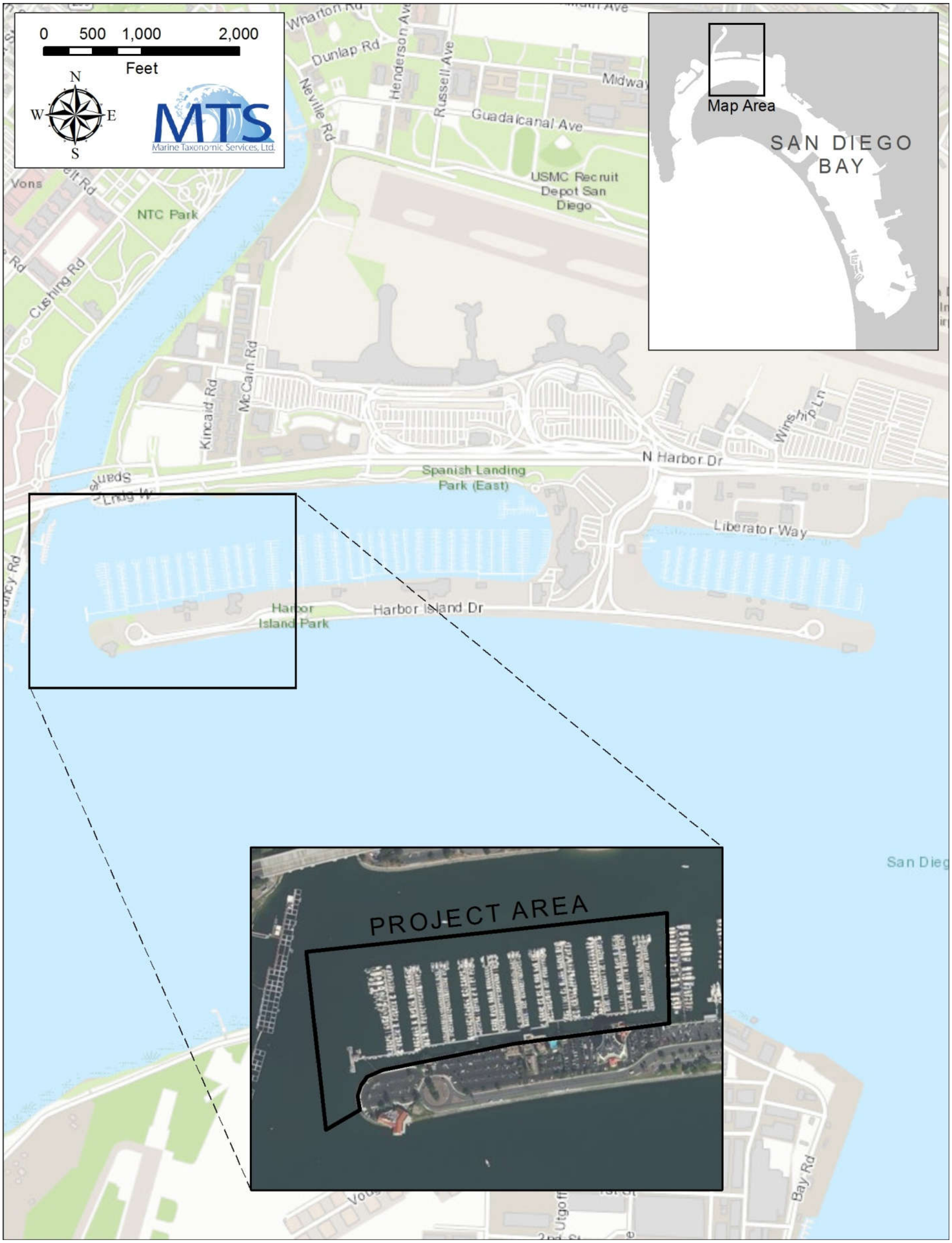

Figure 1. Vicinity map showing location of the Harbor Island West Marina within San Diego Bay.

along each fairway and a series of transects were performed around the perimeter of the marina. The data were post-processed in Hypack to produce a grid of interpolated data that were corrected for changing tidal elevations during the survey. The grid data were then processed and smoothed in ArcMap to produce depth contours.

SCUBA and Transect Surveys

The SCUBA surveys were implemented to visually verify the sonar data, provide an independent means of estimating eelgrass coverage, provide additional mapping support in areas where sonar data could not be adequately obtained, and provide eelgrass density data. The visual verification and coverage information were obtained by placing 100-meter transect lines on the seafloor running up the middle of every other fairway (refer to Figure 2). The diver swam each transect and noted where each transect intercepted eelgrass beds. In addition to the intercept data, the diver used the transects to randomly place a 1/16 square meter quadrat within eelgrass beds. The quadrat data were used to calculate eelgrass density by using the diver's counts of leaf shoots within each quadrat.

The diver transects were subsequently plotted in ArcMap. The transect data were used to calculate a percent cover of eelgrass for each transect. The data were also used to help refine the side-scan sonar digitizing. If eelgrass was found by a diver that was not digitized, the GIS Specialist would inspect the sonar record. If the sonar record showed a return in that region, the eelgrass boundary was refined and similar returns in that area were also be used to refine the eelgrass boundaries. If there was no sonar return that could be justified to represent eelgrass, no attempt was made to draw additional eelgrass patches. The two methods are sampling techniques and so variation with sampling error is considered a valid result.

Side-Scan Sonar Survey

To detect and map any eelgrass present, a side-scan sonar survey was performed by navigating a small vessel along a series of transects through the study site. The vessel was fitted with a pole-mounted side-scan sonar operating at 450 kHz. The sonar was set to scan 30 meters on both the port and starboard channels for a total scanning swath of 60 meters. Two survey transects were navigated down each of the marina fairways with the vessel biased to the left and right of center. This allowed for complete coverage of each fairway while providing for overlapping data to provide redundancy within the sonar record. Similarly transects were navigated around the perimeter of the marina with significant overlap to ensure the survey area was thoroughly covered. In areas where vessels could not be navigated, diver data were used to map eelgrass resources. The survey boundary is provided in Figure 2.

Following the field surveys, the collected side-scan sonar files were geographically registered using the vessel's navigation data collected during the survey. The side-scan files were then compiled to create a contiguous view of the seafloor across the entirety of the study site. The boundaries of the eelgrass present were then digitized from the compiled data set using ESRI ArcMap software and plotted on a geographically registered image of the project area.

Figure 2. Position of diver transects performed to validate sonar and assess eelgrass condition.

Results

Bathymetric Survey

The bathymetric survey results show that the survey area ranges from intertidal to -17-feet Mean Lower Low Water (MLLW). From simple observation of the contour lines, the toe of the shoreline rip-rap occurs at approximately -1-foot MLLW. Most of the slips occur over water in the -10 to -11-feet MLLW range.

SCUBA and Transect Surveys

The diver transect survey revealed that estimates of eelgrass cover within the marina ranged from a low of 13% at the eastern end of the marina to a high of 66% at the westernmost fairway that was sampled along transect number F2 (Table 1). The general trend was for increasing eelgrass cover moving from east to west.

Table 1. The below table provides the position of the SCUBA-based diver transects and the associated percent cover of eelgrass along each transect.

	Transect Start Coordinates		Transect End Coordinates		
Transect	Latitude	Longitude	Latitude	Longitude	Cover
F1	32.725429	-117.213679	32.726270	-117.213857	49%
F2	32.726536	-117.212633	32.725640	-117.212441	66%
F3	32.726492	-117.211605	32.725595	-117.211429	30%
F4	32.726779	-117.210753	32.725903	-117.210544	30%
F5	32.726890	-117.209725	32.725996	-117.209664	35%
F6	32.726877	-117.208778	32.725967	-117.208661	13%

Eelgrass density within the marina was generally low across the survey area. Eelgrass beds in shallow water along shore typically had shorter blades than patches observed in deeper water. Eelgrass density within the marina was 59.5 ± 44.7 (mean ± 1 sd) leaf shoots per square meter. A total of 155 quadrats (n=155) were sampled to determine the leaf shoot density estimate. The relatively high variability given the number of sampled quadrats was due to high variability among quadrats sampled in shallow water along the shore. There were many areas near shore where eelgrass was short in stature and occurred in low density.

Side-Scan Sonar Surveys

The side-scan sonar mapping resulted in identification of 15,256 square meters of eelgrass within the survey area (Figure 3). Eelgrass is generally spread across the survey area as clusters of individual patches. All fairways within the marina had eelgrass; however, eelgrass occurrence as observed by SCUBA and sonar was lowest in the easternmost fairway and the area between Harbor Island West and the neighboring Marina Cortez to the east.

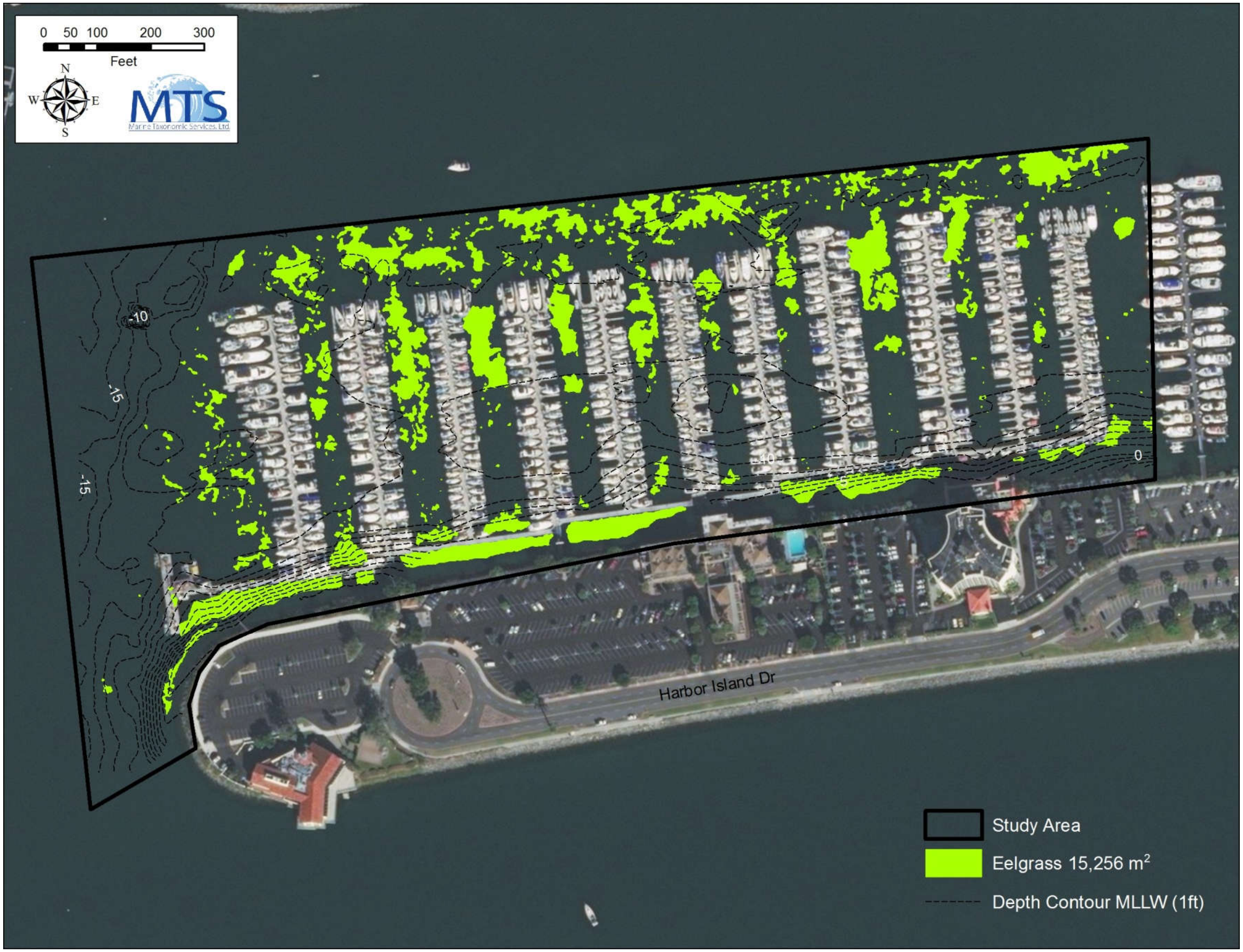

Figure 3. The above figure shows the distribution of eelgrass resources within the Harbor Island West eelgrass survey area.

Eelgrass Impact Analysis

The eelgrass map and bathymetric map data were analyzed to determine the potential for impacts to eelgrass resources within the survey area. For the purpose of the analysis, the existing and proposed dock layouts were used to create a mask. The dock masks were then used to clip the bathymetry and the eelgrass data. The eelgrass and bathymetry that remained outside the mask provided the unshaded eelgrass and bathymetric depth distribution. The proportion of eelgrass within each unshaded 1-foot depth category provides the percent cover of eelgrass habitat within each depth category. Only areas that were both surveyed for eelgrass and had associated depth data were included in the analysis. Some areas were mapped by SCUBA for eelgrass but could not be accessed by the survey vessel when the bathymetry survey was performed.

The potential habitat lost or gained is simply the difference between each of the depth categories before and after implementation of the dock plan. In cases where a greater amount of a depth category is shaded after construction, potential habitat is lost and a negative number results. If a depth category has less shading after construction, the value is positive. The expected eelgrass change is calculated by multiplying the potential habitat lost or gained by the percent eelgrass cover observed in each unshaded depth category. This assumes that where dock structures are removed, eelgrass will recruit to those unshaded areas in a manner similar to that observed for those depth categories prior to construction.

It is important to point out that the dock masks were created by using the perimeter of the current and proposed dock layouts with an assumption that areas within boat slips were covered. This is different from the area of the docks themselves as presented in other planning documents for the Project. This is basically assuming all slips are filled with vessels prior to and after construction regardless of the current vacancy status. The existing combined dock and slip area was calculated to be 41,244 square meters (443,947 square feet). The proposed dock and slip area measures 39,779 square meters (428,178 square feet). The existing dock and slip area where there was also bathymetry such that it could be included in the eelgrass impact model was 39,763 square meters (428,005 square feet). The proposed dock and slip area with bathymetry included in the analysis was 39,593 square meters (426,176 square feet).

The results of the eelgrass impact analysis show that the reconfiguration of the marina facilities will directly cover 177 square meters (1,905 square feet) of eelgrass (Figure 4 and Table 2). This represents all of the eelgrass mapped within the easternmost fairway as that fairway will be covered by the new dock arrangement. It also includes minor amounts of eelgrass at the westernmost dock/headwalk where some of the western boat slips are increasing in length (Figure 4).

Figure 4. The above figure shows the existing and proposed dock footprint masks as used to support the impact analysis. The insets show where most of the 177 square meters of eelgrass will be covered due to dock reconfiguration.

Table 2. The below table provides the distribution of habitats and eelgrass by depth and whether or not they are covered by marina facilities. The three columns at right are calculated using the other fields. The percent cover of eelgrass habitat is the proportion of unshaded bottom within each depth classification that is vegetated by eelgrass. The potential loss/gain is the amount of unshaded potential eelgrass habitat that will be lost or gained when the existing docks are replaced by the current docks. The expected eelgrass loss/gain multiplies the percent eelgrass cover by the amount of potential eelgrass loss/gain within each depth classification to determine the expected loss or gain of eelgrass after the Project is implemented. All values represent areas in square meters.

Depth Range (ft MLLW)	Bathymetric Distribution	Existing Dock Cover	Proposed Dock Cover	Eelgrass Distribution	Existing Dock Over Eelgrass	Proposed Dock Over Eelgrass	Bathymetric Distribution Unshaded	Eelgrass Unshaded	Habitat % Eelgrass Cover	Potential Loss/Gain	Expected Eelgrass Loss/Gain
-17 to -16	478	0	0	0	0	0	478	0	0.0%	0	0.0
-16 to -15	1525	0	0	0	0	0	1525	0	0.0%	0	0.0
-15 to -14	2340	0	0	0	0	0	2340	0	0.0%	0	0.0
-14 to -13	3934	2	2	2	0	0	3932	2	0.1%	0	0.0
-13 to -12	6076	960	959	116	0	0	5116	116	2.3%	1	0.0
-12 to -11	38387	11136	11303	4205	4	12	27251	4201	15.4%	-167	-25.7
-11 to -10	52255	21143	20831	6528	18	167	31112	6510	20.9%	312	65.3
-10 to -9	5034	2385	2418	145	13	17	2649	132	5.0%	-33	-1.6
-9 to -8	2706	1323	1331	291	2	5	1383	289	20.9%	-8	-1.7
-8 to -7	2466	1087	1149	432	24	25	1379	408	29.6%	-62	-18.3
-7 to -6	2273	977	976	444	7	12	1296	437	33.7%	1	0.3
-6 to -5	1682	344	264	765	12	18	1338	753	56.3%	80	45.0
-5 to -4	1400	182	142	586	8	8	1218	578	47.5%	40	19.0
-4 to -3	1353	114	108	509	2	2	1239	507	40.9%	6	2.5
-3 to -2	4990	76	73	660	2	1	4914	658	13.4%	3	0.4
-2 to -1	3366	33	36	379	2	4	3333	377	11.3%	-3	-0.3
-1 to 0	592	1	1	76	0	0	591	76	12.9%	0	0.0
0 to 1	292	0	0	0	0	0	292	0	0.0%	0	0.0
1 to 2	297	0	0	0	0	0	297	0	0.0%	0	0.0
2 to 3	185	0	0	0	0	0	185	0	0.0%	0	0.0
3 to 4	13	0	0	0	0	0	13	0	0.0%	0	0.0
Totals	**131644**	**39763**	**39593**	**15138**	**94**	**271**	**91881**	**15044**	**NA**	**170**	**84.8**

Note: Existing and proposed dock cover includes slip space and is not the same as dock coverage only values provided in text and in other project documents.

The impact analysis also shows that the Project will provide for greater potential eelgrass habitat area after implementation due to a reduction of 557 square meters (6,000 square feet) of over water dock coverage (170 square meters [1,830 square feet] reduction of dock and slip coverage) (Table 2). Based on model predictions, the Project will result in a net increase of 85 square meters (915 square feet) of eelgrass above that currently mapped within the Project area. This increase is due to the reduction in shading over areas with depths suitable to support eelgrass.

Discussion

The results of this survey show that there are considerable eelgrass resources within and around the Harbor Island West Marina. The patterns of eelgrass occurrence observed are generally similar to two recent mapping efforts (M&A 2012, MTS 2015). However, both the current effort and MTS (2015) identified more eelgrass between the marina and shore relative to M&A (2012). The differences within these shallow, nearshore areas are likely due to a lower level of visual verification in the M&A (2012) study. Increases between MTS 2015 and the current study seem to be due to expansion of eelgrass beds as there are increases throughout the survey area. Eelgrass densities have been highly variable in all recent mapping efforts indicating that eelgrass vigor ranges throughout the survey area.

The results of the impact analysis show that 177 square meters of eelgrass will be directly impacted by the reconfiguration of the docks. These impacts occur in the easternmost fairway where the two docks/headwalks at the eastern end of the marina are being replaced by a single dock/headwalk and at slips of the westernmost dock/headwalk where there are slight increases to slip lengths. The amount of total eelgrass, the amount of eelgrass impacted, and the amount of predicted eelgrass recover is significantly higher than that noted during the MTS (2015) survey. It was pointed out in the MTS (2015) discussion of results that transect survey results predicted that there was slightly more eelgrass in the eastern fairway than mapped via sonar and that future surveys might detect more eelgrass under favorable conditions. Given the expansive eelgrass growth across the marina it appears conditions have been favorable for eelgrass growth since the prior survey.

While the new configuration covers 177 square meters of eelgrass, the results of the impact analysis indicate that the Project will provide a surplus of potential eelgrass habitat relative to the existing condition. As shown in the impact analysis, multiplication of the area made available by the proportion of eelgrass cover observed in each of the bathymetric depth categories indicates that a net increase of 85 square meters of eelgrass can be expected to grow within the areas where the decreased dock footprint results in reduced bottom shading.

The impact analysis shows that the Project is self-mitigating with regards to eelgrass cover. Although there will be 177 square meters of current eelgrass coverage lost, there will be a net increase over the current coverage of 85 square meters. This means the project will result in production of 262 square meters (2,820 square feet) of eelgrass in areas that will be made available by the Project. This equates to a ratio of 1.48:1 of created eelgrass for lost eelgrass.

This is in excess of the 1.2:1 eelgrass mitigation ratio specified in the California Eelgrass Mitigation Policy.

Given the Project provides a net increase in potential eelgrass habitat and therefore a long-term benefit to the resource, it is reasonable to expect favorable review of the Project by NOAA Fisheries. However, it is suggested that a small restoration effort be performed to ensure rapid eelgrass colonization in appropriate areas and to ensure that the Project does not result in a reduction of eelgrass resources. This would simply mean planting approximately 300 square meters worth of eelgrass in areas where shading is removed and depths are suitable for eelgrass growth.

In addition to the potential for direct impacts to eelgrass associated with reconfiguration of the dock layout, there is a potential for direct and indirect impacts associated with construction techniques. Construction elements that can cause direct impact include shading from support vessels (e.g. barges), bottom scour from propeller wash from construction vessels and bottom contact from the use of spuds. Indirect impacts can also occur from increases in turbidity. Turbidity decreases the light available to the eelgrass beds as more light is attenuated through the water column than would be otherwise. Additionally, as particulates settle from the turbid water column they can land of eelgrass blades and reduce the ability of the plant to photosynthesize. The extent of turbidity related impacts is dependent upon the extent and duration of the elevated turbidity.

The potential direct and indirect eelgrass impacts associated with bottom contact, scour, and turbidity mentioned above can be readily avoided through contractor training, provision of eelgrass maps, and use of silt curtains during pile jetting and driving. The map data can be used by construction personnel so that direct and indirect impacts associated with construction activities would be avoided. Silt curtains would minimize the spread of particulates through the water column and minimize the potential for indirect impacts.

References

Marine Taxonomic Services, Ltd. [MTS]. 2015. Harbor Island West Marina Baseline Eelgrass Resource Report. Prepared for ICF International. January 7, 2015 (revised January 2, 2017).

Merkel & Associates, Inc. [M&A]. Baseline eelgrass report for the Harbor Island West Marina Redevelopment Project, San Diego Bay, California. Letter Report. April 23, 2012.

Appendix C
Marine Biological Resources Technical Report

Harbor Island West Marina Marine Biological Resources Report

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April 2, 2018 (Revised September 2, 2019)

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April 2, 2018 (Revised September 2, 2019)

Introduction

Marine Taxonomic Services (MTS) was contracted by ICF International to provide a marine biological survey and essential fish habitat assessment at Harbor Island West Marina in San Diego, California. MTS has previously completed the survey and analysis of the resources at Harbor Island West Marina and has prepared a report on the findings. This report updates that effort by providing additional analyses relative to acoustic effects of pile driving on marine mammals, sea turtles, and fishes. This report is intended to support the environmental planning associated with proposed construction activities. As such the results are discussed relative to potential impacts associated with planned construction activities at the marina.

Harbor Island West Marina is located in the northern portion of San Diego Bay along the northwestern shore of Harbor Island (Figure 1). The Harbor Island West Marina Renovation Project (Project) entails demolishing and replacing all existing buildings and structures as well as replacing landscaping, reconfiguring hardscape, modernizing utilities, modernizing lighting, renovating the parking lot, adding a public promenade, and improving view corridors. On the water, the docks will be replaced and slightly reconfigured. The replacement docks will follow the existing layout except that two-extension dock/headwalks will be consolidated into a single dock/headwalk. This will reduce the current 11 dock/headwallks to 10 docks/headwalks and will reduce the over water coverage of the docks from 146,000 square feet to 140,000 square feet. The number of slips will be reduced from 620 to 603 with adjustments made to the distribution of slip sizes within the marina.

Methods

MTS staff Robert Mooney performed a side-scan sonar survey of the marina on March 26, 2018. The side-scan sonar survey was performed to detect and map any eelgrass (*Zostera marina*) present, the sonar survey was performed by navigating a small vessel along a series of transects through the study area. The vessel was fitted with a pole-mounted side-scan sonar operating at 450 kHz. The sonar was set to scan 30 meters on both the port and starboard channels for a total scanning swath of 60 meters. Survey transects were navigated such that adjacent sonar swaths overlapped, providing complete bottom coverage within the marina study area.

Figure 1. Aerial image showing location of the Harbor Island West Marina (black polygon) within San Diego Bay.

Following the field surveys, the collected side-scan sonar files were geographically registered using the vessel's navigation data collected during the survey. The side-scan files were then compiled to create a contiguous view of the seafloor across the entirety of the study site. The boundaries of the eelgrass present were then digitized from the compiled data set using ESRI ArcView software and plotted on a geographically registered image of the project area.

On March 26, 2018, MTS staff Angelica Lopez and Kees Schipper further inspected the survey area using SCUBA. Each of the habitat types in the marina was surveyed to characterize it and document the dominant flora and fauna present. Notes were made on the occurrence or potential for occurrence of sensitive species that could be impacted by the proposed project.

To determine the potential for noise from pile driving to impact sensitive species, an analysis of potential noise levels was performed. The analysis used the compendium of pile driving noise data from Buchler et al. (2015) to establish potential noise levels at the source of pile driving. The potential for generated noise to cause Level A (injury) and Level B (behavioral) Harassment of marine mammals was then evaluated by calculating isopleths over which noise would attenuate to thresholds established by NOAA (NMFS 2016a and NMFS 2016b). Isopleth calculations for Level A Harassment were performed using the NOAA companion spreadsheet for NMFS (2016a); the isopleths for Level B Harassment were calculated with direct application of the practical spreading loss model (refer to MTS and ICF 2016). Analysis of potential impacts to fish used the NOAA developed spreadsheet and associated thresholds for injury and behavioral effects on fishes[1].

Results

Marine Habitats

The natural and man-made habitats surveyed within the study site were unvegetated soft bottom, vegetated soft bottom, docks and pilings, riprap, and open water. Each is discussed below.

Unvegetated Soft Bottom

The majority of the marina is loosely consolidated soft bottom, ranging in depth from intertidal to -17-feet Mean Lower Low Water (MLLW). The intertidal portions are mostly shoreline rip-rap while the soft bottom habitats start at approximately -1-foot MLLW (low intertidal). Shallow shoreline areas typically have greater content of fine sands that quickly give way to mud as one moves to deeper water. Most of the approximately 13.6-hectare survey area is unvegetated soft bottom. The primary vegetation present was eelgrass growing over approximately 1.5 hectares and leaving approximately 12.1 hectares of unvegetated soft bottom within the surveyed area.

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[1] *https://www.wsdot.wa.gov/NR/rdonlyres/1C4DD9F8.../BA_NMFSpileDrivCalcs.xls*

Unvegetated soft bottom with invertebrate burrows.

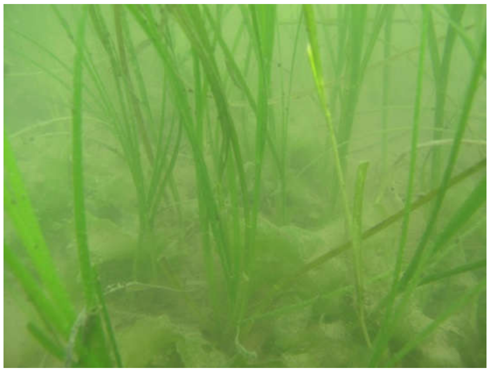
The most common invertebrates observed were the tube-dwelling anemone (*Pachycerianthus fimbriatus*) and sea pens (*Sylatula elongata*). Additionally, the mud showed evidence of numerous burrowing invertebrates, likely including bivalves, burrowing anemones, and amphipods. During the 2014 survey (MTS 2015), a core of mud representative of the unvegetated soft bottom habitat was collected and processed through a sieve. Inspection of the macrofauna retained by the sieve revealed a variety of infaunal polychaetes and a jackknife clam (*Tagelus californianus*). Additionally, the exotic colonial bryozoan, *Zoobotryon verticillatum* was found in occasional clumps over soft bottom.

Common motile invertebrates observed on the mud bottom included spiny lobster (*Panulirus interruptus*), California aglaja (*Navanax inermis*), and cloudy bubble snails (*Bulla gouldiana*). The observed lobsters were associated with debris items.

Fish species observed over unvegetated soft bottom included numerous round stingrays (*Urobatis halleri*). Fleeing flatfish were observed that were difficult to identify but likely included diamond turbot (*Hypsopsetta guttulata*) and California halibut (*Paralichthys californicus*). Barred sand bass (*Paralabrax nebulifer*) and spotted sand bass (*Paralabrax maculatofaciatus*) were also observed over unvegetated soft bottom.

Vegetated Soft Bottom

Eelgrass occurs in a portion of the un-shaded soft bottom habitat across much of the marina. Mapping of the side-scan sonar record identified 15,256 square meters of eelgrass patches within the study site, growing at depths ranging from approximately -1 to -13-feet MLLW (Figure 2). Eelgrass density varied across the survey area. The average eelgrass density was 59.5 ± 44.7 (mean ± 1 sd) leaf shoots per square meter. A total of 155 quadrats (n=155) were sampled to determine the leaf shoot density estimate. The eelgrass was generally observed to be healthy with a minimal epiphyte load and was not flowering at the time of the survey. Eelgrass growing in shallow water along shore was typically shorter (less than 30 centimeters tall) relative to eelgrass in deeper water that was typically greater than 40 centimeters in length.



Eelgrass with the green alga Ulva lactuca.

Frequently intermixed with the eelgrass were loose clumps of a Gracilarioid red alga (Family Gracilariaceae). This alga is frequently found in eelgrass beds in southern California, at times in such abundance as to smother the eelgrass. The green alga, *Ulva lactuca* was also occasionally observed intermixed with eelgrass.

Figure 2. The above figure shows the distribution of eelgrass resources within the Harbor Island West eelgrass survey area.

Fish observed within the eelgrass included a few round stingrays, barred sand bass, spotted sand bass, and a Pacific seahorse (*Hippocampus ingens*).

The most common invertebrate observed within eelgrass was the tube-dwelling anemone. The soft-bottom associated with eelgrass was generally similar to unvegetated areas with evidence of numerous burrowing invertebrates, likely including bivalves, burrowing anemones, and amphipods. Common motile invertebrates observed included the California aglaja and cloudy bubble snails.

Docks and Piles

A large portion of the study site is covered by floating docks and their associated piles. The upper reaches of the piles (0 to -6-feet MLLW) were generally colonized by a fouling community dominated by barnacles (*Balanus glandula* and *Chthamalus* sp.), tunicates (*Styela clava, Ciona* sp. *Botrylloides* spp*.,* and others), sponges, oysters (*Ostrea lurida*), the soft bryozoan *Zoobotryon verticillatum,* encrusting bryozoans (*Eurystomella* sp.), hydroids, and the green algas *Ulva intestinalis*, and *Ulva lactuca*. Sponges were the primary fauna on the piles below -6-ft MLLW.

Fish observed around the piles included giant kelpfish, kelp bass (*Paralabrax clathratus*), and barred sand bass. Schools of topsmelt (*Atherinops affinis*) were observed nearby while inspecting the docks.

The sides of the dock floats were fouled by similar flora and fauna as the piles. Dominant algal species were *Ulva lactuca*, *Mazzaella splendens*, and the exotic kelp *Undaria pinnatifida*.

Riprap

The riprap revetment along the marina shoreline supported a limited amount of hard bottom intertidal marine life. Occasional barnacles, limpets, and the green alga *Ulva intestinalis* colonized the riprap. Near the tow of the rip-rap the exotic alga *Sargassum muticum* occurred at low density as interspersed individuals. The crevices formed by the rocks likely provide shelter to small fish, though none were seen during the survey. Spiny lobsters were observed associated with the rip-rap particularly in areas associated with wharf piles.

Open Water

Schools of topsmelt were observed in the open water around and between the boat docks. It is likely that other schooling bait fish frequent the open waters of the marina, including slough anchovy (*Anchoa delicatissima*) and deepbody anchovy (*Anchoa compressa*) (Pondella and Williams 2009). These fish are important prey items for sea birds that can be expected to forage in the marina, including brown pelicans (*Pelecanus occidentalis californicus*), double-crested cormorants (*Phalacrocorax auritus*), grebes, loons, and terns. While pelicans loons, and terns were not observed during the survey, double-crested cormorants, and western grebes (*Aechmophorus occidentalis*) were observed.

Sensitive Species

Protected, rare, threatened, or endangered species that may occur within Harbor Island West Marina include east Pacific green sea turtle (*Chelonia mydas*) (Federal Threatened), California least tern (CLT; *Sternula antillarum browni*) (State Endangered and Federal Endangered), California brown pelican (California Department of Fish and Wildlife Fully Protected). Mammals protected under the Marine Mammal Protection Act and likely to occur within the marina include the harbor seal (*Phoca vitulina*) and California sea lion (*Zalophus californianus californianus*). None of the above species were observed during the survey, though their likelihood of occurrence is as follows.

Individuals from the green sea turtle population that live in San Diego Bay are typically observed in south San Diego Bay. They could potentially enter the marina when migrating but such an occurrence would be a rare event. CLT are seasonally present in San Diego Bay, from April to September. The marina is located approximately 1.5 miles from each of two nesting site in north San Diego Bay and it is likely that CLT could forage within the marina during nesting season. Year-long, baywide avian surveys identified CLT across the water at Spanish Landing in 2006 and 2009 (TDI 2009, 2011). California brown pelicans do not nest in San Diego Bay, but frequently loaf and forage in marina habitats. During the 2006 and 2009 baywide avian surveys, California brown pelicans were observed a total of 15 and 14 times, respectively (TDI 2009, 2011). Harbor seals and California sea lions do not breed in San Diego Bay, but forage there year-round and may occasionally enter the marina.

Essential Fish Habitat Assessment

The following assessment of Essential Fish Habitat (EFH) for Harbor Island West Marina is provided in accordance with the 1996 amendments to the Magnuson-Stevens Fishery Management and Conservation Act (MSA) (Code of Federal Regulations (CFR) Title 50, Chapter VI, Part 600). The amendments require the delineation of "essential fish habitat" for all managed species. Federal action agencies which fund, permit, or carry out activities that may adversely impact EFH are required to consult with the National Marine Fisheries Service (NMFS) regarding the potential effects of their actions on EFH and respond in writing to the NMFS's recommendations.

The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." For the purpose of interpreting the definition of essential fish habitat: "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle. A healthy ecosystem is defined under the MSA as, "an ecosystem where ecological productive capacity is maintained, diversity of the flora and fauna is preserved, and the ecosystem retains the ability to regulate itself".

The purpose of this EFH assessment is to comprehensively identify and analyze EFH occurring within the Harbor Island West Marina, so that federal agencies can best determine whether or not the proposed Project would adversely affect designated EFH, and identify possible conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH. The MSA requires consultation for all federal agency actions that may adversely affect EFH. EFH consultation with NMFS is required by federal agencies undertaking, permitting, or funding activities that may adversely affect EFH, regardless of its location. Under Section 305(b)(4) of the MSA, NMFS is required to provide EFH conservation and enhancement recommendations to federal and state agencies for actions that adversely affect EFH. As such, the following EFH assessment, which includes an analysis of species managed by the Pacific Fishery Management Council (PFMC) that are known to utilize EFH within the Project area, and an analysis of potential HAPCs within the Project area, will provide all of the information necessary for NMFS to conduct any future EFH consultations for the proposed Project.

NMFS Managed Ichthyofauna Present in San Diego Bay

To adequately address EFH at the project site, fish species managed by the PFMC that are known to either occur within the Project area, have historically occurred within the Project area, or depend upon those marine habitats that are known to occur within the Project area, were identified. This was accomplished through a thorough review of the latest PFMC's Fishery Management Plans (PFMC 2019 and 2016), a thorough analysis of the range and habitat requirements of PFMC managed fish species (McCain 2003, Love et al. 2002, Henderson and Mooney 2001, and PFMC 2005), running an analysis of the latest EFH mapping GIS software regularly maintained and updated by NOAA Fisheries (NOAA Fisheries 2019), and by evaluating fish species identified during the most recent fisheries inventories conducted throughout San Diego Bay in 2016 (Williams et al. 2016).

In all, 100 species of marine fishes, and one species of marine invertebrate were identified to contain EFH within Harbor Island West Marina (NOAA Fisheries 2019). Of these species identified, 96 are currently managed under the Pacific Coast Groundfish FMP, and 5 are managed under the Coastal Pelagic Species FMP (PFMC 2019 and 2016). Thorough analyses of the range and habitat requirements of each of these species suggests that 57 of the 101 species identified to contain EFH within Harbor Island West Marina have the greatest likelihood to occur within the Project area based on species-specific habitat requirements. This subset of marine species that maintain the strongest affinities for bays and harbors in Southern California are listed below in Table 1.

Table 1. PFMC-managed coastal pelagic fish species and pacific coast groundfish species with habitat requirements in San Diego Bay.

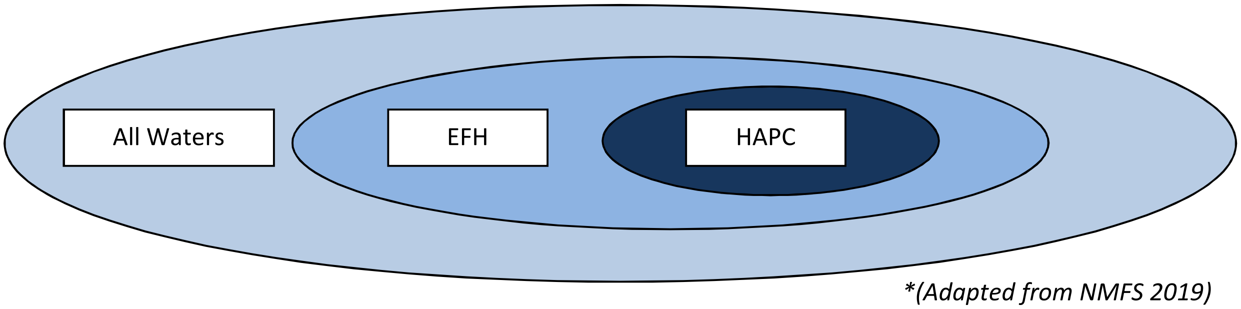
Common Name	Species Name
Coastal Pelagic Species FMP	
Jack Mackerel	*Trachurus symmetricus*
Market Squid	*Loligo opalescens*
Northern Anchovy*	***Engraulis mordax***
Pacific Mackerel	*Scomber japonicas*
Pacific Sardine*	***Sardinops sagax***
Pacific Coast Groundfish FMP	

Aurora Rockfish	*Sebastes aurora*
Bank Rockfish	*Sebastes rufus*
Blue Rockfish	*Sebastes mystinus*
Boccaccio	*Sebastes paucispinis*
Big Skate	*Raja binoculata*
Brown Rockfish	*Sebastes auriculatus*
Cabezon	*Scorpaenichthys marmoratus*
Calico Rockfish	*Sebastes dallii*
California Scorpionfish*	***Scorpaena guttata***
California Skate	*Raja inornate*
Canary Rockfish	*Sebastes pinniger*
Chilipepper Rockfish	*Sebastes phillipsi*
Cowcod	*Sebastes levis*
Curlfin Sole	*Pleuronichthys decurrens*
Dark Blotched Rockfish	*Sebastes crameri*
Dover Sole	*Microstomus pacificus*
English Sole	*Parophrys vetulus*
Finescale Codling	*Antimora microlepis*
Gopher Rockfish	*Sebastes carnatus*
Grass Rockfish	*Sebastes rastrelliger*
Green-Spotted Rockfish	*Sebastes chlorostictus*
Honeycomb Rockfish	*Sebastes umbrosus*
Kelp Greenling	*Hexagrammos decagrammus*
Kelp Rockfish	*Sebastes atrovirens*
Leopard Shark	*Triakis semifasciata*
Lingcod	*Ophiodon elongatus*
Longnose Skate	*Raja rhina*
Longspine Thornyhead	*Sebastes altivelis*
Mexican Rockfish	*Sebastes madonaldi*
Olive Rockfish*	***Sebastes serranoides***
Pacific Cod	*Gadus macrocephalus*
Pacific Ocean Perch	*Sebastes alutus*
Pacific Sanddab	*Citharichthys sordidus*
Pacific Whiting	*Merluccius productus*
Petrale Sole	*Eopsetta jordanni*
Ratfish	*Hydrolagus colliei*
Rex Sole	*Glyptocephalus zachirus*
Rock Sloe	*Lepidopsetta bilineata*
Rougheye Rockfish	*Sebastes aleutianus*
Sablefish	*Anoplopoma fimbria*
Sand Sloe	*Psettichthys melanostictus*
Sharpchin Rockfish	*Sebastes zacentrus*
Shortbelly Rockfish	*Sebastes jordani*
Shortspine Thornyhead	*Sebastes alascanus*
Soupfin Shark	*Galeorhinus zyopterus*
Spiny Dogfish	*Squalus suckleyi*
Splitnose Rockfish	*Sebastes diploproa*
Starry Flounder	*Platichthys stellatus*
Stripetail Rockfish	*Sebastes saxicola*
Treefish	*Sebastes serriceps*
Widow Rockfish	*Sebastes entomelas*
Yellowtail Rockfish	*Sebastes flavidus*

***Indicate species caught during San Diego Bay Fisheries Inventories in 2016 (Williams et al. 2016).**

Habitat Areas of Particular Concern

While 100% of the Project area falls within designated EFH for the two FMPs identified above, Habitat Areas of Particular Concern (HAPC) are also designated within Harbor Island West Marina. HAPCs are a discreet subset of EFH (as illustrated below*) that are distinguished by characteristics including their high ecological value and vulnerability to anthropogenic stressors.



(Adapted from NMFS 2019)

Areas within designated EFH can also be designated as a HAPC based on one or more of the following characteristics: 1) The importance of the ecological function provided by the habitat, 2) Its sensitivity to human-induced environmental degradation, 3) The extent of threats posed by development of the habitat, or 4) The rarity of the habitat type (NMFS 2019). HAPCs are considered high priority areas for conservation, management, or research because they are rare, sensitive, stressed by development, or important to ecosystem function (NMFS 2019). The HAPC designation does not necessarily mean additional protections or restrictions upon an area, but they help to prioritize and focus conservation efforts (NMFS 2019). Although these habitats are particularly important for healthy fish populations, other EFH areas that provide suitable habitat functions are also necessary to support and maintain sustainable fisheries and a healthy ecosystem (NMFS 2019). Current HAPC types are estuaries, canopy kelp, seagrass, and rocky reefs.

Seagrass habitat is present in Harbor Island West Marina and is a designated as HAPC by the National Marine Fisheries Service (PFMC 2016). The seagrass present at the marina is known as eelgrass (*Zostera marina*). Mooney and Woodfield (2009) summarized eelgrass functions and contributions to ecological processes:

> Eelgrass plays many important roles in estuarine systems. It clarifies water through sediment trapping and stabilization (de Boer 2007). It also provides the benefits of nutrient transformation and water oxygenation (Yarbro and Carlson 2008). Eelgrass serves as a primary producer in detritus-based food webs (Thresher et al. 1992) and is further directly grazed upon by invertebrates, fish, and birds (Valentine and Heck 1999), thus contributing to eco-system health at multiple trophic levels. Additionally, it provides physical structure in the form of habitat to the community and supports epiphytic plants and animals, which are in turn grazed upon by other invertebrates, fish, and birds. Eelgrass is also a nursery

area for many commercially and recreationally important finfish and shellfish (Heck et al. 2003), including both those that are resident within the bays and estuaries, as well as oceanic species that enter the estuaries to breed or spawn. Among recreationally important species, sand basses and lobster make use of eelgrass beds as habitat. Besides providing important habitat for fish, eelgrass and associated invertebrates provide important food resources, supporting migratory birds during critical life stages, including migratory periods.

Analysis of Pile Driving Noise

The MMPA of 1972 states that "take" ("to hunt, harass, capture, kill, or collect”) any marine mammal or attempt to do so is prohibited. In 1994, amendments were made to this act that defined two levels of harassment, labeled "Level A" and "Level B". For marine mammals, Level A harassment is defined as, "any act of pursuit, torment, or annoyance which has the potential to injure..." Level B harassment is defined as the potential to disturb by, "causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

According to NMFS, extreme sound levels can cause harassment to marine mammals and other wildlife species (e.g. fish and sea turtles). The sound level thresholds for Level A harassment for marine mammals was updated in July 2016 and provides different thresholds based on the auditory ranges of different types of marine mammals (NMFS 2016a). The thresholds are provided in Table 2. The thresholds were developed using dual metrics of cumulative sound exposure level for a 24-hour accumulation period (L_E) and peak sound level (L_{pk}) for impulsive sounds (e.g. impact pile driving), and only L_E for non-impulsive sounds (e.g. vibratory pile driving). The thresholds for Level B harassment are based on older guidelines and are 160 decibels root mean square (dB RMS) for impulsive noise and 120 dB RMS for unattenuated noise (Table 2). The RMS accounts for variable sound levels over time and provides a measure of the sound magnitude. To calculate the RMS, each point over the calculation period is squared, the average taken, and then the square root of the average is taken. For impact pile driving, RMS is calculated over the period of the pulse that contains 90% of the acoustical energy (Department of the Navy 2013). Only impulsive sounds due to impact pile driving are analyzed for this Project because vibratory methods are not proposed.

The analysis of in-water noise used L_{PK}, RMS, and single-strike sound exposure level values of 185 decibels (dB), 166 dB, and 155 dB, respectively. These values were determined to be the potential worst-case sound energy levels associated with driving 18-inch concrete piles after review of Buchler et al. (2015). The project will use jetting with impact driving for final setting of 12-inch, 14-inch, and 18-inch piles. The calculation of isopleths used assumptions of 12 strikes per pile and installation of 10 piles per day.

Table 2. NMFS thresholds and calculated isopleths to thresholds for Level A harassment of marine mammals for each of the marine mammal hearing groups. Isopleths are in meters and thresholds are in dB.

Hearing Group	Low-Frequency Cetaceans	Mid-Frequency Cetaceans	High-Frequency Cetaceans	Phocid Pinnipeds	Otariid Pinnipeds
L_E Threshold	183	185	155	185	203
PTS Isopleth to L_E Threshold	3.3	0.1	3.9	1.8	0.1
L_{PK} Threshold	219	230	202	218	232
PTS Isopleth to L_{PK} Threshold	0.0	0.0	0.0	0.0	0.0

Level A Harassment (physical injury) has a low likelihood of occurrence as a result of the Project given the projected sound pressure levels from pile-driving activities. Anticipated L_{PK} at the source of pile driving for this project are estimated up to 185 dB (i.e., with use of an impact hammer to drive 18-inch piles) (Buchler et al. 2015). This is below Level A thresholds established by NOAA for low-frequency cetaceans (219 dB), mid-frequency cetaceans (230 dB), high-frequency cetaceans (202 dB), phocid pinnipeds (218 dB), and otariid pinnipeds (232 dB). Thus, the potential for L_{PK} noise levels that would harm marine mammals is negligible.

In addition to L_{PK} thresholds, recent NOAA guidance (NMFS 2016a) regarding Level A Harassment of marine mammals includes thresholds for L_E. The worst case calculated L_E at source would be above the threshold for all marine mammals. However, the threshold exceedance would be so low that the sound levels would attenuate to the thresholds within minimal isopleth distances. Based on an assumption of 12 strikes per pile for 18-inch concrete piles, the mid-frequency cetaceans and otariid pinniped isopleths are 0.1 meter from source. Phocid pinnipeds are 1.8 meters from source. The isopleths for low-frequency cetaceans and high-frequency cetaceans are 3.3 and 3.9 meters from source, respectively. Given such narrow isopleths within which noise levels can exceed thresholds for cumulative exposure, the potential for noise level impacts, as measured by L_E, is negligible.

The recent NOAA guidance for noise level impacts on marine mammals addresses only Level A Harassment (NMFS 2016a). A determination of Level B Harassment (behavioral) relies on previous guidance established by NOAA (NMFS 2016b). Level B Harassment could occur if marine mammals are exposed to in-water sound levels greater than 160 dB RMS. Impact driving of 18-inch concrete piles is anticipated to produce noise levels of 166 dB RMS (Buchler et al. 2015). The isopleth where sound is attenuated from 166 dB rms to 160 dB rms is 25 meters, based on the practical spreading loss model (Table 3). However, there are data showing higher noise levels for driving of smaller (16-inch) piles. Buchler et al. (2015) provide data showing 173 dB RMS at source for driving of 16-inch concrete piles. The isopleth to attenuate sound from 173 dB RMS to 160 dB

RMS is 74 meters based on the practical spreading loss model (Table 3). Therefore, there is minor potential for Level B Harassment of marine mammals and green sea turtles.

Taking a conservative approach, an isopleth of 74 meters would be sufficient to monitor marine mammals during construction. In-air sound attenuates faster that in-water sound and sound levels are generally lower in air. Therefore, monitoring marine mammals within 74 meters of source in air or in water would be sufficient to protect marine mammals. This standard is also protective of green sea turtles.

Table 3. The below table provides the Level B harassment isopleths as calculated using the anticipated sound levels from driving piles using NMFS guidance and the practical spreading loss model.

Pile Size / Type	Driving Method	Level B Influence Isopleth Distance[1]
16” Concrete	Impact	74 m
18” Concrete	Impact	25 m

[1] 160 dB_{RMS} used as threshold for Level B harassment.

The results of noise analysis relative to fishes used the same worst-case scenarios and assumptions as those used for marine mammals. Applying the NOAA thresholds for physical injury and behavioral modification for fishes, allowed calculation of isopleths within which injury or behavioral modification may occur. L_{PK} sound levels are not anticipated to result in physical injury to fishes given that L_{PK} levels are anticipated to be lower than the threshold for injury based on peak sound levels (Table 4). L_E sound exposure levels are also expected to be too low based on 12 strikes per pile and 10 piles per day to cause physical injury to fishes. RMS levels for behavioral modification of fish based on the worst-case scenario (166 dB RMS) are above the 150 dB RMS threshold established by NOAA. Calculation of the behavioral modification isopleth using the practical spreading loss model requires a 117-meter isopleth to reduce RMS levels from 166 to 150 dB. Thus, behavioral modification may occur for all fish occurring within 117 meters of pile driving (Table 4).

Table 3. NMFS thresholds and calculated isopleths to thresholds for physical injury and behavioral effects in fishes. Physical injury for all fishes can occur if peak sound levels are above 206 dB or if cumulative sound exposure levels exceed 187 dB for fish ≥ 2 grams or 183 dB for fish < 2 grams. Behavioral modification is assumed to occur for all fish at above 150 dB RMS.

	Onset of Physical Injury			Behavior
	All Fish	**Fish ≥ 2 g**	**Fish < 2 g**	**All Fish**
Threshold	206 dB (L_{pk})	187 dB (L_E)	183 dB (L_E)	150 dB (rms)
Isopleth	0 m	0 m	0 m	117 m

Discussion

The biological communities present in Harbor Island West Marina are typical of the inner reaches of bays and harbors in the region and are not notably diverse, unique, or sensitive. The proposed changes to the dock layout pose no major biological constraints to marina improvements.

However, the following are biological and permitting issues to consider for general planning purposes.

The presence of eelgrass poses the greatest constraint to development activities. Eelgrass creates a unique marine habitat that serves many important functions in the bay environment, and is therefore given special status under the Clean Water Act, 1972 (as amended), Section 404(b)(10). The project has been determined to have impacts to eelgrass anticipated at approximately 177 square meters (1,905 square feet [MTS 2018]). However, the impact assessment identified that due to a reduction of 557 square meters (6,000 square feet) of vessel dock area, the Project would provide additional potential eelgrass habitat. That increased habitat potential could be used as part of a mitigation strategy to restore eelgrass resources on site. The increased habitat potential is expected to provide a net gain of 85 square meters (915 square feet) of eelgrass above that currently present. That means the project will result in eelgrass growth that will replace the 177 square meters of impact plus an additional 85 square meters. This represents a 1.48:1 ratio of impacted to expected growth.

To avoid any additional eelgrass restoration commitments, the Project should seek to avoid impacting eelgrass during construction. Indirect impacts may arise due to disturbance by construction vessels, pile installation, or increased turbidity. To avoid these impacts, Project implementation should minimize shading associated with staging of vessels or dock structures. Construction crews should incorporate techniques that avoid suspension of sediments that could reduce light penetration or settle on eelgrass directly.

Due to the known presence of eelgrass within the marina, state and federal permits will require pre- and post-construction eelgrass surveys be performed, whether or not impacts are anticipated. Surveys and any mitigation must be performed in accordance with the California Eelgrass Mitigation Policy (CEMP) (NMFS 2014). If impacts cannot be avoided, the permitee will be required to prepare and implement an Eelgrass Mitigation Plan per the CEMP, which involves a compensatory restoration of lost eelgrass at a 1.2:1 ratio (or 1:1 for impacts less than 10 square meters) and a five-year monitoring and reporting program. However, given that the Project will result in a net production of eelgrass and potential eelgrass habitat, it is possible that NOAA Fisheries will allow for a 2-year monitoring period prior to assessing impacts. Under that scenario it is likely that any eelgrass lost due to dock realignment will be offset by new growth.

The eelgrass data presented in this report were collected as part of a broad program to characterize the marina habitats. As such, it should be used for planning and permitting purposes; not as a surrogate for a pre-construction eelgrass survey. The project's pre-construction eelgrass survey should make use of extensive diver transect data to ensure mapping accuracy.

Another biological constraint to consider is a potential impact to CLT from turbidity generated by Project activities such as pile jetting and pile driving. This arises from concerns that elevated turbidity reduces visibility in the water and could impair foraging terns, which view prey fish from above and dive to catch them in surface waters. Most projects with such elements are required utilize best management practices to mitigate turbidity.

An additional concern raised regionally by resource agencies reviewing proposed projects is the loss of open water for foraging by CLT and other piscivorous birds. Given that the dock reconfiguration proposed, this Project will have an overall decrease (4,500 square feet) in over water cover and therefore should be looked upon as favorable to piscivorous birds.

It is not anticipated that the other sensitive species noted above would be significantly impacted by the marina improvements or construction activities.

In addition to the potential impacts noted above, the EFH assessment identified designated EFH habitat for 101 species of marine fish and invertebrates managed under the PFMC Coastal Pelagic and Pacific Coast Groundfish FMPs within Harbor Island West Marina. Furthermore, both estuarine and seagrass HAPCs occur within the Project area and could be impacted by potential project activities. The presence and potential to impact eelgrass, a HAPC was noted above.

With regard to potential impacts to EFH and the coastal pelagic and pacific coast groundfish species managed under the Coastal Pelagic and Pacific Coast Groundfish FMPs, the coastal pelagic species that both occur, and have the potential to occur in San Diego Bay, are generally open water schooling species that would only occasionally be found in a marina environment in San Diego Bay. Fish species managed under the Pacific Coast Groundfish FMP occur in low numbers in San Diego Bay and are not likely to be common within the Project area. More importantly, none of the proposed Project construction activities are expected to negatively alter the ecological roles and processes currently occurring within the Project area that are characteristic of designated EFH for coastal pelagic species and pacific coast groundfish. As such, any potential impacts to the role(s) that waters and substrate within the Project area play for these species regarding habitat for spawning, breeding, feeding, or growth to maturity, are expected to be negligible.

With regard to potential impacts to seagrass HAPC within the Project area, any potential impacts are expected to range from negligible to beneficial. The completed Project will result in the reduction of overwater coverage by Harbor Island West Marina by 6,000 square feet and will pose a negligible impact to eelgrass beds already present with the implementation of best management practices that are protocol for such dock renovation/replacement projects. As such, the removal of shading and increase eelgrass habitat is only expected to benefit/improve seagrass HAPC already present within Harbor Island West Marina, with other potential impacts to seagrass HAPC being negligible, as other ecological roles and processes characteristic of the HAPC will not be altered by the proposed Project.

The results of acoustic analysis of potential pile driving sounds indicates marine mammals, sea turtles, and fish will not be harmed due to pile driving generated sounds. The analysis indicates that there is the potential to cause behavioral modification to marine mammals, green sea turtles, and fishes. The behavioral isopleths are generally small (less than 74 meters for marine mammals and sea turtles, and 117 meters for fishes). These impacts are minimal and can be mitigated by use of soft-start techniques during pile driving to allow animals to flee the work area as well as a biological observer to ensure no sensitive species are harmed.

References

Allen, L.G. 1999. Fisheries inventory and utilization of San Diego Bay, San Diego, California. Final report. Nearshore Marine Fish Research Program, Department of Biology, California State University, Northridge.

de Boer, W.F. 2007. Seagrass-sediment interactions, positive feedbacks and critical thresholds for occurrence: a review. Hydrobiologia 591 (1): 5-24.

Heck, K.L., G. Hays, and R.J. Orth. 2003. Critical evaluation of the nursery role hypothesis for seagrass meadows. Marine ecology progress series 253:123-136.

Henderson, H.D. and R.C. Mooney. 2001. Essential Fish Habitat Assessment for the Port of San Diego Harbor Police and Transient Vessel Dock Replacement Project, Shelter Island, San Diego, California. Prepared for Port of San Diego. 12 pp.

Love, M.S., M. Yoklavich, and L. Thorsteinson. 2002. The Rockfishes of the Northeast Pacific. University of California Press, Berkeley, California.

McCain, B.B. 2003. Essential fish habitat west coast groundfish draft revised appendix. Seattle, WA: National Marine Fisheries Service, Northwest Fisheries Science Center.

[MTS] Marine Taxonomic Services, Ltd. 2015. Harbor Island West Marina Baseline Eelgrass Resources Report. Prepared by Robert Mooney. Prepared for ICF International. January 5, 2015, revised January 2, 2017.

[MTS] Marine Taxonomic Services, Ltd. 2018. Habor Island West Marina Updated Baseline Eelgrass Resources Report. Prepared by Robert Mooney. Prepared for ICF International. April 2, 2018.

[MTS and ICF] Marine Taxonomic Services and ICF International. 2016. Acoustic Monitoring Plan for the Shelter Island Boat Launch Facility Improvements Project. Prepared for the Port of San Diego Environmental and Land Use Management Department. October 2016.

Mooney, R.C. and R.A. Woodfield. 2009. Eelgrass and cordgrass (Chapter 4). *In, Batiquitos Lagoon long-term biological monitoring program final report 2009.* Prepared by Merkel & Associates. Prepared for City of Carlsbad Planning Department and The Port of Los Angeles Environmental Management Division.

[NMFS] National Marine Fisheries Service. 2014. California Eelgrass Mitigation Policy (October 2014).

[NMFS] National Marine Fisheries Service. 2016a. Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Department of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-55, 178 p.

[NMFS] National Marine Fisheries Service. 2016b. Interim Sound Threshold Guidance. Available online at: http://www.westcoast.fisheries.noaa.gov/protected_species/marine_ mammals/threshold_guidance.html.

[NMFS] National Marine Fisheries Service. 2019. Essential Fish Habitat: Habitat Areas of Particular Concern (HAPC). Available online at: https://www.westcoast.fisheries.noaa.gov/habitat/fish_habitat/hpac.html. Accessed 30 Aug. 2019.

National Oceanic and Atmospheric Administration [NOAA] Fisheries. Essential Fish Habitat Mapper, 2019, https://www.habitat.noaa.gov/application/efhmapper/index.html. Accessed 31 Aug. 2019.

[PFMC] Pacific Fishery Management Council. 2005. Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery. Appendix B; Part 2: Groundfish Life History Descriptions. Pacific Fishery Management Council, Portland, OR.

[PFMC] Pacific Fishery Management Council. 2016. Pacific Coast Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery. Pacific Fishery Management Council, Portland, OR.

[PFMC] Pacific Fishery Management Council. 2019. Coastal Pelagic Species Fishery Management Plan as amended through amendment 17. Pacific Fishery Management Council, Portland, OR.

Pondella, D. J. and J. P. Williams. 2009. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California for Surveys Conducted in June 2009. Prepared for the Port of San Diego. 29 pp.

[TDI] Tierra Data, Inc. 2009. San Diego Bay Avian Species Surveys 2006-2007. Prepared by Tierra Data, Inc. Prepared for Commander Navy Region Southwest Natural Resources Office and San Diego Unified Port District Environmental Services Department. April 2009.

[TDI] Tierra Data, Inc. 2011. San Diego Bay Avian Species Surveys 2009-2010. Prepared by Tierra Data, Inc. Prepared for Naval Base Coronado Environmental Compliance and San Diego Unified Port District Environmental Services Department. May 2011.

Thresher, R.E., P.D. Nichols, J.S. Gunn, B.D. Bruce, and D.M. Furlani. 1992. Seagrass detritus as the basis of a coastal planktonic food chain. Limnology and oceanography 37(8):1754-1758.

[USFWS] United States Fish and Wildlife Service. 2006. California least tern (Sternula antillarum browni) 5-year review summary and evaluation. Prepared by U.S. Fish and Wildlife Service Carlsbad Fish and Wildlife Office. Carlsbad, California. Sept 2006.

Valentine, J.F., and K.L. Heck. 1999. Seagrass herbivory: Evidence for the continued grazing of marine grasses. Marine ecology progress series 176:291-302.

Williams, J.P., D.J. Pondella, C.M. Williams, M.J. Robart. 2016. Fisheries Inventory and Utilization of San Diego Bay, San Diego, California for Surveys Conducted in April and July 2016. Prepared for the Port of San Diego. November 2016. 68 pp.

Yarbro, L.A., and P.R. Carlson. 2008. Community oxygen and nutrient fluxes in seagrass beds of Florida Bay, USA. Estuaries and coasts 31(5):877-897.

Appendix D
Geotechnical Investigation—Landside

GEOTECHNICAL INVESTIGATION
LANDSIDE IMPROVEMENTS
HARBOR ISLAND WEST MARINA
SAN DIEGO, CALIFORNIA

Prepared for
HARBOR ISLAND WEST MARINA
San Diego, California

Prepared by
TERRACOSTA CONSULTING GROUP, INC.
San Diego, California

Project No. 2769A
January 28, 2015

TerraCosta
Consulting Group

Geotechnical Engineering
Coastal Engineering
Maritime Engineering

Project No. 2769A
January 28, 2015

Mr. Eric G. Leslie, Director of Marina Operations
HARBOR ISLAND WEST MARINA
2040 Harbor Island Drive
San Diego, California 92101

GEOTECHNICAL INVESTIGATION
LANDSIDE IMPROVEMENTS
HARBOR ISLAND WEST MARINA
SAN DIEGO, CALIFORNIA

Dear Mr. Leslie:

In accordance with your request, TerraCosta Consulting Group, Inc. (TCG) is pleased to submit the following report of geotechnical investigation for the subject project, performed in general accordance with our Proposal No. 14123 dated October 15, 2014 in support of the proposed landside improvements for the Harbor Island West Marina located at 2040 Harbor Island Drive in San Diego, California.

The accompanying report presents the results of our review of available reports, plans, and literature, our field investigation, and our conclusions and recommendations pertaining to the geotechnical aspects of the proposed site development.

We appreciate the opportunity to be of service and trust this information meets your needs. If you have any questions or require additional information, please give us a call.

Very truly yours,

TERRACOSTA CONSULTING GROUP, INC.

Braven R Smillie

Matthew W. Eckert, Director of Engineering
R.C.E. 45171, R.G.E. 2316

Braven R. Smillie, Principal Geologist
R.G. 402, C.E.G. 207

MWE//BRS/jg
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HARBOR ISLAND WEST MARINA, LANDSIDE IMPROVEMENTS GEOTECHNICAL INVESTIGATION

EXECUTIVE SUMMARY

Harbor Island was constructed in the early 1960s by hydraulically dredging relatively clean sands, and then hydraulically pumping and depositing these sands in the current configuration of Harbor Island. These hydraulically placed sands were placed up to about the mean high tide line, and mechanically placed fill soils then imported and placed up to the existing ground surface, with typically about 10 to 12 feet of mechanically placed fills comprising the near-surface soils of Harbor Island. The near-surface fills, hydraulic fills, and natural bay deposits are in turn underlain by the Quaternary-age Bay Point Formation, which was generally encountered near elevation -13 feet MLLW during the earlier Harbor Island West Marina study, and also encountered at elevation -13.5 feet in Boring B-4 during the current study. In one of the offshore borings, specifically Boring B-5 adjacent to the revetted marina slope just offshore of the Harbor Island West pool area, the Bay Point Formation was locally encountered much deeper near elevation -22 feet, with the recent landside Boring B-1 encountering the Bay Point Formation near elevation -27.5 feet. As with other areas in the bay, we anticipate that this was a locally incised drainage channel associated with past flood flows from the San Diego River entering into the bay, now resulting in this locally deeper deposit of loose bay deposits overlain by loose hydraulic fills.

Given this depositional environment, the relatively loose hydraulic fills and granular bay deposits are highly susceptible to liquefaction, with the entirety of Harbor Island at significant risk from liquefaction and its associated lateral spreading during a severe seismic event.

While the Uniform Building Code and the more recently adopted California Building Code (CBC) have required consideration of site seismicity and liquefaction potential, becoming progressively more stringent over time, the 2013 CBC, for the first time, required that potentially liquefiable sites be assessed and mitigated for soil liquefaction resulting from the Maximum Considered Earthquake (MCE), which has a probability of exceedance of 2 percent in a 50-year period, or roughly equivalent to the 2,000-year design event. In contrast, the 2010 CBC required the assessment and mitigation of liquefaction resulting from a probabilistic seismic hazard having a 10% probability of exceedance in a 50-year period, or roughly equivalent to a 400-year design event.

The entirety of Harbor Island has been considered susceptible to liquefaction dating back to the 1970s. However, importantly, the 2013 CBC raised the requirements for mitigation and design to a significantly more severe design event than that used for all of the other structures on Harbor Island.

What this means for the current project is that under the code-specified MCE, site liquefaction and lateral spreading of the margins of the island into the bay must be accounted for in design. Mitigation of liquefaction and soil strength loss can be accommodated through ground improvement, typically stone columns or deep soil mixing; through the use of a robust deep foundation system capable of resisting the seismically induced liquefied lateral loads applied to the deep foundation system; or a rigid structural mat foundation stiff and strong enough to accommodate the anticipated MCE design level settlements and lateral movements without collapse of the structure. All three alternatives are discussed in this report.

GEOTECHNICAL INVESTIGATION
LANDSIDE IMPROVEMENTS
HARBOR ISLAND WEST MARINA
SAN DIEGO, CALIFORNIA

1 INTRODUCTION, PROJECT DESCRIPTION, AND SCOPE OF WORK

1.1 Introduction

TerraCosta Consulting Group, Inc. (TCG) is pleased to present the following report of our geotechnical investigation for the proposed landside improvements at the Harbor Island West Marina located on Harbor Island in San Diego Bay in San Diego, California. This report includes the results of our geotechnical and geologic studies and our recommendations for the landside improvements for the marina.

Harbor Island is a man-made island located just south of the northern boundary of San Diego Bay near the San Diego International Airport (Lindbergh Field). Please refer to the Vicinity Map (Figure 1) and Site Plan (Figure 2). More specifically, the project site is located at approximately 32 degrees 43 minutes and 20 seconds north latitude, and 117 degrees 12 minutes and 38 seconds west longitude.

1.2 Project Description

Based on our review of the conceptual design for the marina, we understand that currently proposed landside improvements for the Harbor Island West Marina include the following:

- Demolition of two existing two-story buildings, an existing one-story building, an existing restroom facility, a trash enclosure, and existing pavement;
- Minor regrading of the parking lot area, including modifications to egress and exits to the property;
- Reconstruction of the parking lot, including new landscape islands and possible permeable pavement areas for site infiltration;
- Construction of new trash enclosures and restrooms;

- Construction of three two-story buildings with two covered courtyards;
- Renovation of an existing overlook; and
- Construction of a bayfront promenade and other site pedestrian walkways.

Figure 3 illustrates the current conceptual site development plan. It is important to note that the exact composition of improvements may change during the planning and review process.

1.3 Scope of Work

In order to address the project geologic and geotechnical issues, and to provide input for the environmental reports required for the project, we performed the following scope of work.

1. Field Investigation - To investigate subsurface soil conditions, we drilled, logged, and sampled four geotechnical test borings ranging in depth from 12 to 48 feet.
2. Laboratory Testing - To characterize site soils, we performed laboratory testing on selected samples obtained from our field investigation.
3. Engineering Analyses - We performed engineering analyses to address the following issues:
    a. The potential for seismically induced liquefaction and lateral spreading;
    b. Structural foundation loads imposed by buildings (perimeter wall footings and column foundations) and ancillary structures, such as retaining walls, buried utilities, concrete flatwork, and asphalt pavements;
    c. Site preparation and earthwork operations; and
    d. Regional and local faulting, seismicity, and geologic hazards, as well as seismic design parameter requirements.

4. Report Preparation - We prepared this report to provide our findings and recommendations.

2 PREVIOUS STUDIES

To assist in our preparation for this project, we reviewed our in-house files and available literature. We also reviewed the conceptual design package prepared by SPAL Miller Hall that was submitted to the San Diego Unified Port District for comment. Lastly, we reviewed the following three studies:

- Carol Liana Forrest's 1982 Master's Thesis titled, "The Liquefaction Potential of Harbor Island."

- TerraCosta Consulting Group's December 10, 2012, draft letter-report prepared for Bellingham Marine Industries, Inc. titled, "Guide Pile and Approach Pier/Gangway, Foundation Criteria, Harbor Island West Marina, San Diego, California."

- TerraCosta Consulting Group's December 11, 2012, draft letter-report prepared for Bellingham Marine Industries, Inc. titled, "Addendum to Guide Pile Foundation Criteria, Evaluation of Existing 12-Inch Square Guide Piles, Harbor Island West Marina, San Diego, California."

3 FIELD AND LABORATORY INVESTIGATION

3.1 Field Investigation

On December 4, 2014, we performed our field investigation, which included a site reconnaissance; and drilling, sampling, and logging of four 6-inch-diameter exploratory test borings ranging from depths of 12 to 48 feet. The approximate locations of our test borings are shown on the Site Plan / Boring Location Map (Figure 2).

Samples were obtained from the test borings using both a 2-inch O.D. Standard Penetration Test (SPT) sampler and a 3-inch O.D. "California Sampler." The samplers were advanced by driving them into the soil ahead of the auger using a 140-pound hammer falling 30 inches.

Samples obtained from the borings were sealed in the field to preserve in-situ moisture, and transported to the laboratory for additional inspection and testing. The drilling operations were observed, and the borings logged and classified, by a geologist from our firm.

Field logs of the materials encountered in the test borings were prepared based on visual examination of the materials, and on the action of the drilling and sampling equipment. The descriptions on the logs are based on our field observations, sample inspection, and laboratory test results. A Key to Excavation Logs is presented in Appendix A as Figure A-1, and final logs of the test borings are presented as Figures A-2 through A-5.

3.2 **Laboratory Testing**

Representative soil samples obtained during our field exploration program were tested in the laboratory to verify field classifications and to provide data for geotechnical input to the design of project structures. The results of our laboratory tests are presented in Appendix B.

4 SITE CONDITIONS AND GEOLOGY

4.1 Regional and Geomorphic Setting

The site is located in San Diego Bay at the westerly edge of the approximately 10-mile-wide terraced coastal plain, which bounds the Peninsular Ranges geomorphic province of California.

The Peninsular Ranges are a northwest/southeast-oriented complex of tectonically related blocks separated by generally parallel fault zones (Norris and Webb, 1990). Geomorphically, this province is known for its long, low mountain ranges separated by deep alluviated valleys. Geologically, the Peninsular Ranges province extends from the southerly end of the Los Angeles Basin in the north and to the south through Baja California. The general tectonic setting is illustrated on the Regional Fault Map (Figure 4).

Offshore from Southern California is an area known as the Continental Borderland. While this area is not officially designated as a geomorphic province, many of those who study the area consider it a separate province due to its geomorphic complexity. The Continental Borderland is composed of elevated blocks and ridges, which form islands and banks separated by deep, often enclosed, basins (Legg and Kennedy, 1991). The Continental Borderland extends from the Santa Barbara Basin to the north, south along the coastline into Mexico and offshore approximately 160 miles out to the Patton Escarpment.

4.2 Local Geologic Setting

The topography for most of the San Diego coastal metropolitan area consists of uplifted ancient sea floors and shore platforms that have become the present-day westerly sloping coastal terraces, which are in turn incised by westerly and southwesterly flowing streams and rivers (Abbott, 1999).

Over the last million years, the San Diego region has risen at an average rate of about 5.5 inches per 1,000 years (Abbott, 1999). In the last 80,000 years, the rate of uplift has increased to nearly 12 inches per 1,000 years northwest of the Rose Canyon fault zone, and approximately 18 inches per 1,000 years southwest of the Rose Canyon fault zone. The Rose Canyon system has been suggested to have right-slip (lateral) displacement and is believed to represent a portion of the motion between the North American and Pacific Tectonic Plates.

Conversely, these tectonic forces have also caused down-dropping of the region within San Diego Bay. Following the Rose Canyon fault zone southerly from downtown San Diego, tectonic forces spread across three major faults (and quite possibly other faults) that underlie San Diego Bay. These faults (the Silver Strand, Coronado, and Spanish Bight Faults) are believed to transfer tectonic forces to the Descanso Fault, which lies offshore of Point Loma extending southerly into Mexico. Structurally, the right step, which occurs between the Rose Canyon and the Descanso fault zones, creates a releasing bend that causes the rocks underlying the bay to be stretched and down-dropped to accommodate the movement caused by these tectonic forces. Typical movements along the faults that underlie the bay are observed to experience a significant vertical or normal component to their movement.

From the standpoint of the overall geologic structure, San Diego Bay (located at the southerly end of the Rose Canyon system) is a down-dropped faulted trough (graben) lying just west of a stable hinterland-coastal plain. Bedrock to the east of the zone has been slightly deformed as opposed to that on the west side of this zone, which has experienced extensive faulting and displacement locally. Faults on the east side of the bay (i.e., La Nacion-Sweetwater Faults) display down-to-the-west normal displacement, while many of the unnamed faults on Point Loma display down-to-the-east normal displacement. The normal faults that parallel the bay to the east are likely a result of subsidence and compaction along the margin of the Pliocene-age San Diego Embayment.

4.3 Site Geology

The project site lies within an area of reclaimed estuarine and low-lying tidelands located south and east of Loma Portal at the north end of San Diego Bay. Historically, prior to the early 1900s, the San Diego River periodically overflowed its banks and reestablished a new course southerly into San Diego Bay (Figure 5).

In the early 1900s, the Army Corps of Engineers created a levee system to prevent flooding and to direct the San Diego River to the west into False Bay (currently Mission Bay). Over the next decades, the low-lying lands in the general San Diego Bay area were developed into what is currently the San Diego International Airport, Harbor Island, Shelter Island, and a few remaining tidelands.

Beginning in 1961, the Harbor Department of San Diego began a major dredging operation of the bay. Dredged material from this operation was used to create Harbor Island. Most of the man-placed fills are of hydraulic origin and generally consist of relatively clean sands placed over relatively granular bay deposits. All of these near-surface overburden soils are underlain at depth by relatively competent Pleistocene-age marine and non-marine terrace deposits.

The local surface geology of the site and adjacent areas, as presented on the State of California’s 30 degree by 60 degree geology map of San Diego (Kennedy and Tang, 2005), is shown on Figure 6. Previous representations of local geologic conditions, as presented by Kennedy in 1975, are shown on Figure 7.

4.4 Site Conditions

The Harbor Island West Marina is comprised of eleven floating docks and various landside improvements, consisting of several buildings and shops and paved parking. The existing structures include two single-story and two two-story wood-framed structures. The two-story structures are located immediately adjacent to the north-facing descending bayfront slope. One single-story structure is located at the western end of the property immediately adjacent to the north-facing descending bayfront slope; the other single-story building is located south of the two two-story buildings. Lastly, the majority of the landward portion of the property is covered with asphalt pavement.

Elevations across the site range from approximately 12 to 15 feet MLLW. The estimated ground surface along the top of the north-facing descending bayfront slope of Harbor Island is near elevation +15 feet MLLW. From the bayfront slope, the site slopes gently downward and to the south toward Harbor Island Drive, to an approximate elevation of +12 feet MLLW, where site parking transitions into an ascending slope to the northern limits of Harbor Island Drive at an approximate elevation of +14 feet MLLW.

4.5 Subsurface Conditions

Within the landward portion (Harbor Island proper) of the marina, subsurface conditions encountered by our onshore borings were comprised of both mechanically and hydraulically placed fill soils underlain by bay deposits, in turn underlain by relatively competent Pleistocene-age marine and non-marine terrace deposits commonly referred to as the Bay Point Formation. According to Forrest's review of several sites on Harbor Island, an average subsurface soil profile consisted of fill soils that extended from surface grades down to an elevation of -9 feet, bay deposits that extended to an elevation of -19 feet MLLW, and Pleistocene-age marine and non-marine terrace deposits that extended to the depths explored. At the Harbor Island West Marina site, the contact between fill and bay deposits ranged from -7 to -20 feet MLLW, and the contact between the bay deposits and the Pleistocene-age marine and non-marine deposits ranged between elevations -13.5 feet and -27.5 feet MLLW.

Within the bayward portion of the marina, the subsurface soil conditions encountered by our offshore borings and vane shear tests typically consist of 6 to 12 inches of near-surface, fine-grained, colloidal flock exhibiting essentially no shear strength. The bay-floor colloidal flock is underlain by variable thickness (typically 1- to 2-feet thick) bay deposits consisting of very loose to medium dense fine sands, and locally very soft to soft silts and clays. Weathered Bay Point formational terrace deposits were generally encountered below elevation -13 feet and the less weathered (more competent) Bay Point Formation below -20 feet.

All of the offshore borings drilled for the marina project (see Figure 2), with the exception of Boring B-5, encountered weathered Bay Point Formation terrace deposits near elevation -13 feet, suggesting a relatively uniform depositional environment. In offshore Boring B-5, terrace deposits were encountered near elevation -22 feet, which we interpreted to be an older incised channel associated with past flows of the San Diego River into San Diego Bay. The more recent onshore borings also reflect this locally incised channel with Boring B-1 immediately bayward of the offshore Boring B-5 encountering the weathered Bay Point Formation near elevation -27.5 feet, while the onshore Boring B-4 again encountered weathered Bay Point Formation soils near elevation -13.5 feet. Thus, it would appear that under at least the eastern portion of the proposed improvements, a deeper incised alluvial channel exists, which is now predominantly filled with loose liquefiable soils.

The individual soil units encountered within the project limits are described in more detail below:

> *Offshore Recent Bay Deposits*: The recent bay deposits consist of a relatively thin layer of colloidal flock underlain by very loose and soft, gray, very fine- to medium-grained sands and silt.
>
> *Offshore Bay Point Formation*: The offshore Bay Point Formation was generally encountered below -13 feet MLLW. The upper 5 to 10 feet of this soil unit is generally weathered, becoming more competent below -20 to -25 feet MLLW. The Bay Point Formation typically consists of old paralic deposits of late to middle Pleistocene age and is mostly poorly sorted, interfingered, beach estuarine and colluvial deposits comprised of siltstones and sandstones and occasional clays.
>
> *Fill Deposits*: Artificial, or man-placed, fill soils encountered within the project area consist of sands, sands with silt, and silty and clayey sands. These fill soils appeared to have been mechanically placed to a depth just above the groundwater table, and hydraulically placed below the groundwater table. The hydraulically placed fill soils were comprised primarily of sands with fines contents less than 6 percent and contained relatively abundant shell fragments. Sample penetration resistances within the mechanically placed soils range from 6 to 37 blows per foot, and sample penetration resistances within the hydraulically placed soils range from 2 to 7 blows per foot.
>
> *Onshore Bay Deposits*: The onshore bay deposits are comprised of gray saturated silty sands. Sample penetration resistances within the onshore bay deposits ranged from 3 to 21. In addition, these bay deposits have fines contents that range from 10 to 19 percent.

> *Onshore Bay Point Formation*: The onshore Bay Point Formation was encountered below -14 feet MLLW in Boring B-4 and -28 feet in Boring B-1. The soils encountered in our borings are comprised of gray silty sands and mottled red-brown clayey and silty sands with sample penetration resistances ranging from 21 to 40.

Generalized geologic and geotechnical cross-sections have been prepared to illustrate the subsurface conditions at the site. These cross-sections are presented as Figures 8 through 11.

4.6 Groundwater

Groundwater levels at the site can be expected to vary in response to tidal fluctuations. Groundwater highs will likely approach tidal highs in the bay, and groundwater lows may drop slightly below mean sea level. From a construction standpoint, any excavations approaching the upper margins of the tidal zone should be expected to experience severe caving.

5 GEOLOGIC HAZARDS

5.1 Introduction

In general, a project may be exposed to risks associated with various geologic hazards. Many of those hazards are related to the actions of earthquakes and faulting. In addition to geologic hazards associated with earthquakes and faulting, other potential geologic hazards exist that could impact a given project, such as landslides, expansive soils, collapsible soils, corrosive soils, and high or perched groundwater. A brief description of the various geologic hazards and their impact on the project site is presented below.

5.2 Faulting and Seismicity

5.2.1 *Regional Faulting Seismicity*

Movement between the North American and Pacific Plates makes Southern California one of the more seismically active regions in the United States. Strain, caused by movement between the North American Plate and the Pacific Plate, is spread across a 150+ mile wide zone between the San Andreas fault zone, approximately 100 miles east of San Diego, out to and beyond the San Clemente fault zone located approximately 50 miles west of San Diego.

Nearing the end of the Miocene, approximately 5.5 million years ago, the boundary between the North American and Pacific Plates moved eastward to its present-day position in the Gulf of California (Abbott, 1999). The resultant extension and stretching of the North American continental crust formed a rift between the two plates, creating the Gulf of California, which continues opening through the present day. The San Andreas, San Jacinto, Elsinore, Rose Canyon/Newport-Inglewood, and San Clemente fault zones are just a few of the resultant strain features (faults) created by this tectonic movement (Figure 4.) Today, there is an estimated 22 to 24 inches per year of relative plate motion between the North American and Pacific Plates spread across the faults within this 150+ mile wide zone, of which the Rose Canyon fault zone is estimated to contribute 0.06 inch/year (±0.02 inch). It is this context within which the local tectonics of San Diego is situated.

5.2.2 *Local Tectonics*

Of the major active fault systems in Southern California, the Rose Canyon/Newport-Inglewood fault zone has impacted the local San Diego region the most. In addition, the La Nacion fault zone to the east of the project and the Descanso Fault offshore to the west have contributed to the local tectonic state of the project site. Together with other offshore fault zones, these faults have contributed to the formation of San Diego Bay. South of La Jolla, the Rose Canyon fault zone changes its orientation from a northwest/southeast trend to a more north/south trend, creating a left bend in the fault zone. This left bend locally creates a locking mechanism within the predominantly right lateral Rose Canyon fault zone. The compressional forces within this zone have caused folding, uplift, and tilting of the overlying sedimentary rocks, thus creating Mount Soledad and the down-dropped Mission Bay area. To the south in San Diego Bay, the Rose Canyon fault zone separates into a “horsetail splay,” spreading movement across the Silver Strand, Coronado, and Spanish Bight Faults (as well as several smaller faults) as it trends offshore toward the Descanso Fault. The Descanso Fault lies offshore from Point Loma, where it extends southerly toward the Agua Blanca fault zone in northern Baja (Legg and Kennedy, 1991). This right step, between the Descanso and Rose Canyon fault zones, creates a releasing bend, causing the rocks to be stretched and down-dropped. In response, the rocks have not deformed elastically, but instead have responded with brittle fault failure (Abbott, 1999). The easterly boundary of this releasing bend is formed by the La Nacion fault zone, which generally consists of normal faults that down-drop to the west.

5.2.3 *Local Faults*

The Harbor Island West Marina project is located along the northerly margin of San Diego Bay and west of the active Rose Canyon fault zone. As described above, when the Rose Canyon fault zone is followed southerly, it appears to terminate in San Diego Bay. From there, the fault movement appears to be transferred to the northerly trending Silver Strand, Coronado, and Spanish Bight Faults that continue offshore toward the Descanso Fault. Based on our review of the State of California Earthquake Fault Zone Map for the Point Loma Quadrangle, the earthquake fault zone boundary for the Spanish Bight Fault (the closest active fault to the Harbor Island West project site) is located approximately 1.8 kilometers to the east/southeast (Figure 12).

5.2.4 *Historical Seismicity*

The historical seismicity of the site can be illustrated from searches of both the California Geological Survey (CGS) database of historical earthquakes and the earthquake database contained in the computer program EQSEARCH. The CGS database contains historical earthquake events from 1800 to 1999 above a minimum magnitude of 5.5, and permits searches for historical earthquakes within a 31 mile radius of the subject site. The database within EQSEARCH contains historical earthquake events between 1800 and 2010 for earthquake magnitudes above 4 for a user-defined search radius (typically on the order of 100 miles from the site). In addition, EQSEARCH permits an estimation of peak ground acceleration (PGA) using common attenuation relationships to help characterize the relative importance that a given historical event may have at a site. For our purposes, we employed a search radius of 100 miles and used Boore, et al., 1997 attenuation relationships for a NEHRP Soil Type D (Vs30m of approximately 820 ft/s).

From our search of the CGS database, four historical earthquakes were identified:

- May 25, 1803, event located at latitude 32.8 degrees north and longitude 117.1 degrees west. This earthquake had a reported magnitude of 5.5 and was located approximately 13.5 kilometers from the site;

- May 27, 1862, event located at latitude 32.55 degrees north and longitude 117.15 degrees west. This earthquake had a reported magnitude of 6.2 and was located approximately 20 kilometers from the site;
- June 25, 1863, event located at latitude 32.4 degrees north and longitude 117.1 degrees west. This earthquake had a reported magnitude of 5.8 and was located approximately 37.3 kilometers from the site; and
- October 23, 1984, event located at latitude 32.8 degrees north and longitude 116.8 degrees west. This earthquake had a reported magnitude of 6.1 and was located approximately 39.4 kilometers from the site.

The results of the EQSEARCH are presented in Appendix C. In general, results of the search are similar to the California Geological Society. However, several of the reported distances of the faults to the site depend on the database searched. The EQSEARCH database reports the May 27, 1862, earthquake occurring closer to the site than the California Geological Society database. This results in a higher estimation of PGA. This is especially true with the event that corresponds to a PGA of 0.38g, which, according to the CGS database, is located approximately 20 kilometers from the site versus the 2.6 kilometers in the EQSEARCH database. Regardless of distance measures, the site has likely experienced historic ground accelerations greater than 0.1g within its lifetime.

5.3 Geologic Hazards Associated with Earthquakes

5.3.1 *General*

Geologic hazards generally associated with earthquakes include ground rupture, ground shaking, tsunamis, seiches, seismic-induced flooding, liquefaction, seismic-induced ground settlement, and seismic-induced slope instability. With respect to these hazards, we have the following comments.

5.3.2 *Ground Rupture*

Our review of the CGS Earthquake Fault Zone Map for the Point Loma Quadrangle (see Figure 12), the Fault Activity Map of California and Adjacent Areas, Bulletin 200 (see Figure 7), and the Geologic Map of the San Diego 30-Minute by 60-Minute Quadrangle (see Figure 6) did not indicate that any active faults trend toward or traverse the site. The nearest active fault is the Spanish Bight segment of the Rose Canyon Fault, located approximately 1.8 kilometers to the east of the site (see Figure 12). Thus, based on our review of these maps, it is our opinion that ground rupture due to faulting is not a hazard for this project.

5.3.3 *Ground Shaking*

As the proposed project is located in an earthquake-prone area, we consider the risk associated with ground shaking at this site to be very high. As such, the project improvements will be required to satisfy, at a minimum, the prescribed California Building Code (CBC) requirements (see Sections 1613 and 1803.5.8 of the CBC).

Code requirements for ground shaking focus on two issues, with the most common issue pertaining to the imparting of inertial forces into buildings and structures. For this issue, ground shaking is oftentimes characterized in terms of a design response spectrum. The second issue (of equal significance) is the stability of the ground during ground shaking. For this second issue, analyses pertaining to slope instability, liquefaction, lateral spreading, and seismic-induced ground settlement are commonly performed.

In past building codes, the design earthquake considered for both assessing ground stability and building design was based upon the same level of earthquake. However, the 2013 Building Code considers different design earthquakes for different analyses. For example, when assessing liquefaction and soil strength loss, CBC Section 1803.5.12 states that the evaluation to be carried out using site peak ground acceleration, earthquake magnitude, and source characteristics consistent with the maximum considered earthquake (MCE). This is roughly equivalent to the 2,000 year design event. For the assessment of building effects due to earthquake loading, is to be generally assessed using a response spectra based on the design level earthquake, which is taken as two-thirds of the response spectra ordinates based on a response spectra corresponding to the MCE, or roughly equivalent to the 400-year design event.

Design parameters for the assessment of ground shaking are discussed and presented in Section 7.5 of this report.

5.3.4 *Tsunamis and Seiches*

Tsunamis and seiches are considered likely hazards at this project site. A review of the State of California Tsunami Inundation Map for Emergency Planning (2009) indicates that the site will be affected by tsunamis caused by both local and distant sources (Figure 13).

In addition, recent tsunamis generated by distant sources (the 2010 Chilean earthquake and the 2011 Honshu, Japan, earthquake) caused damage within San Diego Bay as a result of rapid changes in water surface elevations as the tsunami waves passed into and out of the bay.

5.3.5 *Liquefaction*

Three key ingredients are required for liquefaction to occur: liquefaction-susceptible soils, sufficiently high groundwater, and strong shaking. Liquefaction is the phenomena associated with ground shaking that results in the increase of pore pressures within the soil. As the pore pressure increases, the shear strength of the soil is reduced. If the pore pressure is sufficiently increased, the soil takes on a “liquid like” behavior. Consequences commonly associated with soil liquefaction include ground settlements, surface manifestations (sand boils), loss of strength, and possible lateral ground movement typically referred to as lateral spreading, ground oscillations and lurching, and possible ground failure.

Soils susceptible to liquefaction generally consist of loose to medium dense sands and non-plastic silt deposits below the groundwater table. The soil deposits underlying the site are comprised of loose to medium dense fills, including hydraulically placed fills comprised of sands with varying amounts of silts, bay deposits, and Quaternary-age deposits, all of which exist below the water table.

In general, the results of our liquefaction assessment for the MCE event indicates that the fill soils below the groundwater table and bay deposits are liquefiable, whereas the denser and more clayey weathered strata of the terrace deposits and Bay Point Formation soils are not liquefiable.

As described above, potential liquefaction impacts associated with the MCE event include seismic-induced ground settlement, ground lurching, surface manifestations such as sand boils and surface cracking, and lateral spreading. Liquefaction-induced vertical ground displacements are estimated to be on average approximately 9 inches and expected to range from 4 to 18 inches.

In addition, liquefaction of the saturated fill soils and bay deposits results in a reduction in soil strengths, such that the stability of the bayfront descending slope and areas adjacent to the top of the slope will likely fail due to the reduced soil strengths. A more detailed discussion of the liquefaction-induced slope failure is presented in Section 5.3.7.

5.3.6 *Lateral Spreading and Flow Failure*

Lateral spreading is a phenomenon related to liquefaction that is characterized by accumulated incremental lateral or horizontal displacements that occur during earthquake shaking. During liquefaction, the strength of the soil decreases to a residual undrained shear strength primarily due to the increase in pore pressures in the soil. The residual undrained strength is oftentimes related to the Standard Penetration Test resistance of the soil, and is generally expressed as either an undrained strength or the ratio of undrained strength to initial effective overburden pressure prior to liquefaction. Lateral spreading is oftentimes distinguished from flow failures on the basis of a comparison of the shear stress acting on the soil during static conditions to the cyclic-induced shear stress on the soils generated during an earthquake.

When the static-induced shear stress exceeds the residual undrained strength of the liquefied soil, flow of the soil mass occurs and the phenomenon is commonly referred to as flow failure. However, when the static shear stress is less than the shear strength of the liquefied soil, ground failure is related to the phenomenon known as cyclic mobility, which results from the development of incremental deformations that are driven by both cyclic and static shear stresses. The magnitude of lateral spreading displacements is related to the number and magnitude of stress impulses that exceed the soil strength. The magnitude of lateral movement varies between negligible and significant. These types of deformations are commonly referred to as lateral spreading and can occur on very gentle to virtually flat ground near or adjacent to a free face.

Estimating lateral displacements due to lateral spreading is an imprecise exercise and estimates vary widely. For this site and for the code-specified earthquake scenarios, we estimate that lateral displacements will be on the order of 6 to 22 feet near the top of the bayfront descending slope. In addition, lateral displacements are expected to extend landward from the bayfront slope in a diminishing manner. Given that Harbor Island is approximately 320-feet wide at the location of the Harbor Island West Marina, one would anticipate that lateral spreading effects will affect the majority of Harbor Island, with ground cracking associated with differential lateral displacements occurring across Harbor Island.

5.3.7 *Seismic-Induced Slope Instability*

For this project, there is one primary slope of interest; that being, the bayfront descending slope located along the northern shore of Harbor Island. This slope is a composite slope with inclinations varying from the 1.5:1 to 10:1 (horizontal to vertical). Beginning at the top of the slope near elevation +15 feet MLLW, the slope descends at an inclination of approximately 1.5:1, down to elevation +2 feet MLLW, where the inclination flattens to 3:1 as the slope continues to descend to elevation -2 feet MLLW, where the inclination flattens to 10:1 as the slope continues to descend to elevation -10 feet MLLW.

The slope, which is comprised of fill soils, is underlain by both bay deposits and the Bay Point Formation. From approximate elevation +3 feet to elevation -13 feet (locally -22 feet), the slope is comprised and underlain by liquefiable fill and bay deposit soils, which are anticipated to lose significant strength as the result of liquefaction. Consequently, this slope is prone to seismic instability (both lateral spreading and slope failure).

As discussed above, the effects of lateral spreading are anticipated to extend landward several hundred feet from the top of the slope. In addition, the underlying foundation soils supporting the slope are expected to fail in a bearing capacity manner. This bearing capacity-like failure is estimated to extend approximately 140 feet landward from the top of the slope where the computed seismic factor of safety against failure is approximately 1. It is important to note that the estimated width of Harbor Island near the Harbor Island West Marina is on the order of 320 feet. As such, the potential seismic-induced ground failure extends practically to the middle of Harbor Island. Assuming that the other half of Harbor Island is similar to the half where Harbor Island West Marina is located, the implication is that under the 2,000 year design event, the majority of Harbor Island will experience significant ground damage during the code-specified earthquake event.

Given that a significant portion of the site is expected to experience ground displacement, the CBC requires that areas of the site where buildings are proposed will need to be remediated in order to preclude, or at least mitigate, the effects of liquefaction. As such, during the code-specified seismic event for liquefaction, the bayfront descending slope and the area adjacent to the slope (not having been remediated) will still be susceptible to seismic-induced movements. These movements are a function of the strength of the slope soils. For the condition where the soils do not liquefy, we estimate that the slope and the area adjacent to the top of the slope could be displaced by upwards of 4 inches during the MCE level seismic event. Such displacements can be reduced to less than 1 inch, provided the soils in question have been sufficiently strengthened.

5.4 Landslides

A review of Bulletin 200 and the geology map of the Point Loma Quadrangle (Figure 7), as well as review of reports by others, indicates that no landslides are mapped on or adjacent to the site. As such, it is our opinion that the risk associated with landslides at the site is negligible.

5.5 Slope Stability

As described above in Section 5.3.7, the primary slope of interest for this project is the bayfront descending slope located along the northern shore of Harbor Island. This slope is a composite slope with inclinations that vary from 1.5:1 to 10:1 (horizontal to vertical).

From our analyses, the static factor of safety against failure of this slope varies with distance from the top of the slope. The slope has a minimum computed factor of safety just greater than 1 for failure surfaces intersecting the ground surface approximately 11 feet from the top of slope. The factor of safety increases to the code-required minimum of 1.5 at a distance of 20 feet from the top of the slope face.

5.6 Collapsible Soils

No collapsible soils were reported in the literature reviewed or encountered during our site investigation. As such, it is our opinion that the potential for collapsible soils is low.

5.7 Expansive Soils

Our test borings did not encounter any expansive soils within the proposed grading depths. As such, it is our opinion that the potential for soil movement (swell-shrink) related damage to the development from on-site soils is low to negligible.

5.8 Corrosive Soils

In general, marine environments are very corrosive by nature. Soils (and conditions) should be considered moderately to severely corrosive.

5.9 Groundwater

Groundwater was encountered in the onshore borings at a depth of approximately 12 feet (elevation +4 feet MLLW) at the time of our investigation. The depth to groundwater is directly related to the level of water within the bay and, as such, is expected to vary with tides. As such, any given groundwater elevation is expected to be transitory and to oscillate between an upper and lower bound. Discounting perching horizons and contributions from rainfall and irrigation, we estimate that the groundwater table elevation will vary between a maximum groundwater table elevation corresponding to the Highest Observed Water Level (HOWL), highest recorded tide elevation record in the bay at +8.14 feet MLLW, and a minimum groundwater table elevation corresponding to the lowest tide at -2.2 feet MLLW for current sea level conditions. However, over time, this highest groundwater elevation is likely to rise given sea level rise. Sea level rise has been estimated at 0.25 to 2.2 feet over the next 50 years (IPCC, 2007). If one assumes that the maximum sea level rise is 2.25 feet, the groundwater table elevation is anticipated to fluctuate between -2.2 feet and about 10.3 feet MLLW.

6 DISCUSSION

6.1 Site Development

The proposed project consists of the demolition of existing site improvements, including parking, landscaping, and several existing structures, and the construction of proposed improvements, which includes minor adjustments to site grades, new pavement, new landscaping, and new buildings.

Constraints to the proposed project include stability of the existing bayfront descending slope, stability of foundation soils under code-specified earthquake conditions, and foundation capacity of on-site soils.

Of the constraints for the proposed project, the key issue or concern is the anticipated performance of site soils during the code-specified earthquake event. As stated in Section 5.3 of this report, the proposed development is located on soils that are susceptible to liquefaction, lateral spreading, and seismic-induced slope instability, which under the design event are anticipated to result in ground failure, excessive ground settlement, and lateral ground displacements during the code-specified earthquake event. Also, as mentioned in Section 5.3, given that the width of Harbor Island near the Harbor Island West Marina is on the order of 320 feet, the extent of seismic-induced ground instability, including ground failure, ground cracking, sand boils, ground settlement and lateral displacements, is anticipated to affect the majority, if not all, of Harbor Island. As such, mitigation of the seismic-induced impacts for new structures is required given current code requirements.

Given the technologies and methods of construction available within the area and the industry, it is our opinion that all the geologic hazards for this project can be mitigated to a level that would permit new development within code requirements.

6.2 Site Remediation and Mitigation

There are two general areas of the site that require remediation and mitigation: the static stability of the existing bayfront slope and ground failure issues associated code-specified earthquake events.

6.2.1 *Mitigation of Static Slope Stability of Bayfront Slope*

Our analyses indicate that areas adjacent to the top of the existing bayfront descending slope have computed factors of safety against slope failure less than the common industry standard of 1.5. Our analyses show that the area from the top of the slope to 20 feet beyond the top of the slope has a computed factor of safety less than 1.5 and greater than 1. **As such, locating new structure a distance greater than 20 feet will mitigate concerns of placing new structures near slopes of marginal safety.**

6.2.2 *Mitigation of Seismic-Induced Site Hazards*

According to Sections 1803.5.11 and 1803.5.12 of the 2013 Edition of the CBC, structures need to consider the potential for liquefaction and lateral spreading and their impact on the proposed development. As part of this assessment, mitigation measures pertaining to the potential seismic impacts are to be considered as part of the design process for the structures. Such mitigation measures typically include ground stabilization, appropriate foundation systems, and/or other structural systems that can accommodate the anticipated displacements and forces. As we understand the code requirements, the primary focus of seismic mitigation is to mitigate and address life and safety concerns more so than maintaining building performance. As such, it is our opinion that a mitigation measure that prevents building collapse but does not prohibit building damage satisfies code requirements.

It is important to note that, in general, all existing structures and buildings on Harbor Island are at risk to significant impacts associated with ground failure and vertical and lateral soil movements. As such, existing structures will likely be significantly damaged during the code-specified earthquake scenario and, depending upon the foundation system of a given structure, may also experience structural collapse.

That said, it is our understanding that code requirements for mitigation pertain to protecting the life and safety of occupants in the proposed new structures. As such, the selection of the type and extent of mitigation depends on a variety of factors, which includes prevention of structural collapse, protecting the life and safety of occupants, desired condition and end-use of the structure after the occurrence of the code-specified earthquake, cost of mitigation, and cost of repair.

As outlined in the CBC, mitigation measures may include prevention of liquefaction and lateral spreading by improving the ground, selecting foundation systems that can accommodate the anticipated seismically induced ground movements and forces, or a combination of measures that includes some amount of ground stabilization in conjunction with a compatible foundation system.

Oftentimes, the first mitigation strategy considered is remediating site soils to preclude site liquefaction, lateral spreading, and seismically induced slope instability and ground failure. To this end, mitigation methods employed for ground modification and stabilization include the following:

- Soil compaction;
- Deep dynamic compaction;
- Vibro-compaction and vibro-replacement with stone columns;
- Compaction grouting;
- Deep soil mixing;
- Jet grouting; and/or
- Chemical grouting.

Brief descriptions of the ground improvement methods and their advantages and disadvantages are presented in Table 1.

In addition to mitigating the liquefaction and lateral spreading impacts by using ground improvements, the selection and design of the foundation system for the structure or improvement may be a viable alternative. Table 2 summarizes several foundation systems that might be appropriate, pending their ability to accommodate the anticipated liquefaction and lateral spreading-induced ground movements without structural collapse.

The selection of an appropriate strategy for mitigating liquefaction and lateral spreading impacts is oftentimes an iterative process where several alternatives are considered, with the more cost-effective solution selected. These cost-benefit analyses typically consider ground improvement costs, building construction costs, and repair costs. However, given the site soils and anticipated site performance, it is our opinion that, of the potential options available for consideration, the alternatives presented in Table 3 are likely the most feasible. Lastly, to help facilitate this process, we have provided preliminary design criteria for the alternatives presented in Table 3. These criteria are presented in Section 7 of this report.

7 RECOMMENDATIONS

7.1 Site Preparation

Site preparation for this project is anticipated to consist of:

- Minor regrading and placement of limited amounts of new fill soils;
- Remediation of ground instability associated with liquefaction, lateral spreading, and seismically induced instability within and adjacent to new building areas by either ground improvement, the use of deep foundations with grade beams and structural floors, or the use of mat foundations;
- Preparation of subgrade soils for other structures and facilities, pavement, and flatwork; and
- Utility installation and trench backfilling.

Recommendations for site preparation and earthwork operations are presented below. Recommendations for ground improvement alternatives are presented in Section 7.2. Recommendations for deep foundations with grade beams and structural floors are presented in Section 7.3. Recommendations for mat foundations are presented in Section 7.4.

7.1.1 *Site Preparation and Earthwork Operations*

7.1.1.1 **Site Preparation Beneath Sidewalks, Flatwork, and Buildings**

We recommend that, where improvements consisting of sidewalks, flatwork, pavements, and buildings are to be placed, the site be excavated to a minimum depth of 1 foot below existing grade or finish grade, whichever is deeper, and then scarified to a minimum depth of 8 inches, watered, and properly recompacted to a minimum of 95 percent relative compaction, in accordance with ASTM D 1557. Any loose zones encountered during compaction of the final subgrade should be overexcavated and properly recompacted to 95 percent in order to provide the recommended subgrade density.

7.1.1.2 Site Preparation for Remaining Areas

We recommend that, as a minimum, the existing ground surface or finish grade, whichever is deeper, be scarified to a depth of 8 inches, moistened as needed, and recompacted to a relative compaction of 92 percent.

7.1.1.3 Site Preparation and Remediation Within Ground Improvement Areas

The near-surface soils in the area of ground improvement will be highly disturbed during installation. As such, within the areas of ground improvement, we recommend that the site be excavated to a depth of 4 feet (1 foot below the top of treatment). The contractor is to then place a minimum of 18 inches of 1/2-inch crushed rock or gravel. The crushed rock or gravel shall comply with Section 200-1.2 - Crushed Rock and Rock Dust of the Standard Specifications for Public Works Construction. A non-woven filter fabric shall be placed on top of the 18-inch crushed rock layer. The non-woven filter fabric shall be Mirafi N-140 or equivalent. The contractor shall then place fill materials and recompact the soil to finish grade to a relative compaction of 95 percent.

7.1.1.4 General Site Preparation and Earthwork

Where new fill is to be placed in areas underlying buildings or structures, we recommend that new fill be compacted to 95 percent relative compaction. For areas not underlying buildings, sidewalks, flatwork, and pavements, we recommend placing new fill at a minimum relative compaction of 92 percent.

All fill should be placed at a moisture content between optimum moisture, as determined by the latest approved version of ASTM D 1557, and 2 percent above optimum.

For utility trench backfill, we recommend that the soils within the pipe zone be compacted to the minimum specified relative compaction per the utility designer. Soils used as backfill above the pipe zone shall be compacted to a minimum relative compaction of 92 percent.

We recommend that the existing hydraulic fill sands be compacted by a combination of vibration using a vibratory roller, compactor, and/or heavy track equipment.

Except for as noted above, all site preparation and grading should be performed under the observation of the geotechnical engineer and in accordance with Section 300, “Earthwork,” of the Standard Specifications for Public Works Construction.

7.2 Ground Improvement Implementation

As discussed above, Sections 1803.5.11 and 1803.5.12 of the 2013 Edition of the CBC require that effects associated with liquefaction , lateral spreading, and seismically induced slope and ground instability be mitigated. This mitigation may be achieved by ground improvements, foundation design, or a combination of both. As the project is still in the planning stages, the selection of the most viable mitigation strategy will require an alternatives evaluation of potentially viable methods. As such, preliminary design guidelines and criteria for two ground improvement methods are presented below. Final design recommendations can be provided once a mitigation strategy has been selected.

As discussed in Section 6.2 of this report, it is our opinion that the two most likely candidates for ground improvement are stone columns installed by vibro-replacement with wick drains and deep-soil-mixing. Preliminary recommendations for use in the evaluation of these two options are presented below.

7.2.1 *Ground Modification via Wick Drains and Stone Columns Installed by Vibro-Replacement*

1. We recommend that the wick drain and stone column system be designed by a design-build contracting team.
2. We recommend that the ground improvements consist of vibro-replaced stone columns installed within the limits of the proposed building footprint, and that the area of treatment extend horizontally a minimum distance of 30 feet from the edge of the building footprint. It is important to note that site improvements and facilities located outside of the ground improvement treatment area will be subjected to significant seismically induced ground movements, as described in previous sections of this report.

3. We recommend that the stone column improvements extend vertically from 3 feet below grade to an elevation corresponding to 5 feet below the contact of the Bay Point Formation. For preliminary planning purposes, the elevation of the Bay Point Formation contact may be taken as elevation -30 feet.

4. In addition, we recommend that liquefiable soils be improved to a condition such that the post-treated soils have a minimum normalized clean sand CPT tip resistance of 190. The normalized clean sand CPT tip resistance is to be computed using methods outlined by Robertson and Wride (1998). We anticipate that this will require a replacement area ratio ranging from 10 to 20 percent. Our estimates suggest a replacement area ratio of 15 percent. We anticipate that this would require the placement of stone columns on a 7- to 8-foot grid.

5. As the silt content of the bay deposits is significant and likely resistant to densification, wick drains may be required in conjunction with the stone column. The design of the wick drain system should mitigate liquefaction within the underlying bay deposits.

6. The near-surface soils in the area of ground improvement will be highly disturbed during installation. As such, within the areas of ground improvement, we recommend that the site be excavated to a depth of 4 feet below grade (1 foot below the top of treatment). The contractor shall then place a minimum of 18 inches of 1/2-inch crushed rock or gravel. The crushed rock or gravel shall comply with Section 200-1.2 - Crushed Rock and Rock Dust of the Standard Specifications for Public Works Construction (“Greenbook”). A non-woven filter fabric shall be placed on top of the 18-inch crushed rock layer. The non-woven filter fabric shall be Mirafi N-140 or equivalent. The contractor shall then recompact the soil to finish grade to a relative compaction of 95 percent in accordance with ASTM Test Designation D 1557.

7. As the buildings will likely be located near the bayfront, the treated ground will be subjected to lateral loading associated with the seismically induced ground movements discussed in Section 5.3 of this report. As such, the ground improved area will act as a buttress to non-treated soils located inland from the bayfront edge. Thus, the area of treatment may need to be enlarged and modified in order that the treated soils remain stable, with limited lateral

movements due to soil loads imposed on the treated area due to the behavior of the non-treated areas. As such, the treated area needs to be designed to accommodate the following two lateral load design cases:

a. Case 1 assumes a passive pressure loading of the upper soils equal to 480 pcf. The soils generating the passive loading are to be taken from the ground surface to an elevation equal to +3 feet MLLW. Below elevation +3 feet MLLW, the soils are assumed to be liquefied with a lateral pressure equal to 120 pcf. The zone of liquefied soils is to extend to a minimum elevation of -30 feet MLLW. Below elevation -30 feet MLLW, an active soil pressure of 20 pcf is to be assumed.

b. Case 2 assumes a lateral soil loading of 120 pcf acting against the soil-cement buttress from the ground surface to a minimum elevation of -30 feet. Below elevation -20 feet MLLW, an active soil pressure of 20 pcf is to be assumed. In addition, an equivalent hydro-dynamic loading of the liquefied soil is to be applied. This loading can be estimated by Westergaard's equation using an equivalent fluid unit weight of 120 pcf.

8. A base seismic coefficient of 0.53 is to be used in the design. This value may be modified depending upon the allowable displacement assumed for the design.

9. A sliding coefficient of 0.6 may be assumed along the bottom of the sliding mass. For passive pressures within the Bay Point Formation, we recommend an unfactored passive pressure of 160 pcf.

10. Lastly, as the buildings will likely be located near the descending bayfront slope, the ground improved areas for the buildings will need to be designed in order to maintain global stability near the bayfront slope. As such, the treated area is to be designed such that seismically induced displacements associated with ground instability, including global slope stability near the descending bayfront slope, are less than 0.5 inch. For design purposes, the horizontal seismic coefficient is to be taken as 0.53.

7.2.2 *Ground Modification via Deep Soil Mixing*

1. We recommend that, as a minimum, the deep soil mixing treatment area should include the limits of building footprints, and a minimum distance of 25 feet beyond the building footprints. The actual limits, including embedment, will depend on global stability requirements for overturning and sliding of the treated area. It is important to note that site improvements and facilities located outside of the ground improvement treatment area will be subjected to significant seismically induced ground movements, as described in previous sections of this report.

2. We recommend that the area of treatment be designed by a design-build contracting team.

3. The soils within the treatment area can either be fully-mixed and augmented by the creation of soil-cement soils generated by the deep-soil-mixing process, or may be partially augmented by the creation of interlocking soil-cement-mixed-columns. The interlocking soil-cement-mixed column cells shall be designed to maintain structural integrity and limited lateral displacements associated with anticipated seismically induced loads. In addition, if the interconnected cell concept is adopted, we recommend that the outside perimeter of the treated area be comprised of soil column elements such that columns overlap to create a continuously treated soil mass. This continuously treated soil mass should have a minimum width of 15 feet, as measured from the outside edge of the treated area. The configuration of columns within the interior portion of the soil-cement mixed mass should result in a coherent and interlocked treated area. The layout and pattern of interlocking columns within the interior of the buttress is at the discretion of the design-build contractor. Regardless of the layout, the treated area is to function as a coherent mass.

4. The strength of the soil-cement mix should be determined by the design-build contractor to prevent shear failure of the soil-cement mixed soil. However, we recommend, as a minimum, that the soil-cement mixed soil has an unconfined compressive strength of 400 psi.

5. We recommend that the soil-cement treatment area extend to a minimum of 5 feet below the contact of the Bay Point Formation. Deeper embedment may

be needed to accommodate sliding requirements. For preliminary planning purposes, the elevation of the Bay Point Formation contact may be taken as elevation of -30 feet. The elevation of the top of treatment should be at an elevation of +5 feet.

6. Recommendations provided for stone columns, specifically Section 7.2.1, Items 6 through 9, will also apply for the deep soil mixing alternative.

7.3 **Foundation Design**

7.3.1 *Deep Foundations Used for Ground Instability Remediation*

As indicated above, one potential alternative for mitigating the effects of ground instability associated with liquefaction, lateral spreading, and seismically induced slope/ground instability is the use of foundation systems that can accommodate the ground displacements. For this site, one such system is either driven piles or cast-in-drilled-hole (CIDH) shafts tied together with grade beams. These deep foundation elements help to isolate the building from the anticipated ground movement. However, key to the design is the need to accommodate the imposed lateral soil loading on the piles. The grade beams are necessary to tie the piles together and thus help to provide additional lateral restraint to the imposed loads.

We recommend the following design parameters for preliminary design and planning assessment of the viability of the use of a deep foundation and grade beam system:

1. Piles or CIDH shafts are to be tied structurally together by grade beams in order to provide additional fixity to the pile and shaft system.

2. Piles or CIDH shafts are to be designed to accommodate building loads, lateral loads due to ground displacement, and down-drag loads due to the reconsolidating of liquefiable soils. To this end, the following design loads, in addition to building loads, are to be considered in the design of the pile or shaft foundation system:

    a. Down-drag loads of 1 ksf skin friction for that portion of the pile or shaft that extends from the bottom of the grade beam to elevation -30 feet MLLW.

    b. Lateral soil loads of 480 pcf for the perimeter piles located landward of the top of the descending bayfront slope for those portions of the grade beam and pile/shaft foundation system that extend from the ground surface to elevation +3 feet MLLW.

c. Linearly increasing lateral soil pressure acting over the length of each pile/shaft beginning at elevation +3 feet MLLW at a magnitude of 400 psf, and extending to an elevation of -30 feet MLLW at a magnitude of 900 psf.

3. The pile/shaft foundations are to be embedded a minimum of 4 times T, where T is equal to the square root of the modulus of elasticity of the pile/shaft (E), times the moment of the inertia of the pile/shaft (I), divided by the stiffness of the soil (f). The stiffness of the soil (f) is 25 pci.

4. For analyses using point of fixity calculations, the point of fixity may be taken as 1.8 times T, as determined in Item 3, above.

5. The axial capacities of pile/shafts are to be determined using an ultimate skin friction of 1 ksf and an ultimate bearing capacity of 25 ksf.

7.3.2 *Foundations for Buildings Founded on Improved Ground*

For those buildings located on improved ground in accordance with Section 7.1.1:

- We recommend that buildings be supported on a combination of continuous strip footings, spread or pad footings, and grade beams.

- We recommend that the foundation elements be designed for an allowable bearing pressure of 2,000 psf or less. The allowable bearing pressure may be increased by one-third for seismic and/or wind loads. We estimate that for foundations designed to these bearing pressures, total settlements due to building loads will be less than 1 inch, and differential settlements will be less than or equal to 1/2 inch.

- We recommend that foundation elements have a minimum embedment depth of 24 inches.

- Foundations shall be designed in accordance with Chapter 18 of the CBC, and shall specifically address the requirements of seismic ties for footings as presented in Section 1809.13 of the CBC.

To provide resistance for design lateral loads, we recommend that an allowable friction coefficient of 0.45 be used between the concrete mat foundation and the underlying recompacted sandy subgrade soils. If, for some reason, additional lateral resistance is required, interior shear keys can be added when located a minimum of three times the depth of the shear key in from the perimeter edge of the mat foundation. Passive pressures, if used, should be limited to an equivalent fluid pressure of 300 pcf.

7.4 **Mat Foundation Recommendations**

7.4.1 *Static Design*

We recommend that all mat foundations be designed by a registered civil or structural engineer experienced in mat foundation design. We recommend a subgrade modulus of 100 pci that has been adjusted for foundation size. We recommend that maximum allowable contact stresses be limited to 2,000 psf. This value should not be increased for any transient loads, including seismic and wind loads. The settlement associated with a bearing pressure of 2,000 psf is 0.5 inch. The estimated settlement of the mat foundation may be pro-rated as a function of bearing pressure. Differential settlements of mat foundations are a function of mat loading and relative mat stiffness. We recommend that the mat be designed to limit the differential settlements to 0.25 times the total settlement, or less.

To provide resistance for design lateral loads, we recommend that an allowable friction coefficient of 0.45 be used between the concrete mat foundation and the underlying recompacted sandy subgrade soils. If, for some reason, additional lateral resistance is required, interior shear keys can be added when located a minimum of three times the depth of the shear key in from the perimeter edge of the mat foundation. Passive pressures, if used, should be limited to an equivalent fluid pressure of 300 pcf.

7.4.2 *Seismic Design Assuming Liquefaction and Lateral Spreading*

The design approach presented below for mat foundations is to:

1. Design the mat foundation to span areas beneath the slab that can lose bearing support due to differential settlements associated with lateral spreading and liquefaction;

2. Design deepened footings within the mat foundation systems to resist passive pressures on the footing sides generated potentially by the lateral displacement of the ground due to lateral spreading;

3. Design the mat foundation to resist forces exerted on the mat foundations assuming sliding of the mat foundation due to lateral displacement of the ground associated with lateral spreading;

4. Design the mat foundation system so that it can undergo rigid-body-like rotations associated with one end of the mat moving or rotating downward relative to the other end of the mat; and

5. Design the mat foundation system stiffness to limit differential settlements within the mat after adjustments for rigid-body-like rotations that can be transmitted into the building superstructure that limit angular distortions into the building superstructure so as to maintain life and safety concerns.

To this end, we provide the following:

1. We recommend that the buildings be founded on a structural mat foundation designed to support the structure in question and span over areas where potential ground loss may occur, namely under and around the buildings. We anticipate that portions of the mat foundation may become unsupported. To estimate the loss of support, we recommend that the lateral distance subject to loss of support be determined as follows:

   - For building footprint dimensions less than 30 feet, the lateral distance subject to loss of support should be taken as one-third (0.33 times) the dimension of the building; and

   - For building footprint dimensions greater than 30 feet, the lateral distance subject to loss of support should be taken as one-quarter (0.25 times) the dimension of the building, with the following restrictions: the minimum is 7.5 feet and the maximum is 15 feet.

2. To accommodate potential lateral movement of the structure, we recommend that:

   - Footings that extend below grade be designed to resist lateral earth passive pressures equal to 500 pcf.

   - For interior footings, the effective depth of the footing is to be taken as the difference between the actual footing embedment and the projected depth of embedment of the adjacent footing below the intersection of the height of the footing in question, projected back along a 2:1 (horizontal to vertical) plane. For example, assuming two footings are spaced 3 feet apart and both are embedded to a depth of 2 feet, the effective embedment of the footing in question would be equal to 2 feet (its embedment) minus 0.5 foot, or an effective height of 1.5 feet. The 0.5-foot height was determined by first computing the projected height of the footing in question onto the adjacent footing, and then subtracting the footing height from this projected height. If the resulting number is negative, the adjacent footing does not interfere with the footing in question. Therefore, the projected height of the footing is 1.5 feet (3 feet divided by 2). The height of the adjacent footing is 2 feet. Hence, the height of the adjacent footing interfering with the footing in question is 0.5 foot, or 2 feet minus 1.5 feet. Therefore, the effective height of the footing in question is 2 feet minus 0.5 foot.

   - Footings and slabs designed to resist potential sliding of the structure must be designed to resist a lateral load that is equal to the weight of the structure. In other words, the axial capacity or longitudinal capacity of the slabs-on-ground or footings are to be designed to accommodate a horizontal force taken to be equivalent to the weight of the structure.

3. In addition, we recommend that the foundation system be designed to accommodate the foundation gradients across the mat, which can approach the magnitude of total seismic settlements that are estimated to be on average approximately 9 inches and expected to range from 4 to 18 inches;

4. We recommend that the stiffness of the mat foundation be sufficient to limit angular distortions transmitted into the superstructure of the building to levels deemed safe for the structure as it pertains to life and safety concerns of the occupants; and

5. Lastly, we recommend that utility connections into the buildings, including but not limited to water, electric and gas, be designed to accommodate lateral displacements on the order of several feet. Such accommodations may include, but are not limited to, flexible connections and automatic shut-off valves.

7.5 Seismic Design Parameters per CBC

The CBC states that a site-specific seismic response analysis be performed for any site that is considered liquefiable. However, based on ASCE Standard ASCE/SEI 7-05, if the proposed structures have a fundamental period of vibration equal to or less than 0.5 second, site-specific analysis is not required and response spectra can be determined using the equivalent site class for non-liquefiable soil. As such, we have treated the site as a non-liquefiable site having Site Class D.

For structures that are to be designed for earthquake loads per Section 1613 and 1613A of the 2013 CBC, we have provided the following recommended site coefficients for proposed improvements that have a fundamental period of vibration equal to or less than 0.5 second (approximate location: 32.7222 degrees latitude, -117.210 degrees longitude).

CBC Seismic Design Parameters

F_A	1.018
F_V	1.539
S_S	1.205
S_1	0.461
S_{MS}	1.226
S_{M1}	0.709
S_{DS}	0.818
S_{D1}	0.473

7.6 Concrete Flatwork and Walkways

We recommend that areas to receive concrete flatwork and walkways be prepared in general accordance with Section 301-1 of the Standard Specifications for Public Works Construction. We recommend that subgrade soils be scarified to a minimum depth of 6 inches, and compacted to a minimum relative compaction of 95 percent. Additional subgrade preparation may be necessary in those areas where flatwork and walkways may be subject to vehicle loading and should be evaluated on a case-by-case basis.

7.7 Soil Corrosivity

The results of corrosivity testing of the near-surface soils indicate a soil pH of 7.0 and 40 years to perforation for a 16-gauge metal culvert. Test results are included in Appendix B.

7.8 Excavations

We recommend that all trenching operations for the proposed pipeline comply with OSHA and CALOSHA requirements. As such, trench excavations for the pipeline will generally need to be either shored or sloped back. Trench shields may be used in lieu of shoring or sloping the excavations, provided CALOSHA and OSHA regulations are followed.

For preliminary design and cost estimating purposes, we anticipate that the majority of the excavations will be within OSHA Type C soils. We recommend that excavation conditions be verified in the field, and that modifications be made to any trench excavation support systems, as needed, based upon the actual exposed conditions in the field. We recommend that the designated “competent person” determine the need for, and method for, trench stabilization as stated in the OSHA and CALOSHA requirements.

For shoring systems that are cantilevered, we recommend that shoring systems be designed for an equivalent lateral earth pressure of 40 pcf, with area surcharge loads included at 0.33 times the surface pressure. A minimum surcharge surface load of 260 psf should be used for an additional uniform lateral pressure of 86 psf. If heavy equipment is to be used near and adjacent to the trench, additional surcharge loads need to be considered in the design of the shoring system. Heavy construction equipment and materials should be kept away from the trench excavation. We recommend that such loads be kept a minimum distance of two times the depth of the excavation.

We recommend that shoring systems that are internally restrained be designed for a uniform lateral earth pressure of 30H psf, where H is the depth of the excavation in feet. Area surcharge loads shall be included in the design of the shoring and shall be 0.5 times the surface pressure. A minimum surcharge surface load of 260 psf should be used for an additional uniform lateral pressure of 120 psf. If heavy equipment is to be used near and adjacent to the trench, additional surcharge loads need to be considered in the design of the shoring system. Heavy construction equipment and materials should be kept away from the trench excavation. We recommend that such loads be kept a minimum distance of two times the depth of the excavation.

7.8.1 *Pavements*

As no information concerning frequency of traffic loading was provided, we have provided the following pavement for a conventional asphalt concrete section over a crushed aggregate base section on the basis of a typical Caltrans Traffic Index of 5. If anticipated traffic conditions or patterns include frequent heavy trucks, such as trash trucks, additional recommendations may be needed.

We recommend 3 inches of asphalt concrete overlying 4 inches of compacted crushed aggregate base material having a minimum R-value of 79 or CBR of 80. In addition, we recommend that the subgrade soils be compacted to a relative compaction of 95 percent of the maximum dry density, as determined by ASTM D 1557. The crushed aggregate base is to be compacted to a minimum relative compaction of 95 percent of its maximum dry density, as determined by ASTM D 1557. Subgrade soils should not be pumping when pavement is placed.

8 **LIMITATIONS**

Coastal and geotechnical engineering, as well as the other earth sciences, are characterized by uncertainty. Professional judgments presented herein are based partly on our evaluation of the technical information gathered, partly on our understanding of the proposed construction, and partly on our general experience. Our engineering work and judgments rendered meet the current professional standards. We do not guarantee the performance of the project in any respect.

We have investigated only a small portion of the pertinent soil and geologic conditions at the subject site. The opinions and conclusions made herein were based on the assumption that the soil and geologic conditions do not deviate appreciably from those encountered during our field investigation. We recommend that a soil engineer from our office observe construction to assist in identifying soil conditions that may be significantly different from those assumed in our design. Additional recommendations may be required at that time.

REFERENCES

Abbott, P.L., 1999, The Rise and Fall of San Diego: 150 Million Years of History Recorded in Sedimentary Rocks, Sunbelt Publications, San Diego.

American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures, ASCE Standard ASCE/SEI 7-05, including Supplement No. 1 and Errata.

ASTM Standard D 1557, "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort," ASTM International, West Conshohocken, PA, www.astm.org.

Blake T.F, EQSEARCH Version 3.xx – A computer program for the estimation of peak acceleration from California Historical Earthquake Catalogs.

California Department of Conservation, August 2011, http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Inundation_Maps/SanDiego/Pages/SanDiego.aspx.

Forrest, Carol Liana, 1982, The Liquefaction Potential of Harbor Island, San Diego State University.

Idriss, I.M. and R.W. Boulanger, September 2008, Soil Liquefaction During Earthquakes, Monograph MNO-12, Earthquake Engineering Research Institute, Oakland, CA, 261 pp.

IPCC, 2007, *Climate Change 2007. Synthesis Report, Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, IPCC, Geneva, Switzerland 104 pp, http://www.ipcc.ch/ipccreports/assessments-reports.htm.

Kennedy, M.P., and G.L. Peterson, 1975, Geology of the San Diego Metropolitan Area, California: Section A - Western San Diego Metropolitan Area (Del Mar, La Jolla, Point Loma 72 minute quadrangles), California Department of Conservation, Division of Mines and Geology, Bulletin 200.

Kennedy, M.P., and S.S. Tan, 2005, Geologic Map of the San Diego 30' X 60' Quadrangle, California, Scale 1:100,000, California Department of Conservation, California Geological Survey.

Legg, M.R., and J.C. Borrero and C.E. Synolakis, C.E., 2004, Tsunami hazards associated with the Catalina fault in southern California: Earthquake Spectra, vol. 20, p. 917-950.

REFERENCES

Legg, M.R., and M.P. Kennedy, 1991, Oblique Divergence and Convergence in the California Continental Borderland, in Abbott, P.L. and Elliott, W.J. (eds) Environmental Perils, San Diego Region, San Diego Association of Geologists Guidebooks, pp. 1-16.

Madabhushi, G., J. Knappett, and S. Haigh, 2010, Design of Pile Foundations in Liquefiable Soils, Imperial College Press.

Norris, R.M., and R.W. Webb, 1990, *Geology of California*, Second Edition, John Wiley & Sons, Inc.

Public Works Standards, Inc., 2006, Greenbook: Standard Specifications for Public Works Construction, Building News, Inc.

TerraCosta Consulting Group, Inc., December 11, 2012, Addendum to Guide Pile Foundation Criteria, Evaluation of Existing 12-Inch Square Guide Piles, Harbor Island West Marina, San Diego, California.

TerraCosta Consulting Group, Inc., December 10, 2012, Guide Pile and Approach Pier/Gangway, Foundation Criteria, Harbor Island West Marina, San Diego, California.

U.S. Department of the Navy, Naval Facilities Engineering Command, 1986, Foundations and Earth Structures, NAVFAC DM 7.02.

TABLE 1
SUMMARY OF GROUND MODIFICATION TECHNIQUES

	Means of Ground Modification⁽¹⁾				Applicable Soils⁽²⁾		
Method	Densification	Soil Reinforcement	Soil Modification	Pore Pressure Dissipation	Sands	Sands with Significant Fines	Fines
Deep Dynamic Compaction	X				X		
Vibro-Compaction	X				X		
Vibro-Replacement with stone columns	X	X			X		X(3)
Deep Soil Mixing		X	X		X	X	X
Compaction Grouting	X	X			X		X
Jet Grouting		X			X	X	X
Vibro-Compaction with stone columns and wick drains	X	X		X	X	X	
Wick and gravel drains				X	X		
Chemical grout injection			X		X		

NOTES:

(1) The "means of ground modification" depends upon the properties of the soil being modified. Densification pertains to physically changing the density of the soil, and thereby increasing its strength and reducing its liquefaction potential. Soil reinforcement pertains to adding structural element to the soil mass, thereby strengthening the soil and, as such, augmenting the liquefaction resistance of the soil. Oftentimes, soil reinforcement is achieved by inserting a cement or soil-cement column within the soil mass. It is these elements that provide resistance to seismic loading. Soil modification pertains to changing the soil composition, and thereby transforming the soil into a new soil. In deep soil-mixing, a soil-cement composite is created by blending and mixing cement into the soil. In chemical grout injection, a cement is injected into the pore space of the soil to create a cement-soil composite.

(2) The applicability of soil refers to the type of soils that are considered suitable for a particular ground improvement technique. Sands have high permeabilities and, as such, are easy to compact and densify by vibration and other means. Sands with significant fines have lower permeabilities and, as such, are not easy to densify by compactive means. As such, if densification is desired, the drainage of the silty sand soil needs to be improved. One common means for this is through the use of wick drains. As such, the amount of fines and types of fines will have a significant impact on the type of ground modification that will be effective. In fine-grained soils, the only viable ground modification treatment is likely to be reinforcement.

(3) Stone columns may be applicable in fine soils if the concern is the improvement of the vertical support-carrying capacity of the soil. Its applicability is generally limited to vertical support in fine-grained soils.

TABLE 2
SUMMARY OF FOUNDATION ALTERNATIVES TO MITIGATE LIQUEFACTION, LATERAL SPREADING, AND SEISMIC-INDUCED GROUND INSTABILITY

Method	Description of Mitigation Strategy	Applicable Ground Movement		
		Ground Settlement	Limited Lateral Ground Displacement	Ground Failure and Instability
Mat Foundations	Create a rigid foundation to reduce transferring differential ground movements into the superstructure of the building(1)	X	X	
Driven Piles	Isolate building from ground movement(2)	X	X	X
CIDH Shafts	Isolate building from ground movement(3)	X	X	X

Notes:

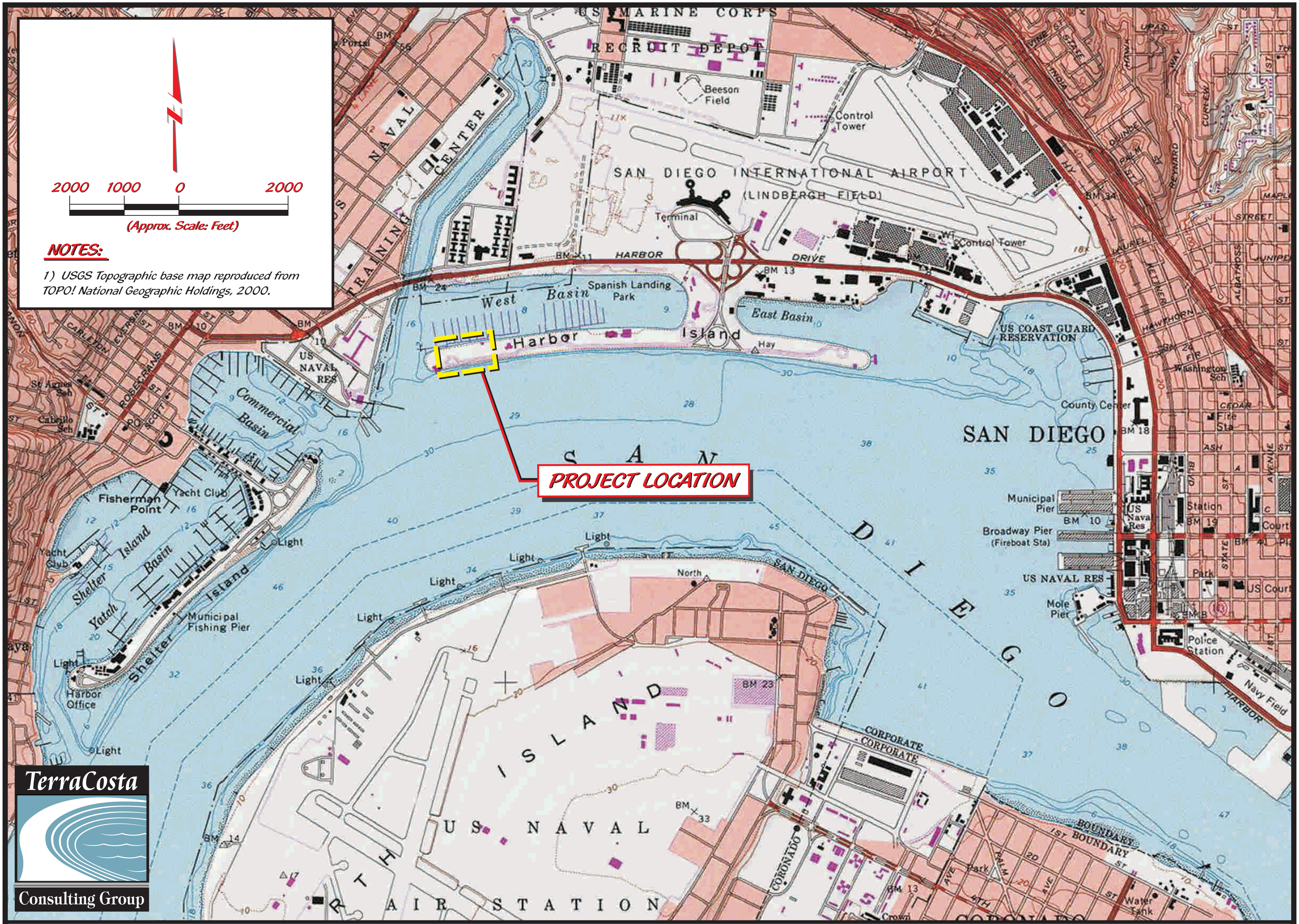
(1) The use of a mat foundation is intended to provide a rigid foundation system that will mitigate the transferring of differential ground movements into the superstructure of the building. As such, the mat will need to be designed to be stiff enough to limit distortion into the structure. It is important to note that buildings founded on mat foundations will undergo rigid body movements and, as such, the functional capacity of a building may be impaired after an earthquake due to significant tilt of the rigid structure due to differential ground settlement. As such, repairs will likely be needed to restore the building to service. The goal of this approach is to prevent structural collapse. As such, this method is applicable when ground movements are such that the movement of the building and mat is acceptable. This system may not be applicable for extreme lateral ground movements and areas where ground instability is anticipated. Lastly, besides designing the mat to accommodate differential settlements, the mat foundation may need to be designed to hold together when the mat moves, as well as when portions of the mat become unsupported due to ground movements.

(2) The strategy for using driven piles is to isolate the building from the ground movements. As such, the pile foundation will likely need to be held together through the use of grade beams, with the first story of the building consisting of a structural floor founded on the grade beams. In addition, given the types of ground movement anticipated, lateral soil loads applied as the result of lateral spreading and ground failure will need to be accommodated. As such, additional piles will likely be required to accommodate the imposed lateral loads. With driven piles, assuming the soils are predominantly sandy, one benefit is the possibility of using closely spaced piles to densify the soils. This densification may have the added benefit of reducing the liquefaction potential of the soils. Any pile foundation system will also need to be designed for down-drag loads due to seismically induced ground settlements.

(3) The strategy for using CIDH shafts is similar to that for driven piles, with the possible exception of the potential benefit of soil densification.

TABLE 3
SUMMARY OF APPLICABLE SEISMIC-INDUCED GROUND MITIGATION METHODS FOR HARBOR ISLAND WEST MARINA LAND IMPROVEMENTS

Method	Type of Mitigation	Applicable	Not Applicable
Deep Dynamic Compaction	Ground Improvement		X
Vibro-Compaction	Ground Improvement		X
Vibro-Replacement with Stone Columns	Ground Improvement		X
Deep Soil Mixing	Ground Improvement	X	
Compaction Grouting	Ground Improvement		X
Jet Grouting	Ground Improvement	X	
Vibro-Compaction with Stone Columns and Wick Drains	Ground Improvement	X	
Wick and Gravel Drains	Ground Improvement		X
Chemical Grout Injection	Ground Improvement		X
Mat Foundations	Structural	X	
Driven Piles	Structural	X	
CIDH Shafts	Structural	X	



NOTES:

1) USGS Topographic base map reproduced from TOPO! National Geographic Holdings, 2000.

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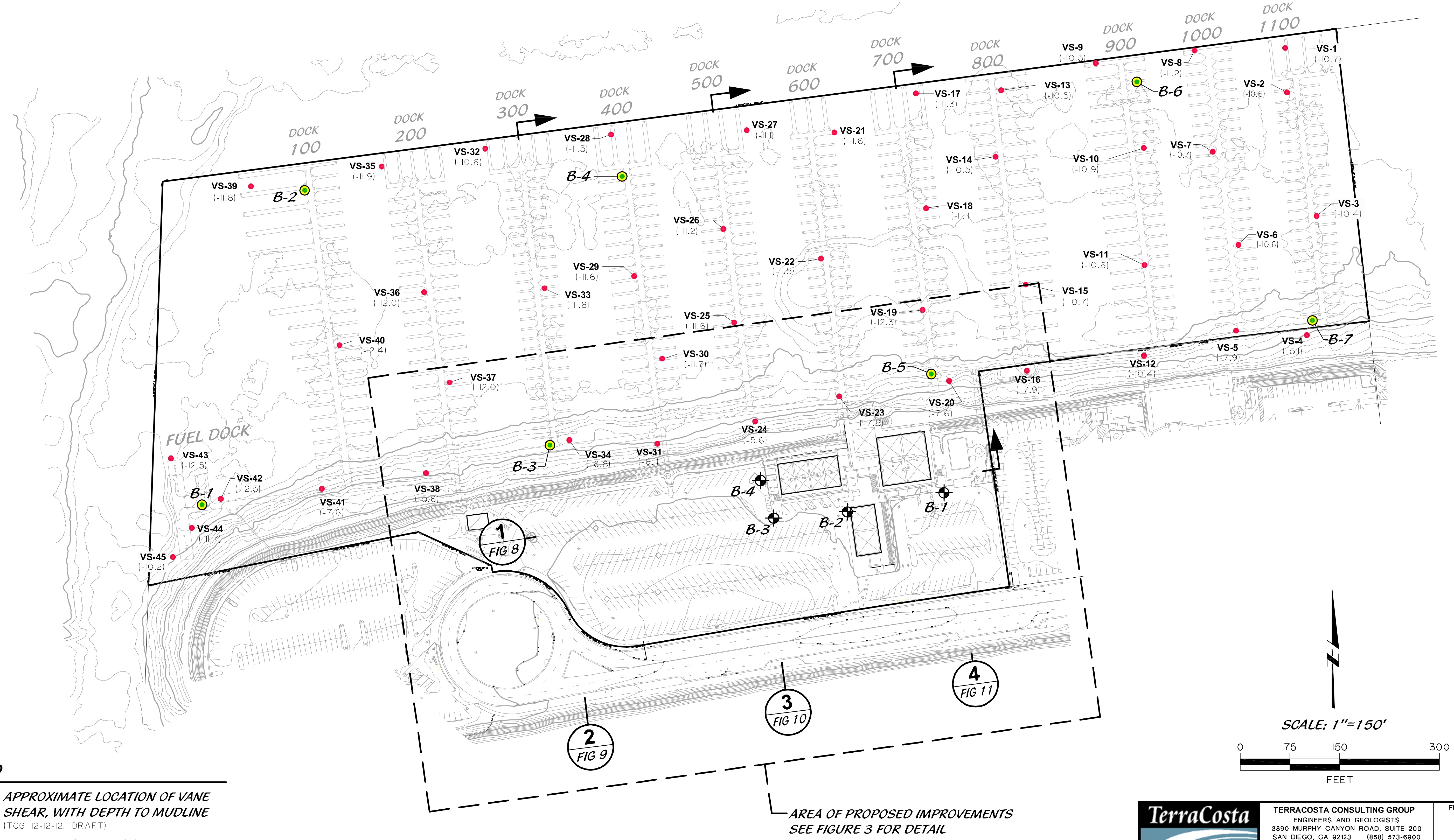
Project: Harbor Island West Marina *Project No. 2769A* *Figure 1*



LEGEND

● VS-45 (-10.2)	*APPROXIMATE LOCATION OF VANE SHEAR, WITH DEPTH TO MUDLINE* (TCG 12-12-12, DRAFT)
● B-7	*APPROXIMATE LOCATION OF WATERSIDE BORING* (TCG 12-12-12, DRAFT)
⌖ B-4	*APPROXIMATE LOCATION OF LANDSIDE BORING*

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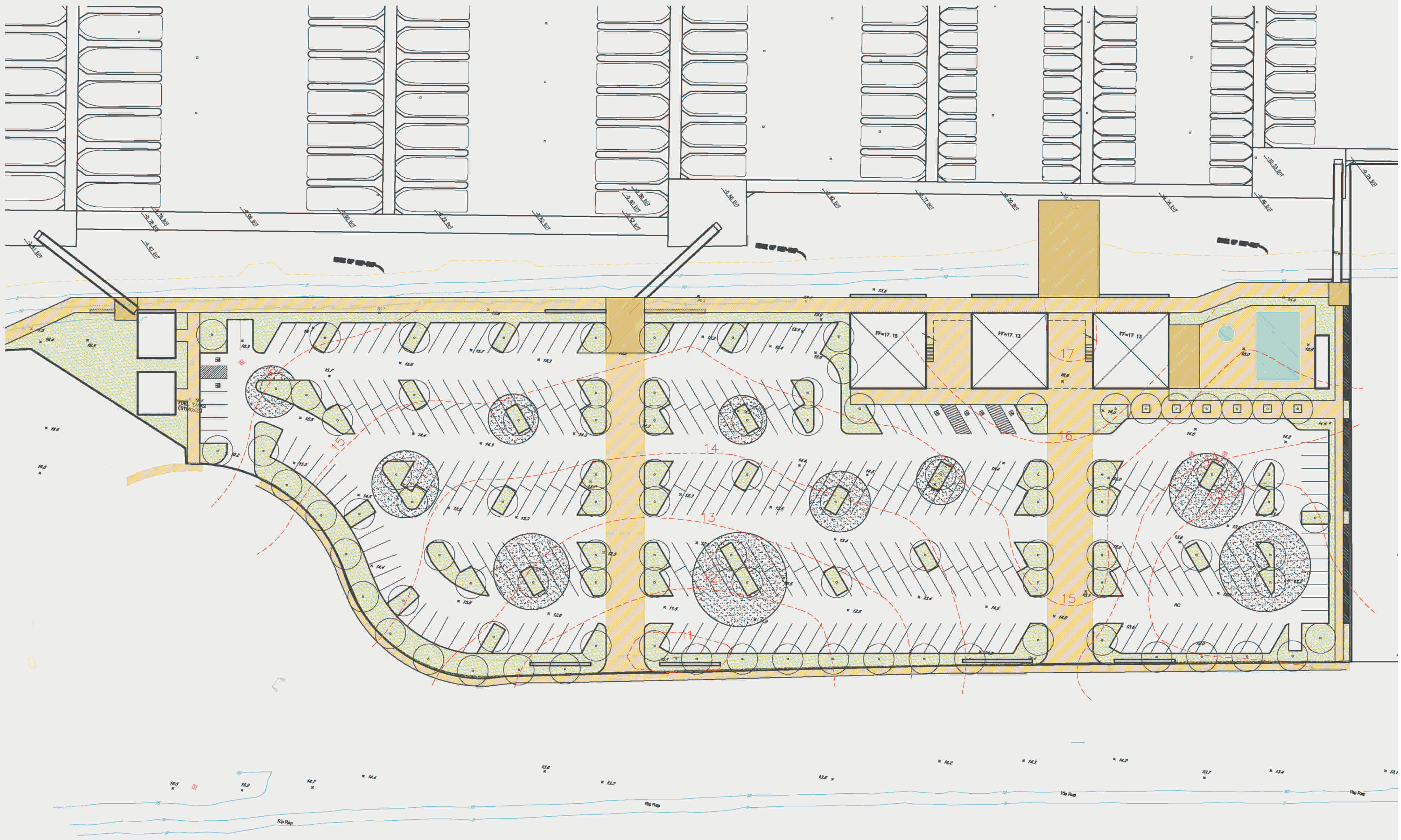
FIGURE NUMBER
2

PROJECT NAME
HARBOR ISLAND WEST MARINA

PROJECT NUMBER
2769A

SITE PLAN / BORING LOCATION MAP



LEGEND	EXISTING PARKING STALLS:	335 (6 HC)	STALLS 18'X8.5'	AISLES 18'-29' WIDE
	PROPOSED PARKING STALLS:	331 (6 HC)	STALLS 18'X8.5'	AISLES 18' WIDE

Harbor Island West Marina

San Diego • Beauchamp Realty, Inc • 15 August, 2012

SPLA

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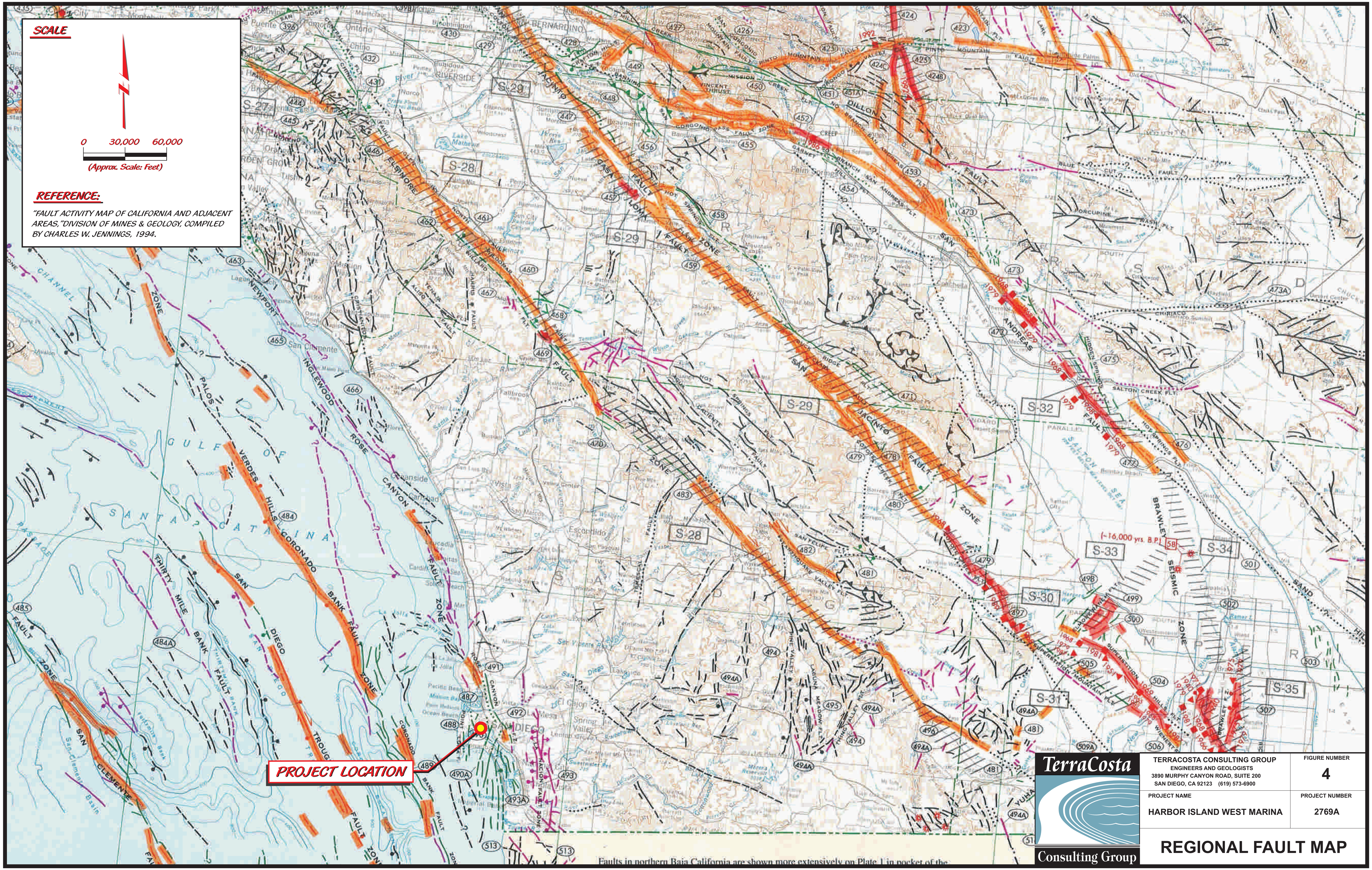
FIGURE NUMBER	3
PROJECT NAME	HARBOR ISLAND WEST MARINA
PROJECT NUMBER	2769A

PROPOSED SITE IMPROVEMENTS



REFERENCE:

"FAULT ACTIVITY MAP OF CALIFORNIA AND ADJACENT AREAS,"DIVISION OF MINES & GEOLOGY, COMPILED BY CHARLES W. JENNINGS, 1994.

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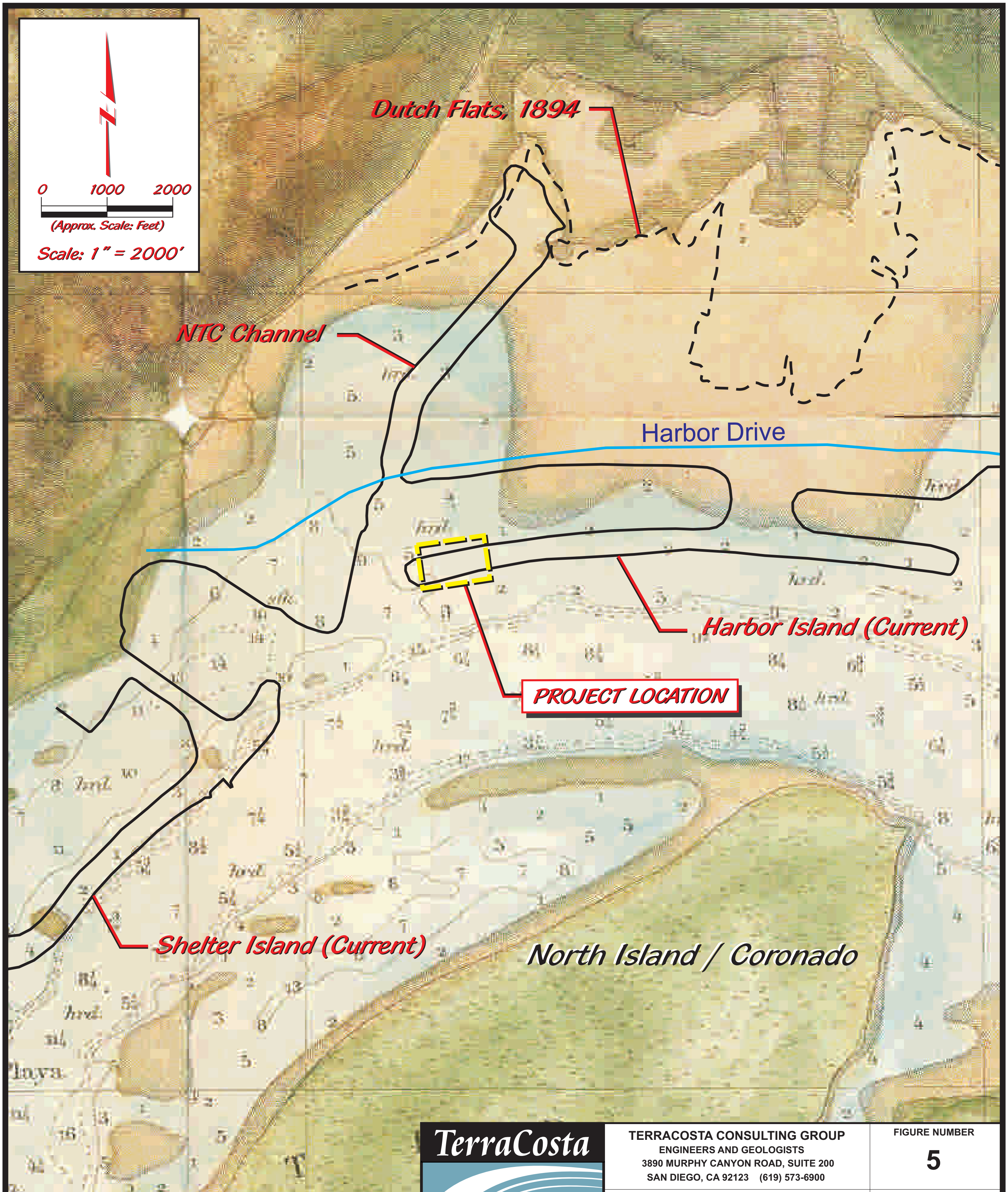
FIGURE NUMBER
4

PROJECT NAME
HARBOR ISLAND WEST MARINA

PROJECT NUMBER
2769A

REGIONAL FAULT MAP



This chart was prepared under the supervision of A. D. Bache for inclusion in the 1857 edition of the *Report of the Superintendent of the United States Coast Survey*. The triangulation for this chart was accomplished by R. D. Cutts, the topography by A. M. Harrison, and the hydrology by a party under the command of James Alden.

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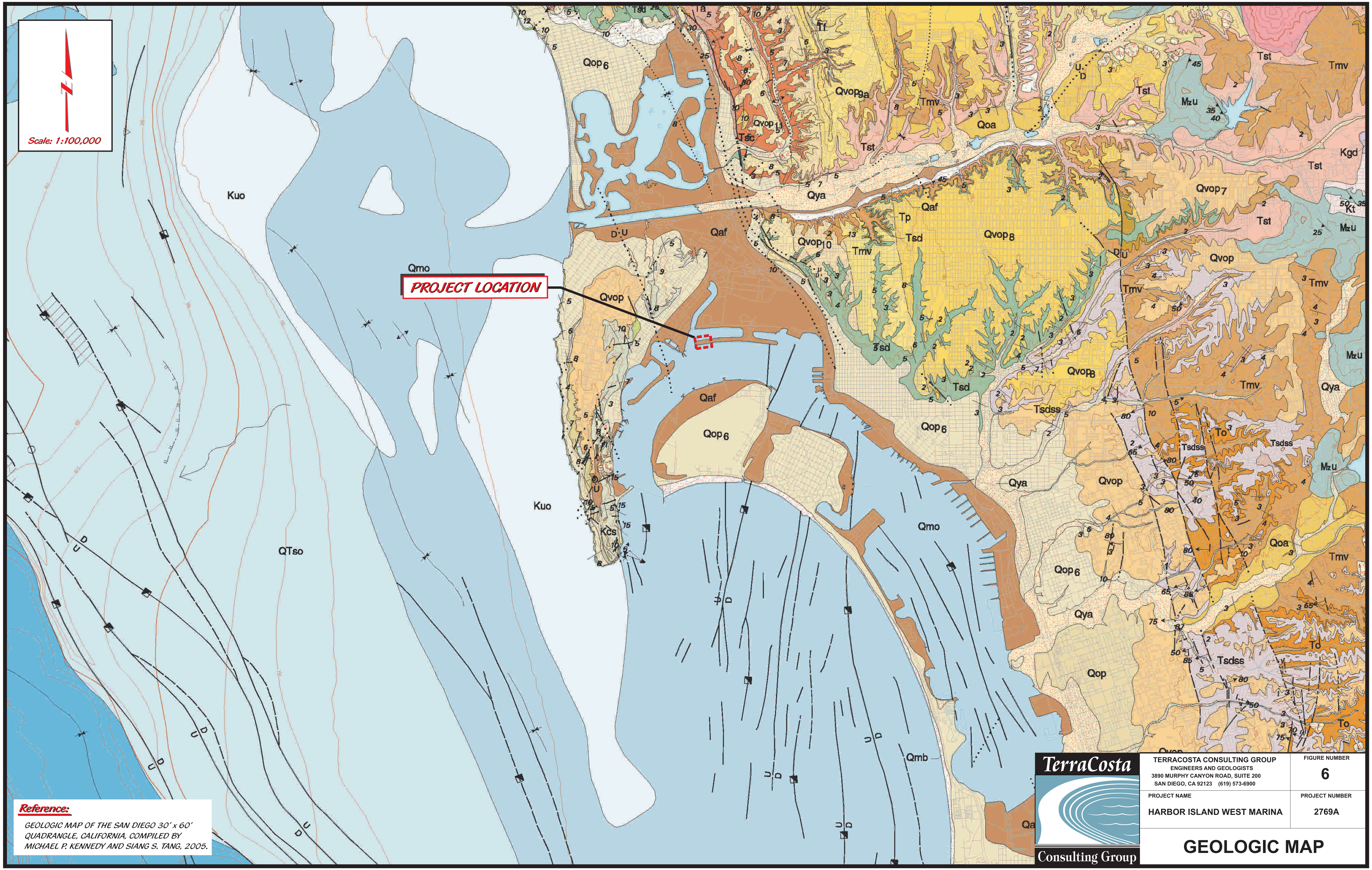
FIGURE NUMBER	PROJECT NAME	PROJECT NUMBER
5	HARBOR ISLAND WEST MARINA	2769A

SAN DIEGO BAY, 1857



Reference:

GEOLOGIC MAP OF THE SAN DIEGO 30′ x 60′ QUADRANGLE, CALIFORNIA, COMPILED BY MICHAEL P. KENNEDY AND SIANG S. TANG, 2005.

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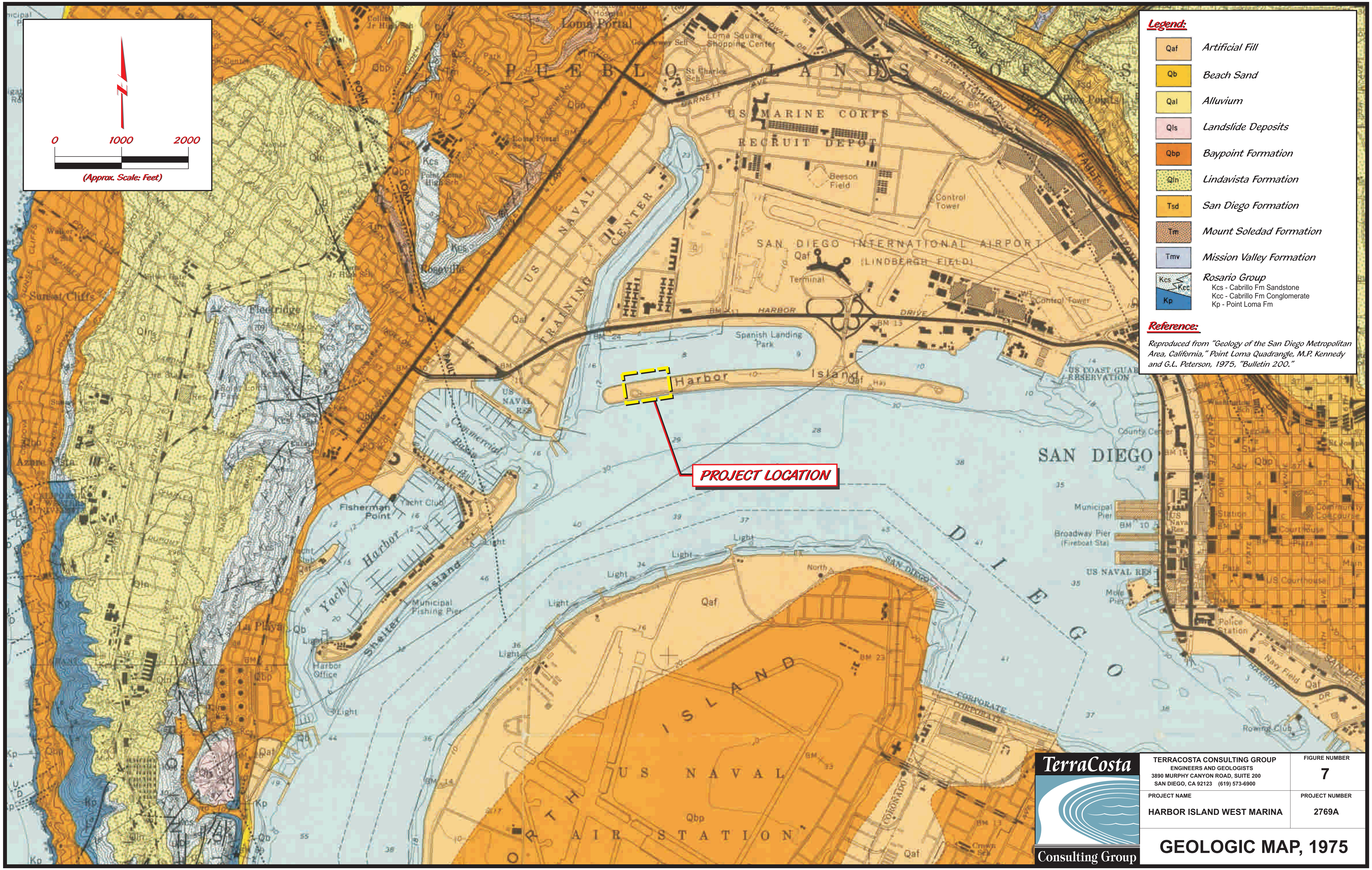
FIGURE NUMBER
6

PROJECT NAME
HARBOR ISLAND WEST MARINA

PROJECT NUMBER
2769A

GEOLOGIC MAP



Reference:

Reproduced from "Geology of the San Diego Metropolitan Area, California," Point Loma Quadrangle, M.P. Kennedy and G.L. Peterson, 1975, "Bulletin 200."

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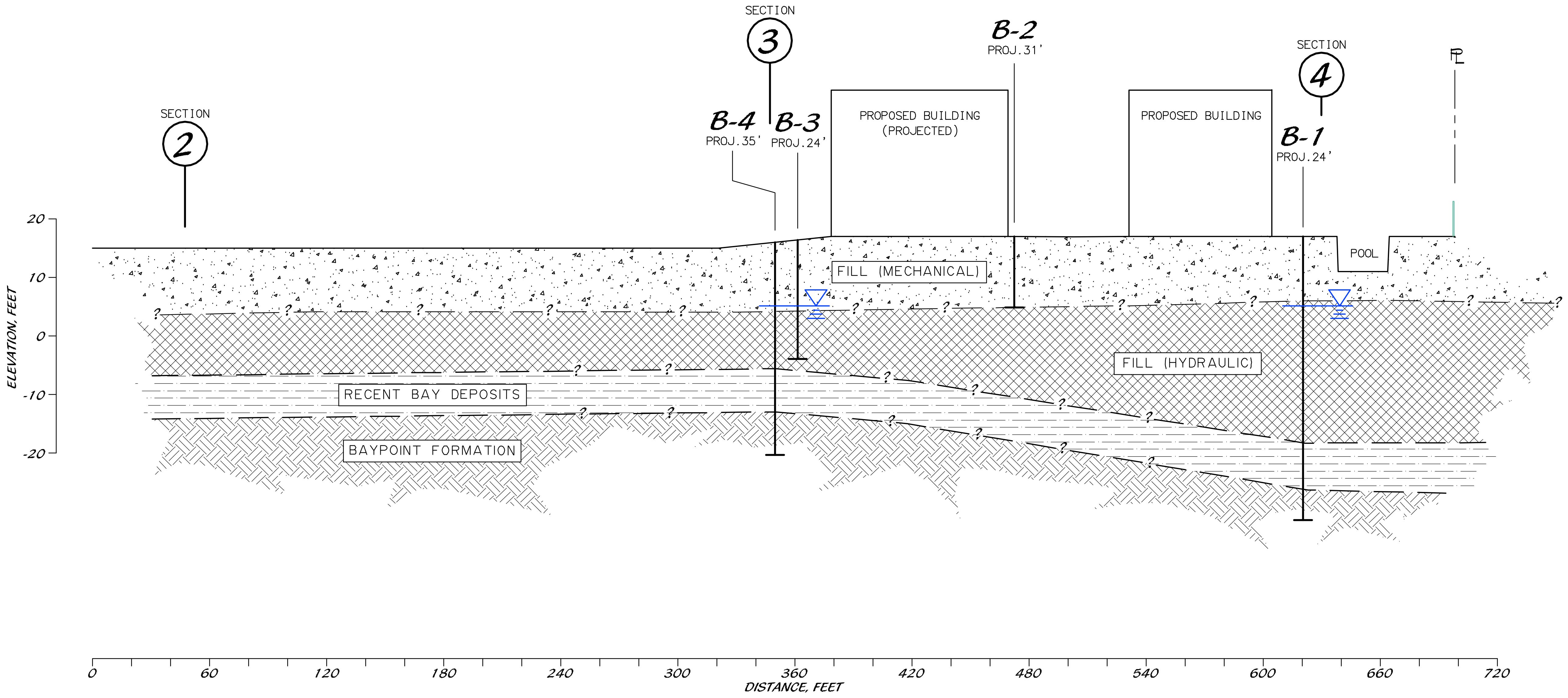
FIGURE NUMBER
7

PROJECT NAME
HARBOR ISLAND WEST MARINA

PROJECT NUMBER
2769A

GEOLOGIC MAP, 1975



CROSS SECTION 1

FIG 2

SCALE: 1"=60' (HORIZ.)
1"=20' (VERT.)

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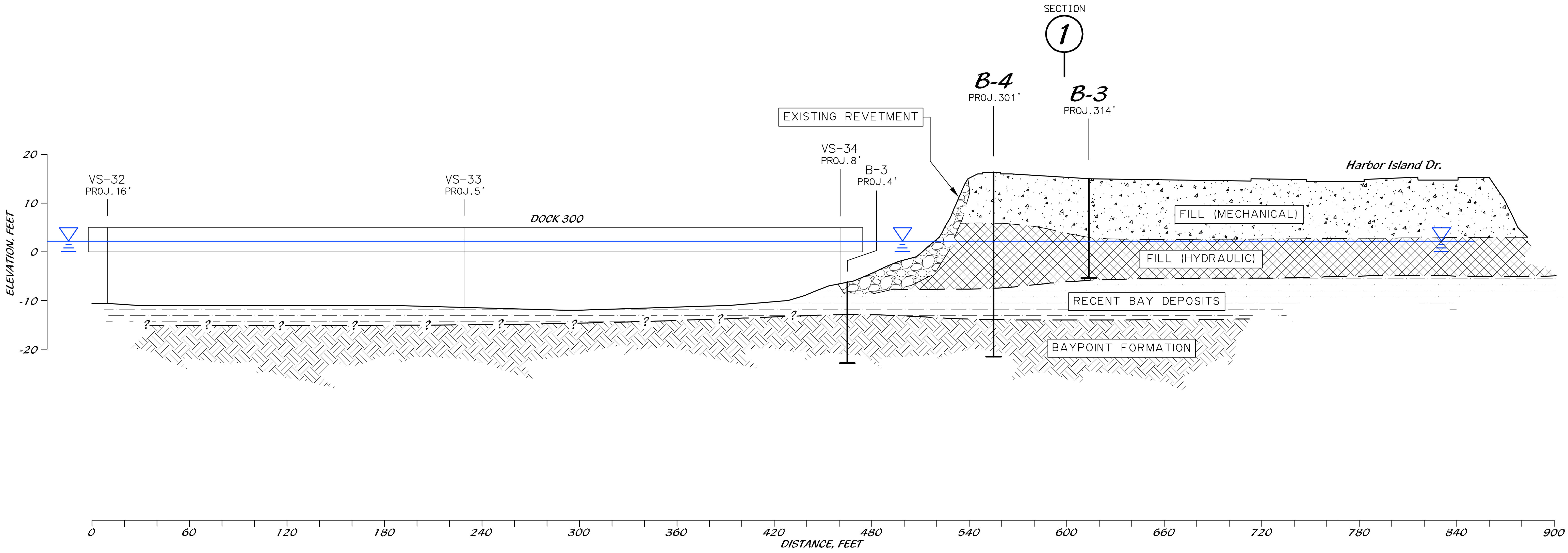
FIGURE NUMBER	**8**
PROJECT NAME	PROJECT NUMBER
HARBOR ISLAND WEST MARINA	**2769A**

GENERALIZED GEOLOGIC SECTION



CROSS SECTION 2 FIG 2

SCALE: 1"=60' (HORIZ.)
1"=20' (VERT.)

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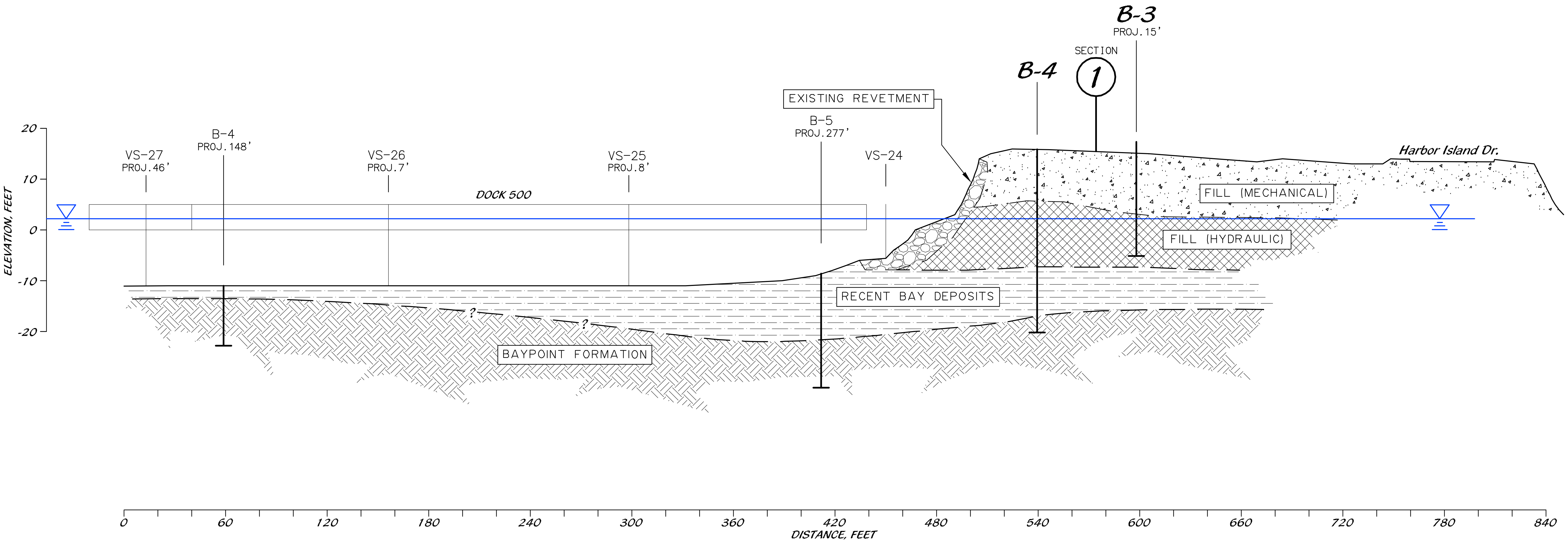
FIGURE NUMBER
9

PROJECT NAME
HARBOR ISLAND WEST MARINA

PROJECT NUMBER
2769A

GENERALIZED GEOLOGIC SECTION

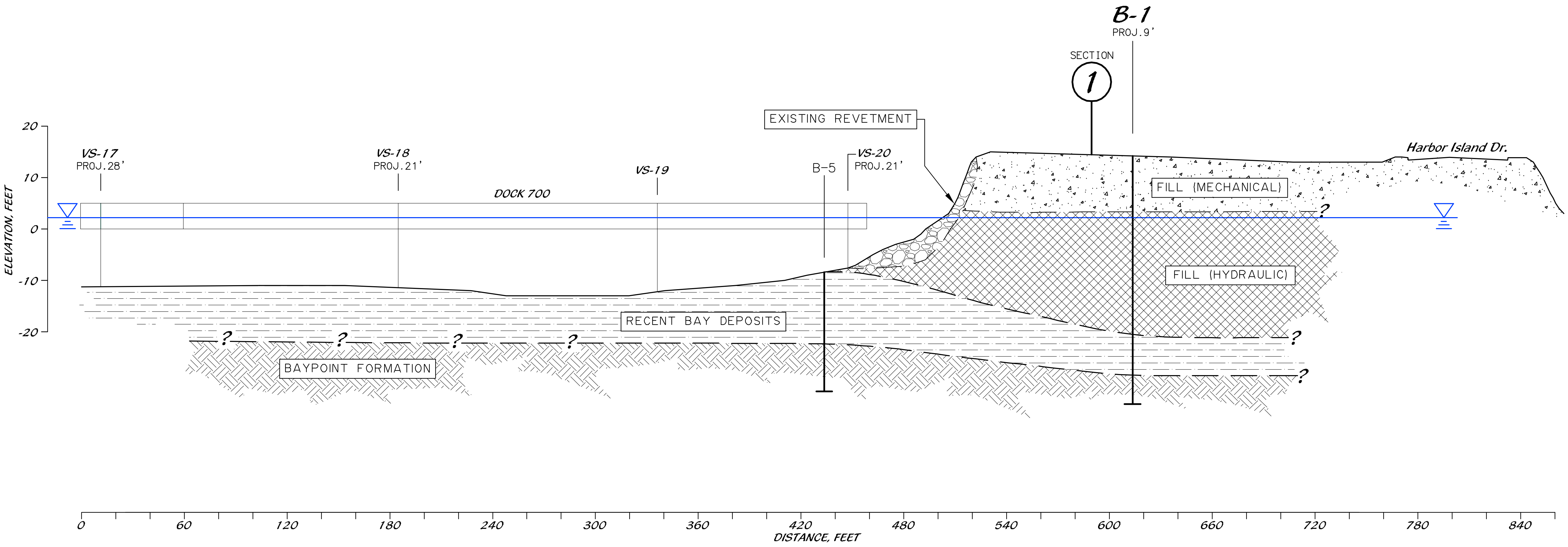


CROSS SECTION 3

FIG 2

SCALE: 1"=60' (HORIZ.)
1"=20' (VERT.)

TerraCosta Consulting Group	**TERRACOSTA CONSULTING GROUP** ENGINEERS AND GEOLOGISTS 3890 MURPHY CANYON ROAD, SUITE 200 SAN DIEGO, CA 92123 (858) 573-6900	FIGURE NUMBER **10**
	PROJECT NAME **HARBOR ISLAND WEST MARINA**	PROJECT NUMBER **2769A**
	GENERALIZED GEOLOGIC SECTION	



CROSS SECTION 4 FIG 2

SCALE: 1"=60' (HORIZ.)
1"=20' (VERT.)

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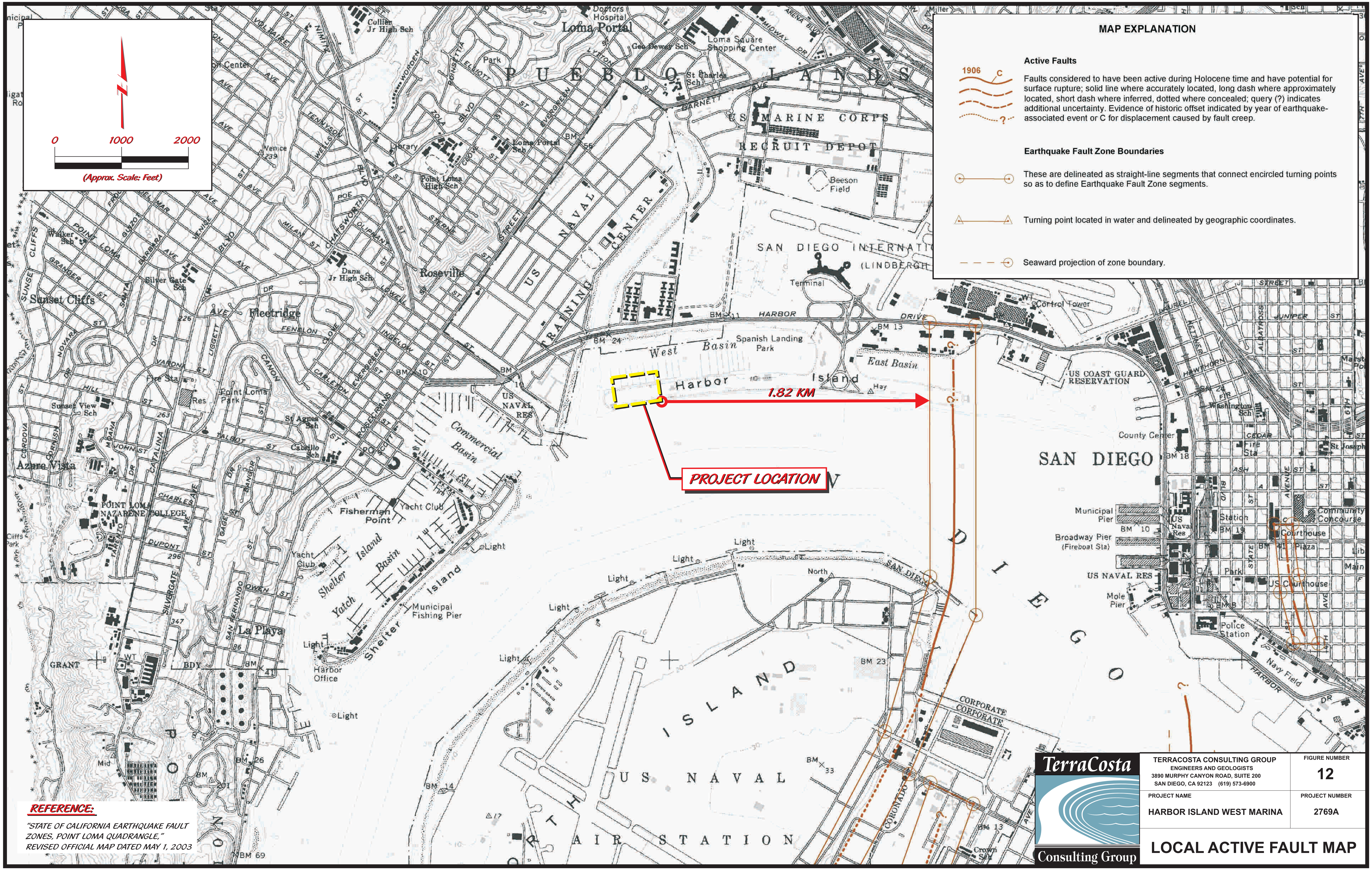
FIGURE NUMBER	11
PROJECT NAME	HARBOR ISLAND WEST MARINA
PROJECT NUMBER	2769A

GENERALIZED GEOLOGIC SECTION



MAP EXPLANATION

Active Faults

Faults considered to have been active during Holocene time and have potential for surface rupture; solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where concealed; query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

Earthquake Fault Zone Boundaries

These are delineated as straight-line segments that connect encircled turning points so as to define Earthquake Fault Zone segments.

Turning point located in water and delineated by geographic coordinates.

Seaward projection of zone boundary.

REFERENCE:

"STATE OF CALIFORNIA EARTHQUAKE FAULT ZONES, POINT LOMA QUADRANGLE," REVISED OFFICIAL MAP DATED MAY 1, 2003

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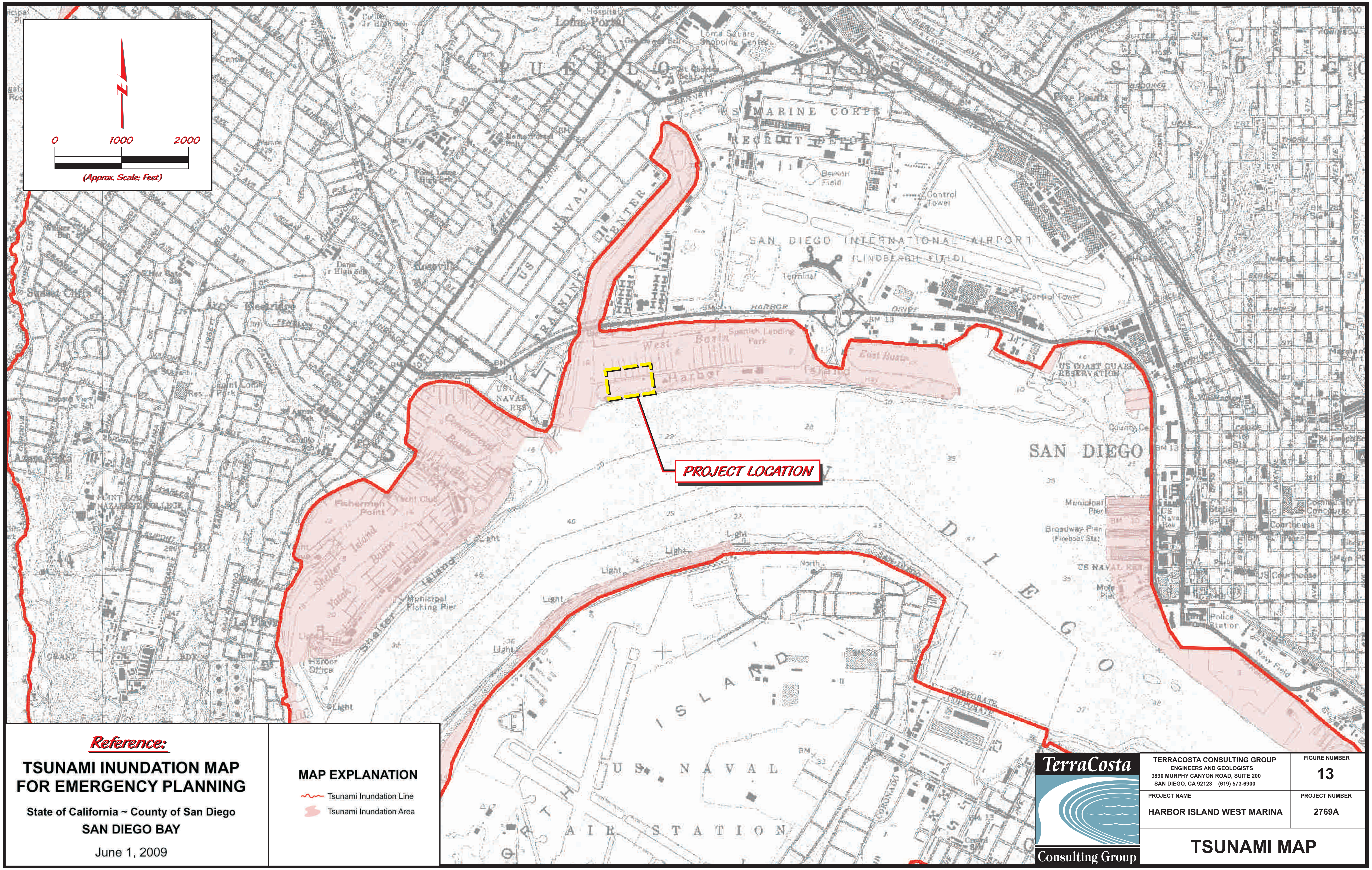
FIGURE NUMBER	12
PROJECT NAME HARBOR ISLAND WEST MARINA	PROJECT NUMBER 2769A

LOCAL ACTIVE FAULT MAP



Reference:

TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

State of California ~ County of San Diego
SAN DIEGO BAY
June 1, 2009

MAP EXPLANATION

〰 Tsunami Inundation Line
▨ Tsunami Inundation Area

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FIGURE NUMBER	13
PROJECT NAME	HARBOR ISLAND WEST MARINA
PROJECT NUMBER	2769A

TSUNAMI MAP

APPENDIX A

LOGS OF EXCAVATIONS

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA - LANDSIDE	PROJECT NUMBER 2769A	BORING **LEGEND**	
SITE LOCATION Harbor Island, San Diego	START 12/4/2014	FINISH 12/4/2014	SHEET NO. 1 of 2
DRILLING COMPANY Pacific Drilling	DRILLING METHOD Hollow Stem Auger	LOGGED BY G. Spaulding	CHECKED BY
DRILLING EQUIPMENT Marl M5	BORING DIA. (in) 6	TOTAL DEPTH (ft) 40	GROUND ELEV (ft)
DEPTH/*ELEV.* GROUND WATER (ft) ▼ n/a			
SAMPLING METHOD SPT/Cal	NOTES		

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5									
10									
		C	1						
		S	2						
15		B	3						

KEY TO EXCAVATION LOGS

▼ WATER TABLE MEASURED AT TIME OF DRILLING

OTHER TESTS

CC	Confined Compression	ppm	parts per million of VOCs*
CL	Chloride Content	R	Resistivity
CS	Consolidation	RV	R-Value
DS	Direct Shear	SA	Sieve Analysis
EI	Expansion Index	SE	Sand Equivalent
GS	Grain Size Analysis	SF	Sulfate
LC	Laboratory Compaction	SG	Specific Gravity
pH	Hydrogen Ion	SW	Swell
PI	Plasticity Index		

PENETRATION RESISTANCE (BLOWS/ft)

Number of blows required to advance the sampler 1 foot.

California Sampler blow counts can be converted to equivalent SPT blow counts by using an end-area conversion factor of 0.67 when using a 140-pound hammer and a 30-inch drop.

SAMPLE TYPE

C ("California Sampler") - An 18-inch-long, 2-1/2-inch I.D., 3-inch O.D., thick-walled sampler. The sampler is lined with eighteen 2-3/8-inch I.D. brass rings. Relatively undisturbed, intact soil samples are retained in the brass rings.

S ("SPT") - a.k.a. Standard Penetration Test, an 18-inch-long, 2-inch O.D., 1-3/8-inch I.D. drive sampler.

B ("Bulk") - a.k.a. Bulk Sack Sample, a disturbed, but representative sample obtained from a specific depth interval placed in a large plastic bag.

NOTES ON FIELD INVESTIGATION

Borings were advanced using a truck-mounted Marl M5 drill rig with a 6-inch hollow-stem auger.

(CONTINUED)

TCG_METRIC_LOG(3) 2769A.GPJ GDCLOGMT.GDT 1/14/15

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1 a

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA - LANDSIDE
PROJECT NUMBER 2769A
BORING LEGEND
SITE LOCATION Harbor Island, San Diego
START 12/4/2014
FINISH 12/4/2014
SHEET NO. 2 of 2
DRILLING COMPANY Pacific Drilling
DRILLING METHOD Hollow Stem Auger
LOGGED BY G. Spaulding
CHECKED BY
DRILLING EQUIPMENT Marl M5
BORING DIA. (in) 6
TOTAL DEPTH (ft) 40
GROUND ELEV (ft)
DEPTH/*ELEV.* GROUND WATER (ft) ⊻ n/a
SAMPLING METHOD SPT/Cal
NOTES

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
25									
30									
35									

KEY TO EXCAVATION LOGS

(CONTINUED)

NOTES ON FIELD INVESTIGATION (Continued)

Standard Penetration Tests (SPT) and California Samplers were used to obtain soil samples. The SPT and California Samplers were driven into the soil at the bottom of the borings with a 140-pound hammer falling 30 inches. When the samplers were withdrawn from the boring, the samples were removed, visually classified, sealed in plastic containers, and taken to the laboratory for detailed inspection.

Free groundwater was encountered in the borings as shown on the logs.

Classifications are based upon the Unified Soil Classification System and include color, moisture, and consistency. Field descritpions have been modified to reflect results of laboratory inspection where deemed appropriate.

TCG_METRIC_LOG(3) 2769A.GPJ GDCLOGMT.GDT 1/14/15

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-1 b

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA - LANDSIDE	**PROJECT NUMBER** 2769A	**BORING** **B-1**	
SITE LOCATION Harbor Island, San Diego	**START** 12/4/2014	**FINISH** 12/4/2014	**SHEET NO.** 1 of 3
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** G. Spaulding	**CHECKED BY**
DRILLING EQUIPMENT Marl M5	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 47.5	**GROUND ELEV (ft)** 14.5
DEPTH/*ELEV.* GROUND WATER (ft) ▼ 12.5 / *2.0*			
SAMPLING METHOD SPT/Cal	**NOTES** Boring sealed with bentonite 5' to 47.5'		

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									6" AC
									FILL **Interbedded Silty SAND (SM)**, red-brown to tan, damp, with shell fragments
		B	1						
	10								
5									
		C	2	21					
	5								
10									
									HYDRAULIC FILL **SAND with Silt (SP-SM)**, medium dense to loose, gray, wet, interbedded with shell fragments
		S	3	19					
								▼	
		S	4	19			GS		
	0								
15									
		S	5	6			SA		
		S	6	6			GS		
	-5								

TCG_METRIC_LOG(3) 2769A.GPJ GDCLOGMT.GDT 1/14/15

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THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-2 a

LOG OF TEST BORING

PROJECT NAME: HARBOR ISLAND WEST MARINA - LANDSIDE
PROJECT NUMBER: 2769A
BORING: **B-1**
SITE LOCATION: Harbor Island, San Diego
START: 12/4/2014
FINISH: 12/4/2014
SHEET NO.: 2 of 3
DRILLING COMPANY: Pacific Drilling
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: G. Spaulding
CHECKED BY:
DRILLING EQUIPMENT: Marl M5
BORING DIA. (in): 6
TOTAL DEPTH (ft): 47.5
GROUND ELEV (ft): 14.5
DEPTH/*ELEV.* GROUND WATER (ft): ▼ 12.5 / *2.0*
SAMPLING METHOD: SPT/Cal
NOTES: Boring sealed with bentonite 5' to 47.5'

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									Fine SAND with Silt (SP-SM), loose to very loose, gray, saturated, interbedded with shell fragments
		S	7	5			SA		
		S	8	4			GS		
	-10								
25									
		S	9	2			SA		
		S	10	2					
	-15								
30									
		S	11	4			SA		
		S	12	6			SA		
	-20								
35									RECENT BAY DEPOSITS **Very Fine SAND (SP/SM) to SILT (ML)**, very loose, gray, saturated, interbedded
		S	13	3		27.8	GS PI		
		S	14	3		21.7	GS PI		
	-25								

TCG_METRIC_LOG(3) 2769A.GPJ GDCLOGMT.GDT 1/14/15

FIGURE A-2 b

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA - LANDSIDE
PROJECT NUMBER 2769A
BORING B-1
SITE LOCATION Harbor Island, San Diego
START 12/4/2014
FINISH 12/4/2014
SHEET NO. 3 of 3
DRILLING COMPANY Pacific Drilling
DRILLING METHOD Hollow Stem Auger
LOGGED BY G. Spaulding
CHECKED BY
DRILLING EQUIPMENT Marl M5
BORING DIA. (in) 6
TOTAL DEPTH (ft) 47.5
GROUND ELEV (ft) 14.5
DEPTH/*ELEV.* GROUND WATER (ft) ▼ 12.5 / *2.0*
SAMPLING METHOD SPT/Cal
NOTES Boring sealed with bentonite 5' to 47.5'

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		S	15	21					- Becomes medium dense
		S	16	39			GS		WEATHERED BAY POINT FORMATION **Silty SAND (SM)**, medium dense to dense, gray, wet, with shell fragments
	-30								
45									BAY POINT FORMATION **Clayey SAND (SC)**, medium dense, mottled red-brown/gray, moist
		S	17	24		14.9	GS PI		
									Boring terminated at depth of 47.5 feet. *Groundwater encountered at depth of 12.5 feet at time of excavation (varies with tides).*
	-35								
50									
	-40								
55									
	-45								

TCG_METRIC_LOG(3) 2769A.GPJ GDCLOGMT.GDT 1/14/15

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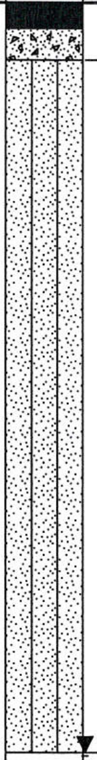
FIGURE A-2 c

LOG OF TEST BORING

PROJECT NAME: HARBOR ISLAND WEST MARINA - LANDSIDE
PROJECT NUMBER: 2769A
BORING: **B-2**
SITE LOCATION: Harbor Island, San Diego
START: 12/4/2014
FINISH: 12/4/2014
SHEET NO.: 1 of 1
DRILLING COMPANY: Pacific Drilling
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: G. Spaulding
CHECKED BY:
DRILLING EQUIPMENT: Marl M5
BORING DIA. (in): 6
TOTAL DEPTH (ft): 12
GROUND ELEV (ft): 16
DEPTH/*ELEV.* GROUND WATER (ft): ▼ 12.0 / *4.0*
SAMPLING METHOD: SPT/Cal
NOTES: Boring sealed with benotnite 5' to 12'±

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									**5" AC / 6" CLASS 3 BASE**
	15								FILL **Silty SAND (SM)**, gray-brown to light brown, damp
		B	1						
5		S	2	27					
	10	C	3	37					
10		S	4	14					
	5	S	5	17					
									Boring terminated at depth of 12 feet. *Groundwanter encountered at 12 feet at time of excavation (varies with tides).*
15									
	0								

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3890 Murphy Canyon Road, Suite 200
San Diego, California 92123

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-3

LOG OF TEST BORING

PROJECT NAME: HARBOR ISLAND WEST MARINA - LANDSIDE
PROJECT NUMBER: 2769A
BORING: **B-3**
SITE LOCATION: Harbor Island, San Diego
START: 12/4/2014
FINISH: 12/4/2014
SHEET NO.: 1 of 2
DRILLING COMPANY: Pacific Drilling
DRILLING METHOD: Hollow Stem Auger
LOGGED BY: G. Spaulding
CHECKED BY:
DRILLING EQUIPMENT: Marl M5
BORING DIA. (in): 6
TOTAL DEPTH (ft): 20
GROUND ELEV (ft): 15
DEPTH/*ELEV.* GROUND WATER (ft): ▼ 11.5 / *3.5*
SAMPLING METHOD: SPT
NOTES: Boring sealed with bentonite 5' to 20'

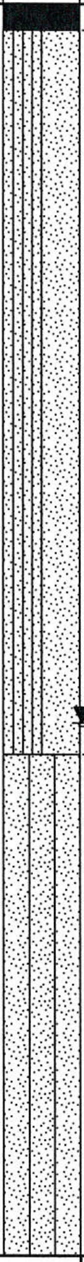
DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									**5" AC**
									FILL **Interbedded Silty SAND (SM) and Fine to Medium Fine SAND (SP)**, gray to gray-brown, damp, with shell fragments
5	10	S	1	13					
		S	2	11					
10	5								
		S	3	18					
								▼	
									HYDRAULIC FILL **Interbedded Silty SAND (SM)**, loose, gray-brown, saturated with shell fragments
		S	4	7					
15	0								
		S	5	5					

FIGURE A-4 a

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA - LANDSIDE
PROJECT NUMBER 2769A
BORING **B-3**
SITE LOCATION Harbor Island, San Diego
START 12/4/2014
FINISH 12/4/2014
SHEET NO. 2 of 2
DRILLING COMPANY Pacific Drilling
DRILLING METHOD Hollow Stem Auger
LOGGED BY G. Spaulding
CHECKED BY
DRILLING EQUIPMENT Marl M5
BORING DIA. (in) 6
TOTAL DEPTH (ft) 20
GROUND ELEV (ft) 15
DEPTH/*ELEV.* GROUND WATER (ft) ▼ 11.5 / *3.5*
SAMPLING METHOD SPT
NOTES Boring sealed with bentonite 5' to 20'

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									Boring terminated at depth of 20 feet. *Groundwater encountered at depth of 11.5 feet at time of excavation (varies with tides).*
25	-10								
30	-15								
35	-20								

TCG_METRIC_LOG(3) 2769A.GPJ GDCLOGMT.GDT 1/14/15

TerraCosta Consulting Group, Inc.
3890 Murphy Canyon Road, Suite 200
San Diego, California 92123

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FIGURE A-4 b

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
HARBOR ISLAND WEST MARINA - LANDSIDE	2769A	**B-4**

SITE LOCATION	START	FINISH	SHEET NO.
Harbor Island, San Diego	12/4/2014	12/4/2014	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Hollow Stem Auger	G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
Marl M5	6	36.5	16	▼ 12.0 / *4.0*

SAMPLING METHOD	NOTES
SPT	Boring sealed with bentonite 4' to 36.5'

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									5" AC
									FILL **Silty Fine SAND (SM)**, gray, damp
	15								
		S	1	11					
									Silty to Clayey SAND (SC), red-brown, damp, with trace gravel
5									
	10	S	2	6					
									HYDRAULIC FILL **Silty Fine SAND (SM)**, loose, gray, moist to wet, with trace of shell fragments
10									
	5	S	3	8					
								▼	
15									
	0	S	4	7					

TCG_METRIC_LOG(3) 2769A.GPJ GDCLOGMT.GDT 1/14/15

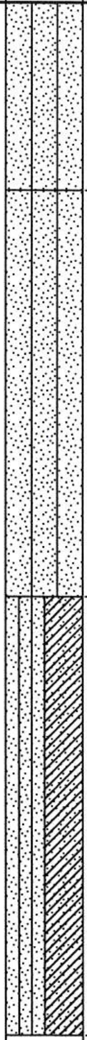
TerraCosta Consulting Group, Inc.
3890 Murphy Canyon Road, Suite 200
San Diego, California 92123

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-5 a

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA - LANDSIDE	**PROJECT NUMBER** 2769A	**BORING** **B-4**		
SITE LOCATION Harbor Island, San Diego	**START** 12/4/2014	**FINISH** 12/4/2014	**SHEET NO.** 2 of 2	
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Hollow Stem Auger	**LOGGED BY** G. Spaulding	**CHECKED BY**	
DRILLING EQUIPMENT Marl M5	**BORING DIA. (in)** 6	**TOTAL DEPTH (ft)** 36.5	**GROUND ELEV (ft)** 16	**DEPTH/*ELEV.* GROUND WATER (ft)** ▼ 12.0 / *4.0*
SAMPLING METHOD SPT	**NOTES** Boring sealed with bentonite 4' to 36.5'			



DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	DESCRIPTION AND CLASSIFICATION
	-5	S	5	4				
								RECENT BAY DEPOSITS **Silty Fine SAND (SM)**, loose, dark gray, saturated
25								
	-10	S	6	3			SA	
								BAY POINT FORMATION **Silty to Clayey SAND (SM/SC)**, medium dense, mottled red-brown, moist
30								
	-15	S	7	21		21.8	GS PI	
35								
	-20	S	8	40			SA	
								Boring terminated at depth of 36.5 feet. *Groundwater encountered at depth of 12.0 feet at time of excavation (varies with tides).*

TCG_METRIC_LOG(3) 2769A.GPJ GDCLOGMT.GDT 1/14/15

TerraCosta Consulting Group, Inc.
3890 Murphy Canyon Road, Suite 200
San Diego, California 92123

THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-5 b

APPENDIX B

LABORATORY TEST RESULTS

amec

9177 Sky Park Ct. San Diego, CA. 92123

PHYSICAL PROPERTIES OF SOILS

PROJECT: #2769A Harbor Island	LAB NO.: 28891-28905 (page 1 of 1)	PROJECT NO.: 5014-09-0006.48
West Marina	SAMPLED BY: G. Spaulding	DATE: 12/04/14
	SUBMITTED BY: G. Spaulding	DATE: 12/05/14
	AUTHORIZED BY: M. Eckert	DATE: 12/05/14
	REVIEWED BY: L. Collins	REPORT DATE: 12/17/14

Sample I.D.	Depth (ft.)	Liquid Limit/ Plastic Limit/PI ASTM D 4318	R- Value CTM301	Percent Passing #200 Sieve ASTM D 1140	Dry Density (pcf)	Moisture Content (%), as received ASTM D 2216
B1-4 (#28891)	12.5'	*	*	5.8	*	*
B1-5 (#28892)	15'	*	*	5.8	*	*
B1-6 (#28893)	17.5'	*	*	2.0	*	*
B1-7 (#28894)	20'	*	*	4.1	*	*
B1-8 (#28895)	22.5'	*	*	3.7	*	*
B1-9 (#28896)	25'	*	*	4.7	*	*
B1-11 (#28897)	30'	*	*	6.1	*	*
B1-12 (#28898)	32.5'	*	*	5.1	*	*
B1-13 (#28899)	35'	NV/NP	*	19.4	*	27.8
B1-14 (#28900)	37.5'	NV/NP	*	10.4	*	21.7
B1-16 (#28901)	42.5'	*	*	15.8	*	*
B1-17 (#28902)	45'	30.8/18.2/12.6	*	35.0	*	14.9
B4-6 (#28903)	25'	*	*	18.3	*	*
B4-7 (#28904)	30'	NV/NP	*	11.5	*	21.8
B4-8 (#28905)	35'	*	*	13.1	*	*

*Indicates test not requested

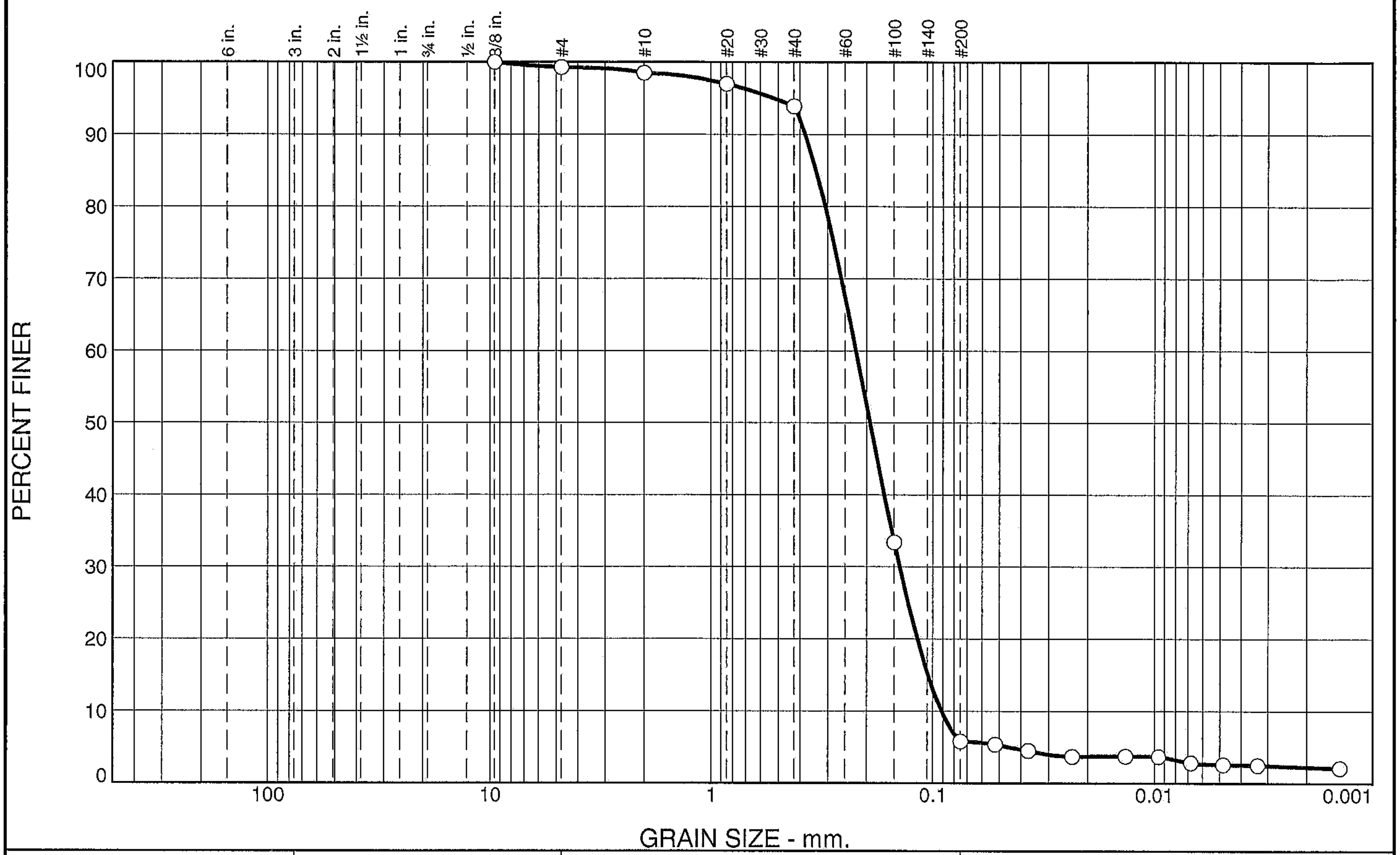
TerraCosta Consulting Inc./ G. Spaulding

AMEC E&I, Inc.

Reviewed By:________________________

Rick Larson, CE#39226
Senior Principal Engineer

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.7	0.8	4.6	88.1	3.5	2.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	99.3		
#10	98.5		
#20	97.0		
#40	93.9		
#100	33.4		
#200	5.8		

* (no specification provided)

Material Description

Poorly Graded Sand w/ Silt, SP-SM (#28891)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3784 D_{85}= 0.3380 D_{60}= 0.2235
D_{50}= 0.1930 D_{30}= 0.1418 D_{15}= 0.1055
D_{10}= 0.0917 C_u= 2.44 C_c= 0.98

Classification

USCS= SP-SM AASHTO=

Remarks

Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay

Sample Number: B1-4 **Depth:** 12.5'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28891

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/17/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 12.5' **Sample Number:** B1-4
Material Description: Poorly Graded Sand w/ Silt, SP-SM (#28891)
Date: 12/12/14
USCS Classification: SP-SM
Testing Remarks: Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.375"	100.0
#4	99.3
#10	98.5
#20	97.0
#40	93.9
#100	33.4
#200	5.8

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 98.5
Weight of hydrometer sample =56.63
Hygroscopic moisture correction:
  Moist weight and tare = 36.63
  Dry weight and tare = 36.63
  Tare weight = 26.03
  Hygroscopic moisture = 0.0%
Table of composite correction values:

Temp., deg. C:	18.6	20.2	21.7	22.3	23.2
Comp. corr.:	-6.0	-5.5	-5.0	-5.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
  Hydrometer effective depth equation: L = 16.294964 - .164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.5	8.5	3.1	0.0136	8.5	14.9	0.0523	5.4
2.00	20.5	8.0	2.6	0.0136	8.0	15.0	0.0371	4.5
5.00	20.6	7.5	2.1	0.0135	7.5	15.1	0.0235	3.7
15.00	20.7	7.5	2.2	0.0135	7.5	15.1	0.0136	3.8
30.00	20.6	7.5	2.1	0.0135	7.5	15.1	0.0096	3.7
60.00	20.6	7.0	1.6	0.0135	7.0	15.1	0.0068	2.8
120.00	20.2	7.0	1.5	0.0136	7.0	15.1	0.0048	2.6
250.00	20.0	7.0	1.4	0.0136	7.0	15.1	0.0034	2.5
1440.00	19.3	7.0	1.2	0.0138	7.0	15.1	0.0014	2.1

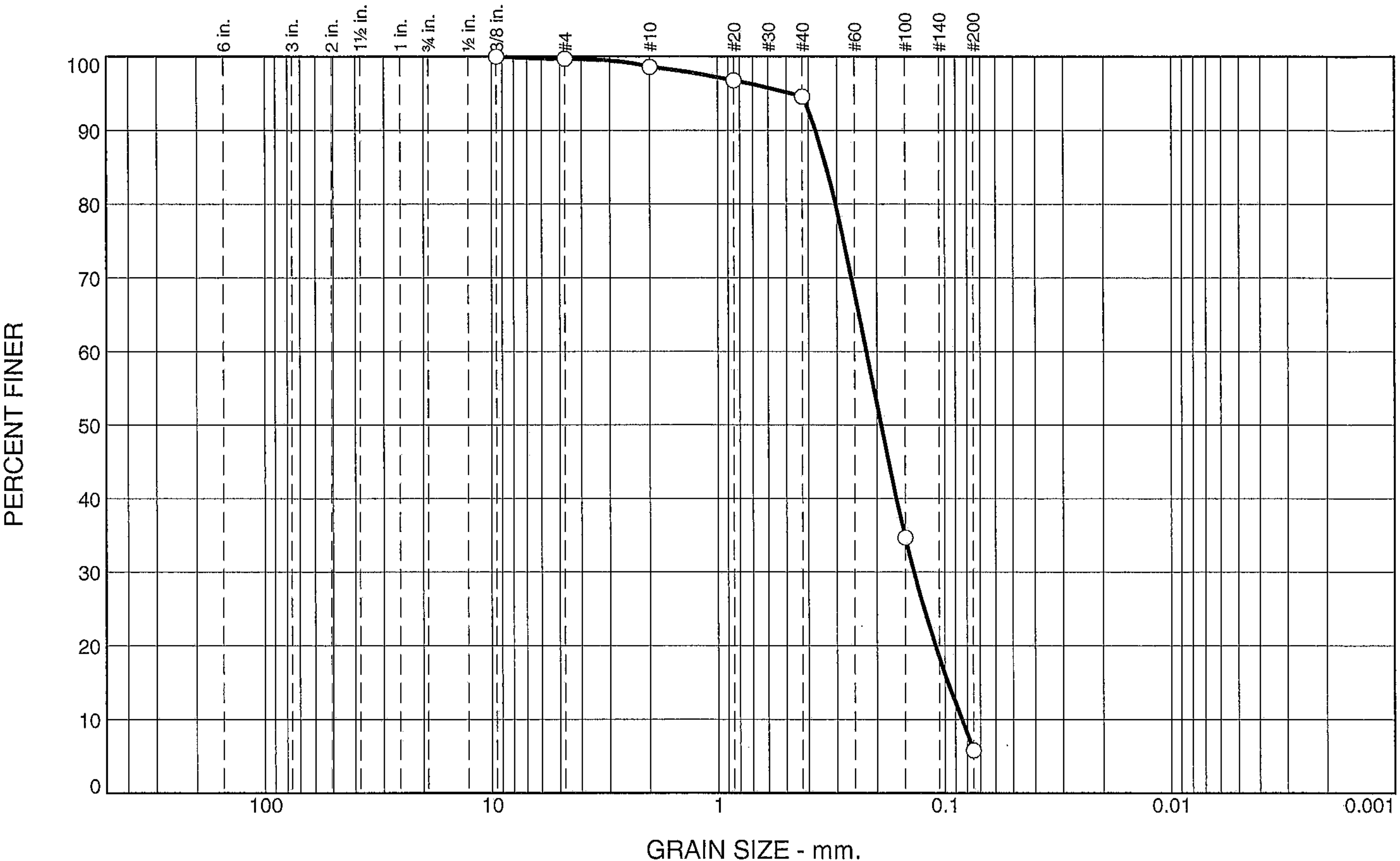
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.7	0.7	0.8	4.6	88.1	93.5	3.5	2.3	5.8

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0917	0.1055	0.1179	0.1418	0.1930	0.2235	0.3072	0.3380	0.3784	0.5225

Fineness Modulus	C_u	C_c
0.96	2.44	0.98

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.3	1.1	4.0	88.8	5.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	99.7		
#10	98.6		
#20	96.8		
#40	94.6		
#100	34.7		
#200	5.8		

* (no specification provided)

Material Description

Poorly Graded Sand w/ Silt, SP-SM (#28892)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3723 D_{85}= 0.3342 D_{60}= 0.2226
D_{50}= 0.1918 D_{30}= 0.1374 D_{15}= 0.0972
D_{10}= 0.0847 C_u= 2.63 C_c= 1.00

Classification

USCS= AASHTO=

Remarks

Sample Number: B1-5 **Depth:** 15'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28892

Tested By: Valles/Sancha **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 15' **Sample Number:** B1-5
Material Description: Poorly Graded Sand w/ Silt, SP-SM (#28892)
Date: 12/12/14
Tested by: Valles/Sancha **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.375"	100.0
#4	99.7
#10	98.6
#20	96.8
#40	94.6
#100	34.7
#200	5.8

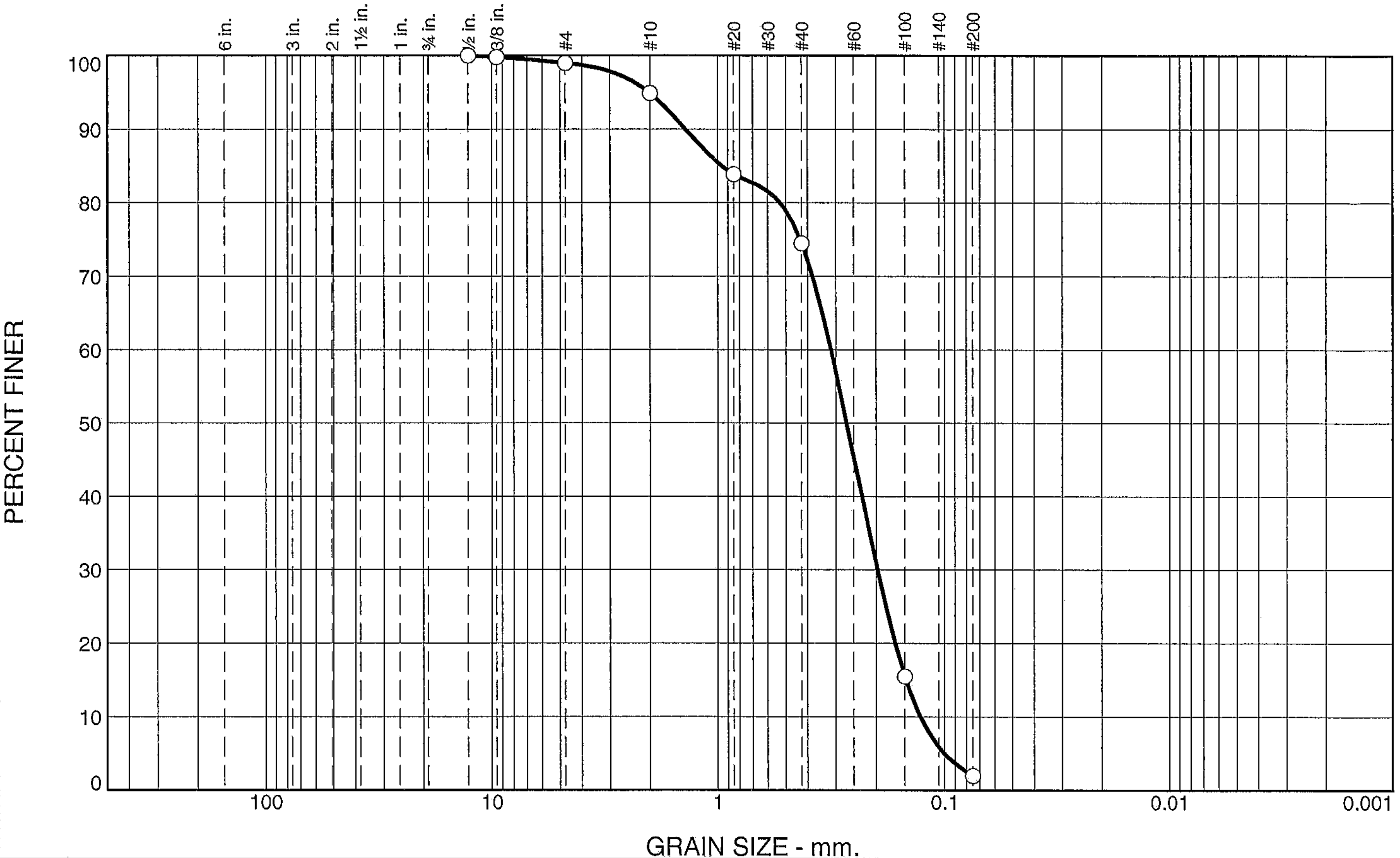
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.3	0.3	1.1	4.0	88.8	93.9			5.8

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0847	0.0972	0.1104	0.1374	0.1918	0.2226	0.3047	0.3342	0.3723	0.4753

Fineness Modulus	C_u	C_c
0.94	2.63	1.00

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.0	4.1	20.4	72.5	2.0	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	99.8		
#4	99.0		
#10	94.9		
#20	83.9		
#40	74.5		
#100	15.5		
#200	2.0		

* (no specification provided)

Material Description

Poorly Graded Sand, SP (#28893)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.3915 D_{85}= 0.9579 D_{60}= 0.3158
D_{50}= 0.2691 D_{30}= 0.1974 D_{15}= 0.1482
D_{10}= 0.1281 C_u= 2.47 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B1-6 **Depth:** 17.5'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28893

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 17.5' **Sample Number:** B1-6
Material Description: Poorly Graded Sand, SP (#28893)
Date: 12/12/14
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.5"	100.0
0.375"	99.8
#4	99.0
#10	94.9
#20	83.9
#40	74.5
#100	15.5
#200	2.0

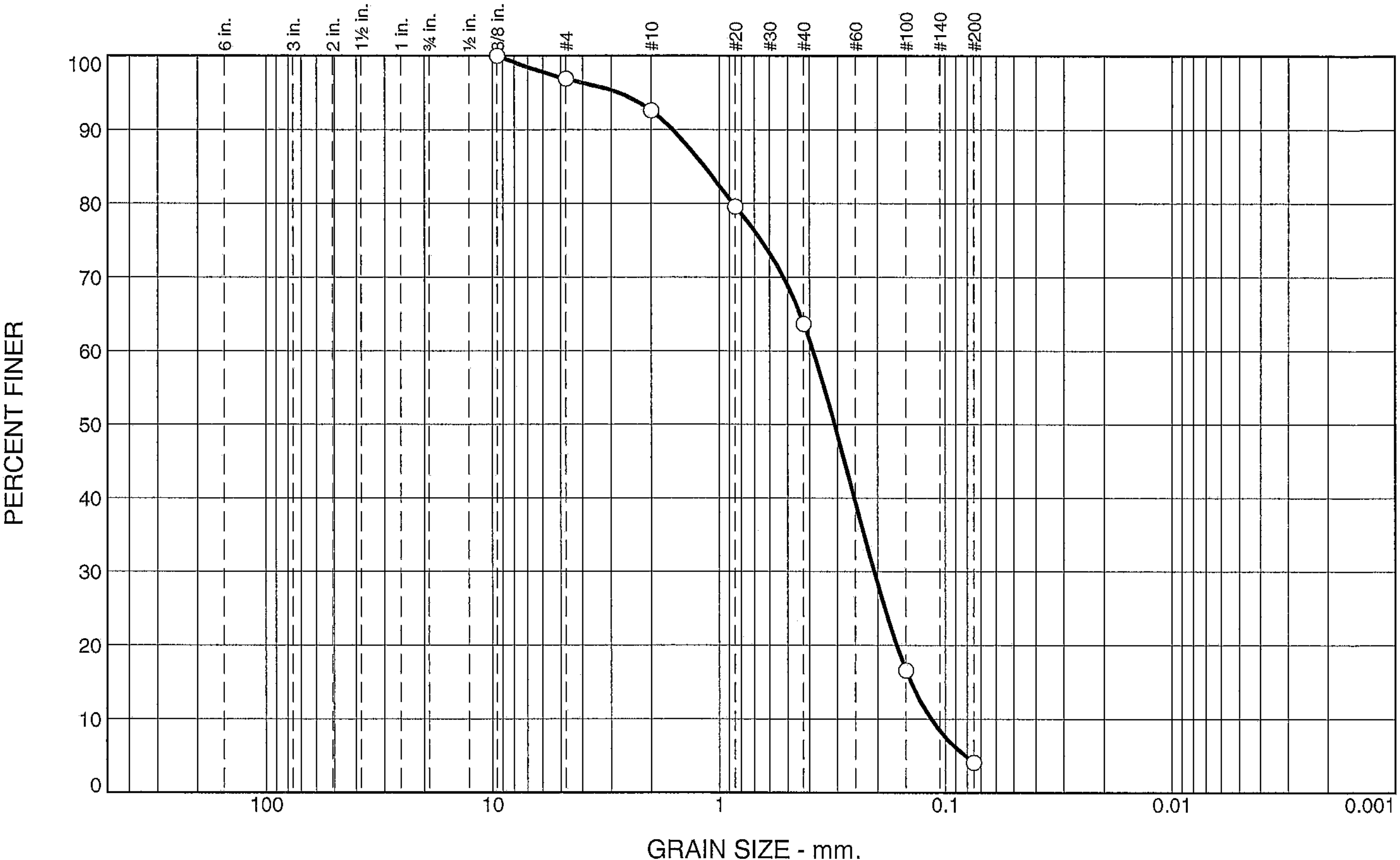
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.0	1.0	4.1	20.4	72.5	97.0			2.0

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1281	0.1482	0.1653	0.1974	0.2691	0.3158	0.5290	0.9579	1.3915	2.0185

Fineness Modulus	C_u	C_c
1.63	2.47	0.96

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.1	4.3	28.9	59.6	4.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	96.9		
#10	92.6		
#20	79.6		
#40	63.7		
#100	16.6		
#200	4.1		

* (no specification provided)

Material Description

Poorly Graded Sand, SP (#28894)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.6099 D_{85}= 1.1654 D_{60}= 0.3863
D_{50}= 0.3099 D_{30}= 0.2074 D_{15}= 0.1425
D_{10}= 0.1160 C_u= 3.33 C_c= 0.96

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B1-7 **Depth:** 20'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28894

Tested By: Valles/Sancha **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 20' **Sample Number:** B1-7
Material Description: Poorly Graded Sand, SP (#28894)
Date: 12/12/14
USCS Classification: SP
Tested by: Valles/Sancha **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.375"	100.0
#4	96.9
#10	92.6
#20	79.6
#40	63.7
#100	16.6
#200	4.1

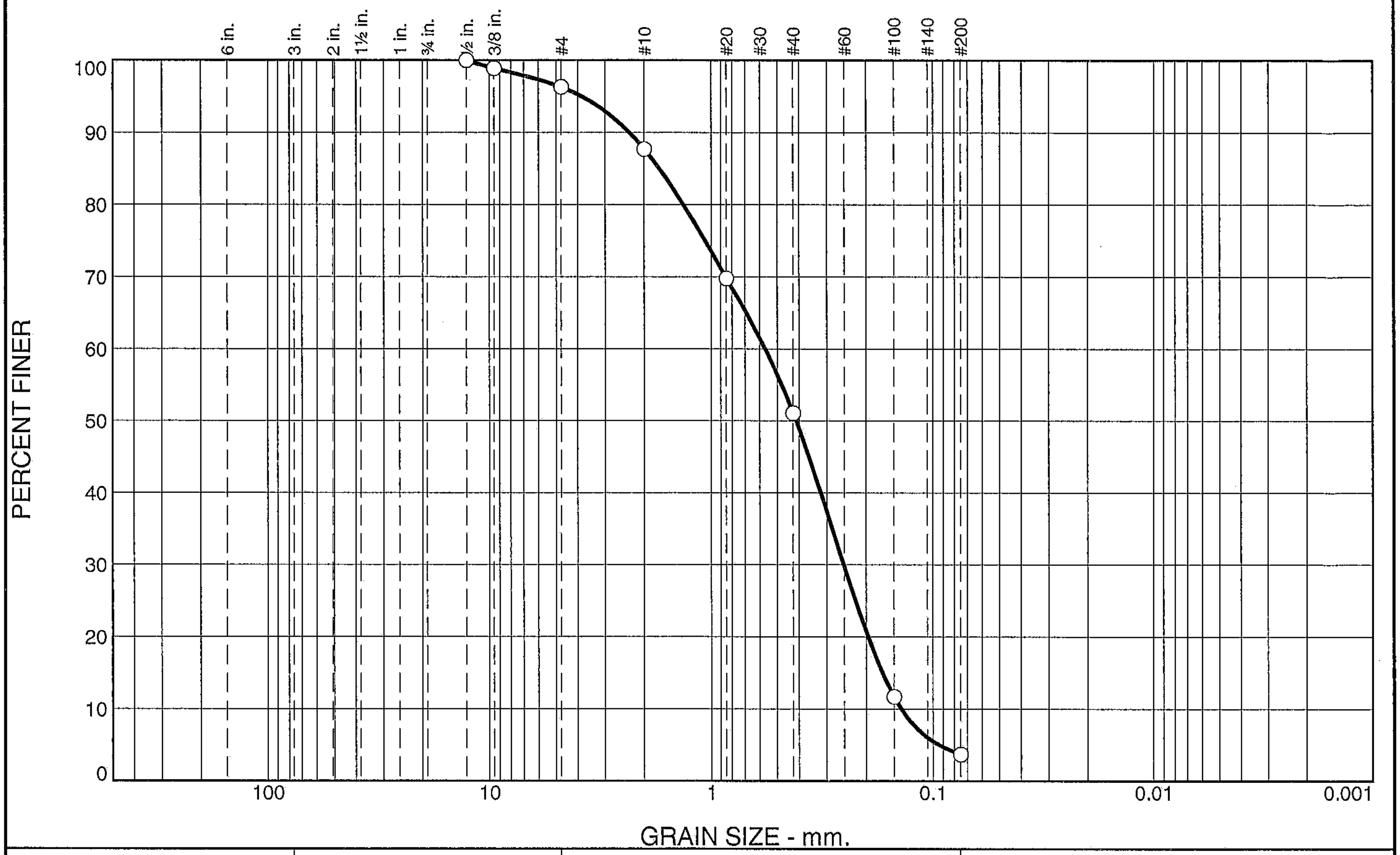
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	3.1	3.1	4.3	28.9	59.6	92.8			4.1

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1160	0.1425	0.1649	0.2074	0.3099	0.3863	0.8702	1.1654	1.6099	2.7805

Fineness Modulus	C_u	C_c
1.86	3.33	0.96

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	3.7	8.6	36.6	47.4	3.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	98.9		
#4	96.3		
#10	87.7		
#20	69.8		
#40	51.1		
#100	11.7		
#200	3.7		

* (no specification provided)

Material Description

Poorly Graded Sand, SP (#28895)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.3367 D_{85}= 1.7120 D_{60}= 0.5680
D_{50}= 0.4121 D_{30}= 0.2524 D_{15}= 0.1690
D_{10}= 0.1391 C_u= 4.08 C_c= 0.81

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B1-8 **Depth:** 22.5'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28895

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 22.5' **Sample Number:** B1-8
Material Description: Poorly Graded Sand, SP (#28895)
Date: 12/12/14
USCS Classification: SP
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.5"	100.0
0.375"	98.9
#4	96.3
#10	87.7
#20	69.8
#40	51.1
#100	11.7
#200	3.7

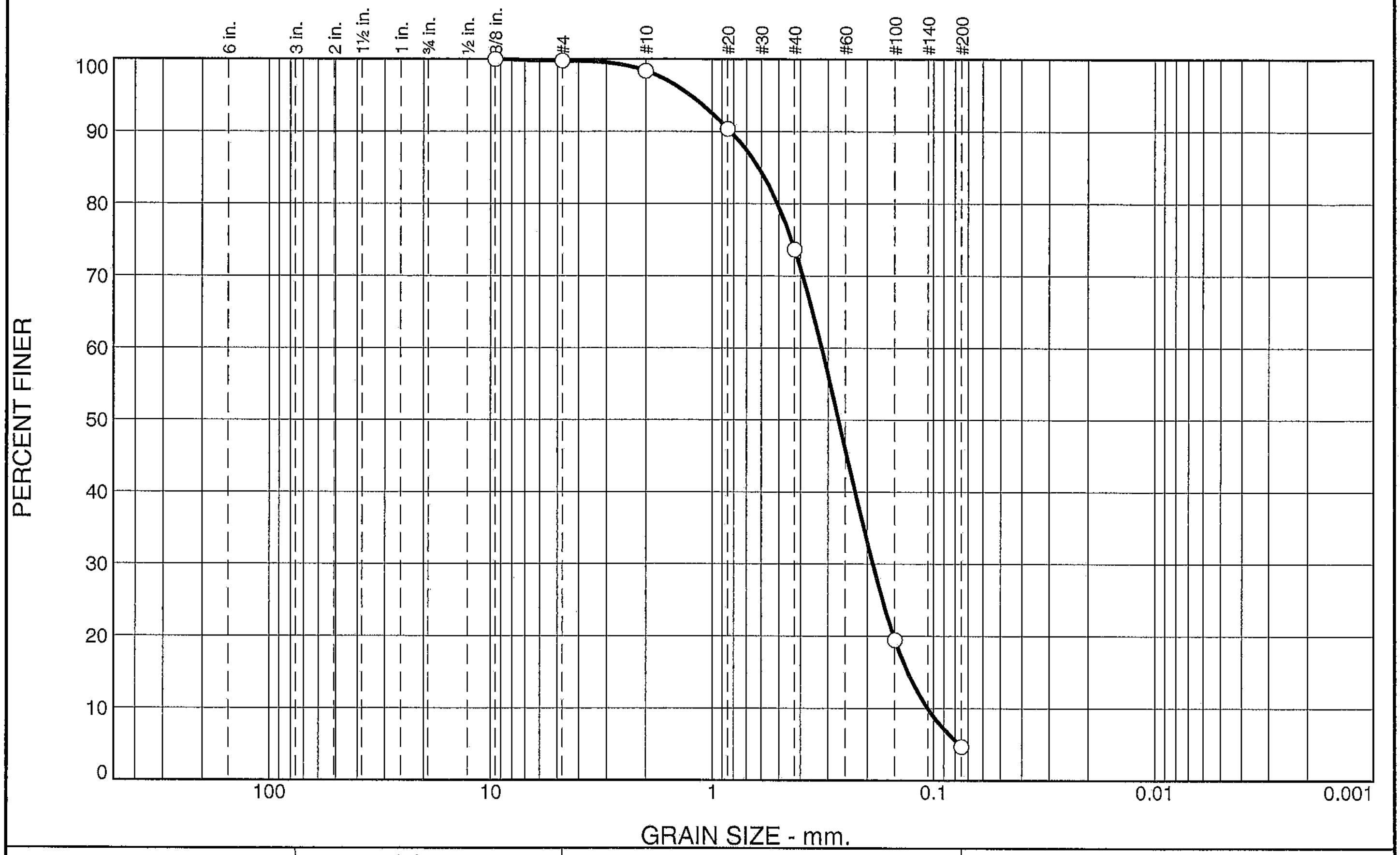
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	3.7	3.7	8.6	36.6	47.4	92.6			3.7

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1391	0.1690	0.1960	0.2524	0.4121	0.5680	1.3347	1.7120	2.3367	3.8382

Fineness Modulus	C_u	C_c
2.27	4.08	0.81

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.2	1.4	24.7	69.0	4.7	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	99.8		
#10	98.4		
#20	90.4		
#40	73.7		
#100	19.5		
#200	4.7		

* (no specification provided)

Material Description

Poorly Graded Sand, SP (#28896)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8260 D_{85}= 0.6175 D_{60}= 0.3211
D_{50}= 0.2693 D_{30}= 0.1888 D_{15}= 0.1313
D_{10}= 0.1067 C_u= 3.01 C_c= 1.04

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B1-9 **Depth:** 25.0'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28896

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 25.0'
Sample Number: B1-9
Material Description: Poorly Graded Sand, SP (#28896)
Date: 12/12/14
USCS Classification: SP
Tested by: R. Valles
Checked by: L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.375"	100.0
#4	99.8
#10	98.4
#20	90.4
#40	73.7
#100	19.5
#200	4.7

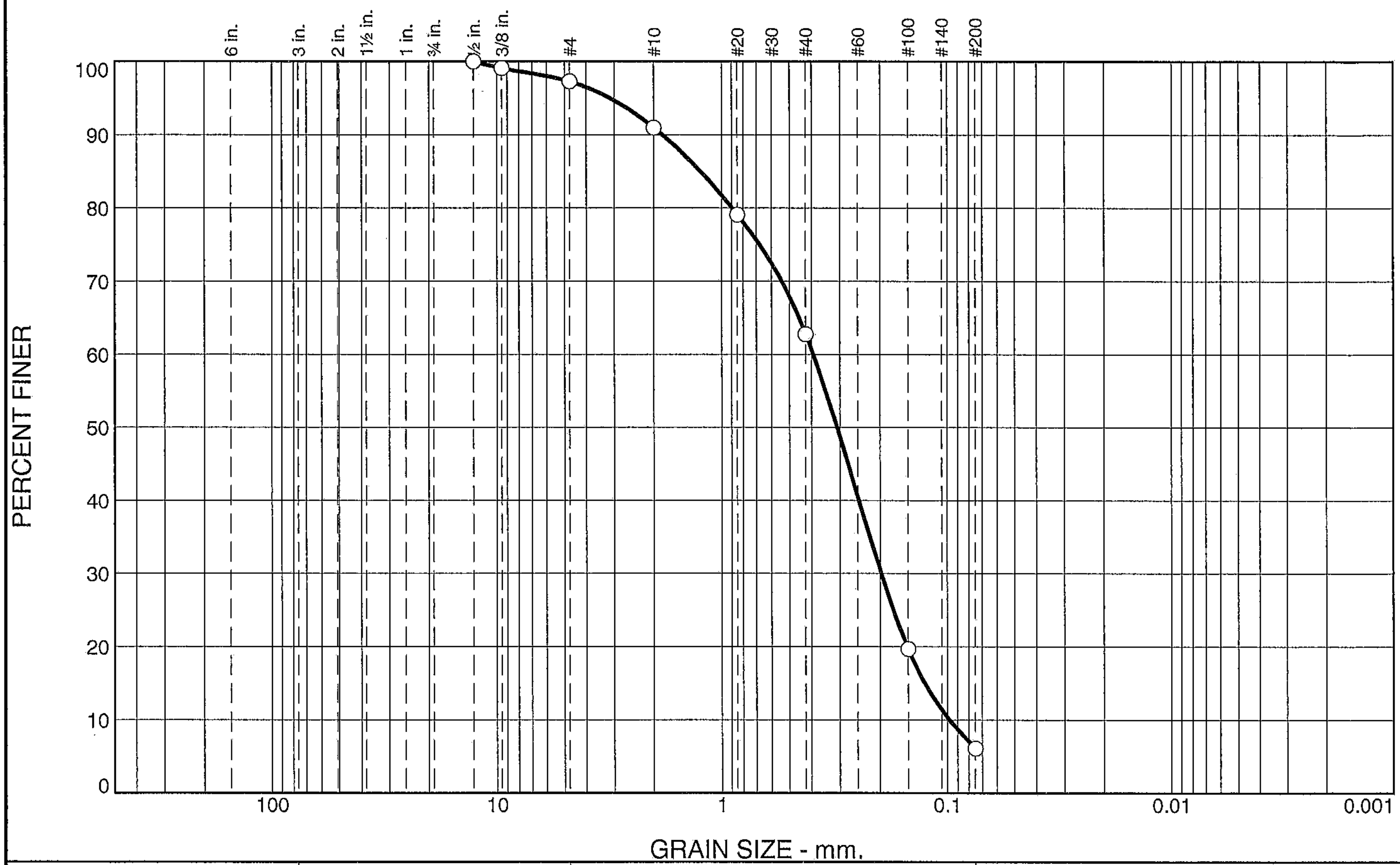
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.2	0.2	1.4	24.7	69.0	95.1			4.7

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1067	0.1313	0.1519	0.1888	0.2693	0.3211	0.5077	0.6175	0.8260	1.2541

Fineness Modulus	C_u	C_c
1.47	3.01	1.04

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.7	6.3	28.2	56.7	6.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	99.1		
#4	97.3		
#10	91.0		
#20	79.1		
#40	62.8		
#100	19.7		
#200	6.1		

* (no specification provided)

Material Description

Poorly Graded Sand w/ Silt, SP-SM (#28897)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 1.8274 D_{85}= 1.2403 D_{60}= 0.3934

D_{50}= 0.3092 D_{30}= 0.1977 D_{15}= 0.1264

D_{10}= 0.0980 C_u= 4.02 C_c= 1.01

Classification

USCS= SP-SM AASHTO=

Remarks

Sample Number: B1-11 **Depth:** 30.0'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.

Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28897

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 30.0' **Sample Number:** B1-11
Material Description: Poorly Graded Sand w/ Silt, SP-SM (#28897)
Date: 12/12/14
USCS Classification: SP-SM
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.5"	100.0
0.375"	99.1
#4	97.3
#10	91.0
#20	79.1
#40	62.8
#100	19.7
#200	6.1

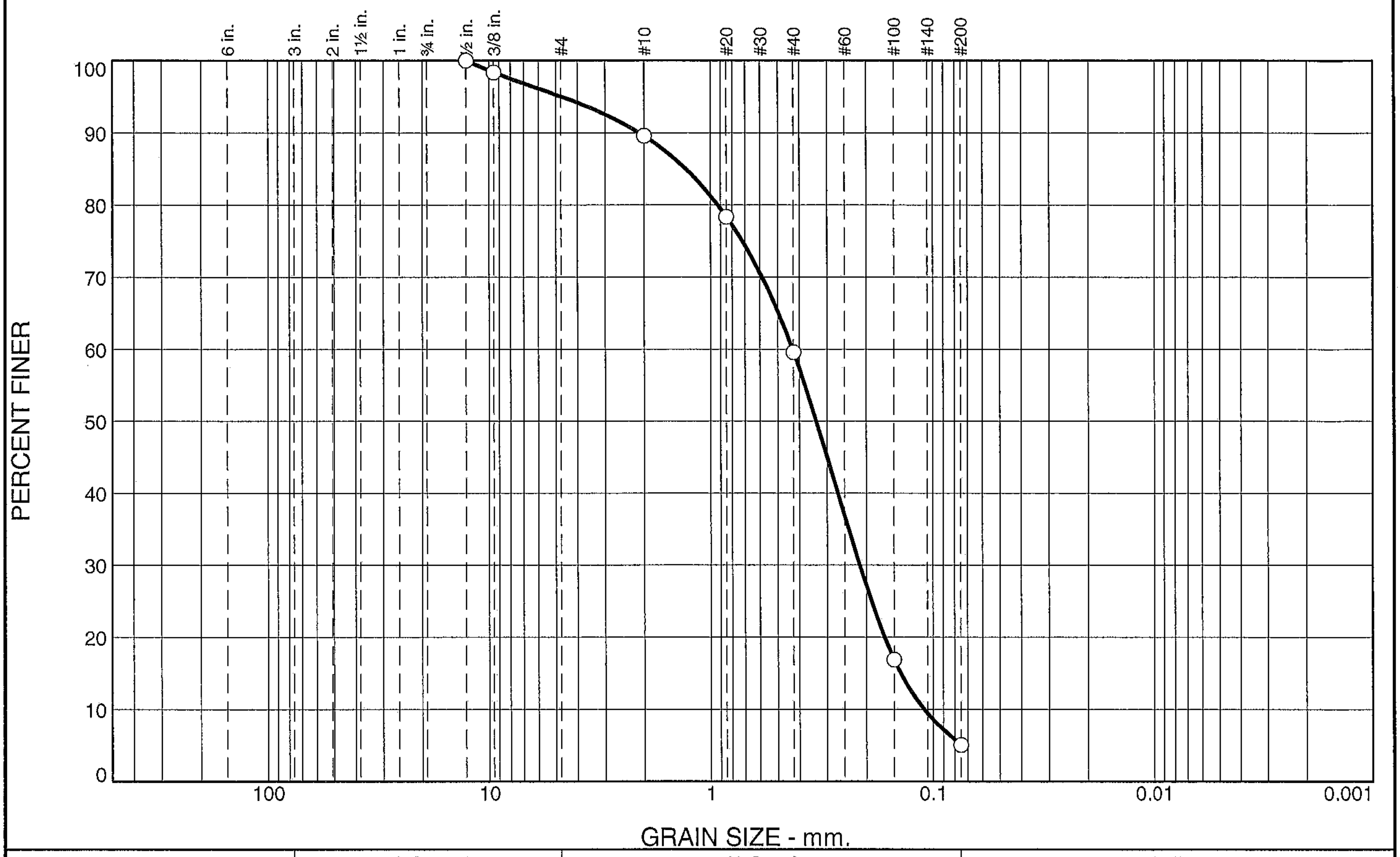
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.7	2.7	6.3	28.2	56.7	91.2			6.1

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0980	0.1264	0.1514	0.1977	0.3092	0.3934	0.8971	1.2403	1.8274	3.1300

Fineness Modulus	C_u	C_c
1.86	4.02	1.01

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	4.9	5.5	30.0	54.5	5.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	98.4		
#10	89.6		
#20	78.4		
#40	59.6		
#100	16.9		
#200	5.1		

* (no specification provided)

Material Description

Poorly Graded Sand w/ Silt, SP-SM (#28898)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 2.0970 D_{85}= 1.2927 D_{60}= 0.4296
D_{50}= 0.3362 D_{30}= 0.2144 D_{15}= 0.1399
D_{10}= 0.1099 C_u= 3.91 C_c= 0.97

Classification

USCS= SP-SM AASHTO=

Remarks

Sample Number: B1-12 **Depth:** 32.5'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28898

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.

Project: #2769A Harbor Island West Marina

Project Number: 5014-09-0006.

Depth: 32.5' **Sample Number:** B1-12

Material Description: Poorly Graded Sand w/ Silt, SP-SM (#28898)

Date: 12/12/14

USCS Classification: SP-SM

Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.5"	100.0
0.375"	98.4
#10	89.6
#20	78.4
#40	59.6
#100	16.9
#200	5.1

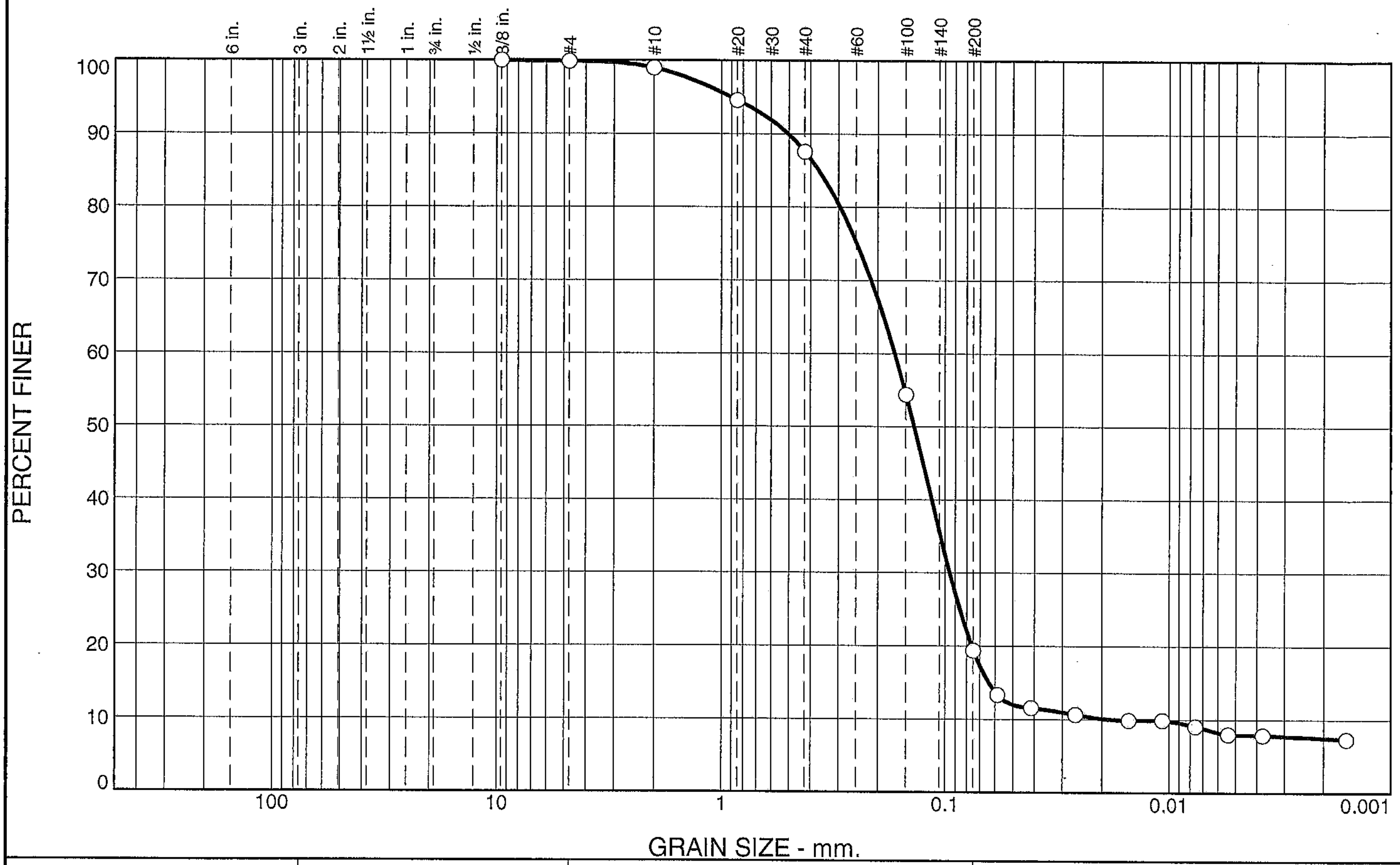
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	4.9	4.9	5.5	30.0	54.5	90.0			5.1

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.1099	0.1399	0.1655	0.2144	0.3362	0.4296	0.9279	1.2927	2.0970	4.6878

Fineness Modulus	C_u	C_c
1.99	3.91	0.97

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.9	11.4	68.2	14.8	4.6

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375	100.0		
#4	99.9		
#10	99.0		
#20	94.6		
#40	87.6		
#100	54.4		
#200	19.4		

* (no specification provided)

Material Description

Silty Sand, SM (#28899)

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.5017 D_{85}= 0.3692 D_{60}= 0.1692
D_{50}= 0.1373 D_{30}= 0.0939 D_{15}= 0.0670
D_{10}= 0.0462 C_u= 3.67 C_c= 1.13

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay

Sample Number: B1-13 **Depth:** 35.0'

Date: 12/12/14

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28899

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/17/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 35.0' **Sample Number:** B1-13
Material Description: Silty Sand, SM (#28899)
Date: 12/12/14 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: SM **AASHTO Classification:** A-2-4(0)
Testing Remarks: Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.375	100.0
#4	99.9
#10	99.0
#20	94.6
#40	87.6
#100	54.4
#200	19.4

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 99.0
Weight of hydrometer sample =57.38
Hygroscopic moisture correction:
Moist weight and tare = 37.23
Dry weight and tare = 37.16
Tare weight = 27.04
Hygroscopic moisture = 0.7%
Table of composite correction values:

Temp., deg. C:	18.6	20.2	21.7	22.3	23.2
Comp. corr.:	-5.0	-5.5	-5.0	-5.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 20.4 - .13 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.7	13.0	7.7	0.0135	13.0	18.7	0.0585	13.3
2.00	20.7	12.0	6.7	0.0135	12.0	18.8	0.0415	11.6
5.00	20.6	11.5	6.1	0.0135	11.5	18.9	0.0263	10.7
15.00	20.8	11.0	5.7	0.0135	11.0	19.0	0.0152	9.9
30.00	20.8	11.0	5.7	0.0135	11.0	19.0	0.0107	9.9
60.00	20.9	10.5	5.2	0.0135	10.5	19.0	0.0076	9.1
120.00	20.5	10.0	4.6	0.0136	10.0	19.1	0.0054	8.0
250.00	20.1	10.0	4.5	0.0136	10.0	19.1	0.0038	7.9
1440.00	19.5	9.5	4.2	0.0137	9.5	19.2	0.0016	7.3

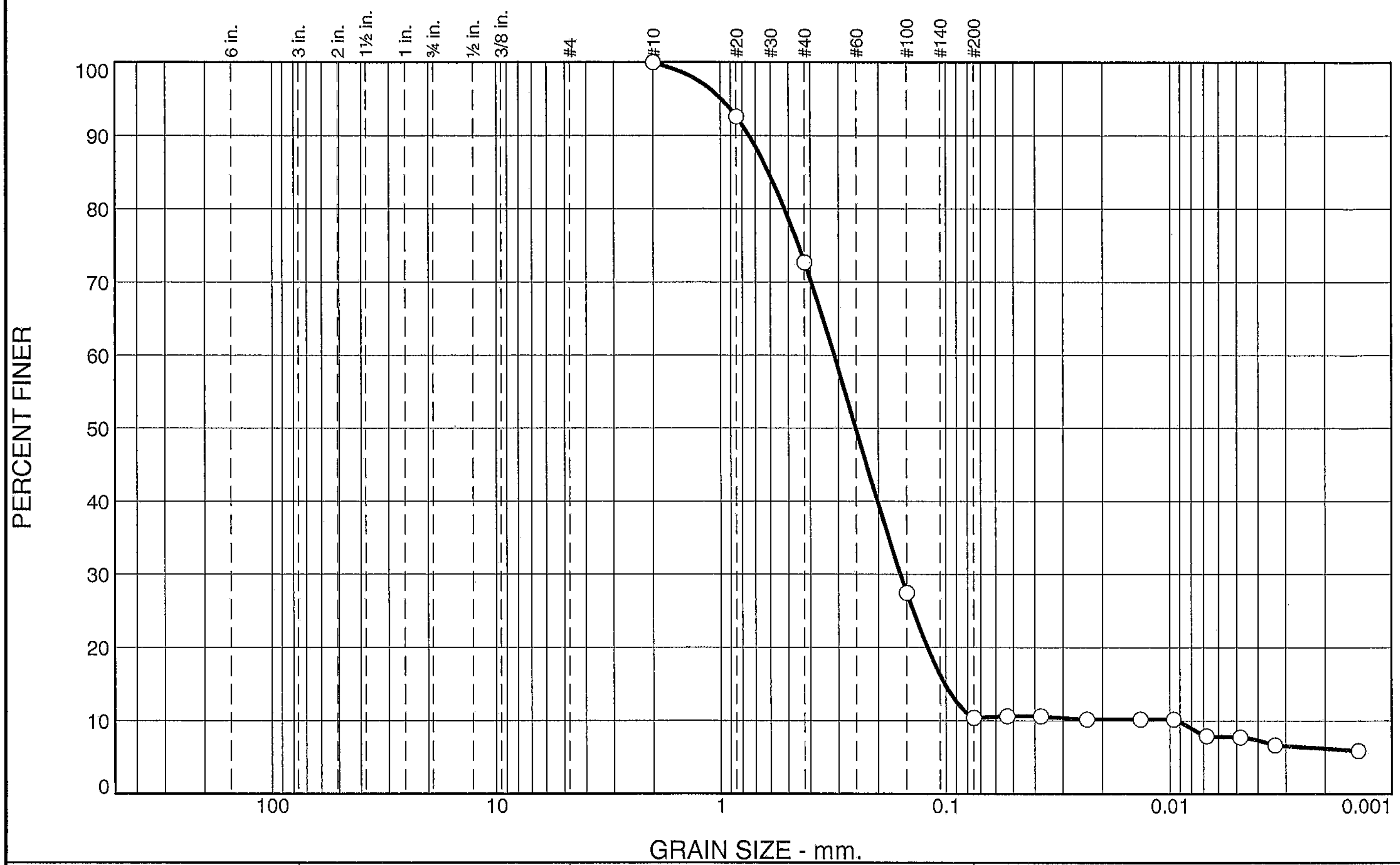
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.1	0.1	0.9	11.4	68.2	80.5	14.8	4.6	19.4

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0462	0.0670	0.0761	0.0939	0.1373	0.1692	0.2983	0.3692	0.5017	0.9037

Fineness Modulus	C_u	C_c
0.78	3.67	1.13

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	27.3	62.3	4.2	6.2

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#10	100.0		
#20	92.6		
#40	72.7		
#100	27.5		
#200	10.4		

* (no specification provided)

Material Description

Poorly Graded Silty Sand, SP-SM (#28900)

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 0.7469 D_{85}= 0.6128 D_{60}= 0.3141
D_{50}= 0.2519 D_{30}= 0.1598 D_{15}= 0.1014
D_{10}= 0.0093 C_u= 33.94 C_c= 8.78

Classification

USCS= SP-SM AASHTO= A-3

Remarks

Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay

Sample Number: B1-14 **Depth:** 37.5'

Date: 12/15/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28900

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/17/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 37.5' **Sample Number:** B1-14
Material Description: Poorly Graded Silty Sand, SP-SM (#28900)
Date: 12/15/14 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: SP-SM **AASHTO Classification:** A-3
Testing Remarks: Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
#10	100.0
#20	92.6
#40	72.7
#100	27.5
#200	10.4

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 100.0
Weight of hydrometer sample =20.65
Hygroscopic moisture correction:
Moist weight and tare = 35.06
Dry weight and tare = 35.05
Tare weight = 29.37
Hygroscopic moisture = 0.2%
Table of composite correction values:

Temp., deg. C:	18.6	20.2	21.7	22.3	23.2
Comp. corr.:	-6.0	-5.5	-5.0	-5.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 16.294964 - .164 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	19.2	8.0	2.2	0.0138	8.0	15.0	0.0533	10.6
2.00	19.2	8.0	2.2	0.0138	8.0	15.0	0.0377	10.6
5.00	20.5	7.5	2.1	0.0136	7.5	15.1	0.0235	10.2
15.00	20.5	7.5	2.1	0.0136	7.5	15.1	0.0136	10.2
30.00	20.5	7.5	2.1	0.0136	7.5	15.1	0.0096	10.2
60.00	20.6	7.0	1.6	0.0135	7.0	15.1	0.0068	7.9
120.00	20.5	7.0	1.6	0.0136	7.0	15.1	0.0048	7.8
250.00	19.8	7.0	1.4	0.0137	7.0	15.1	0.0034	6.7
1440.00	19.3	7.0	1.2	0.0138	7.0	15.1	0.0014	5.9

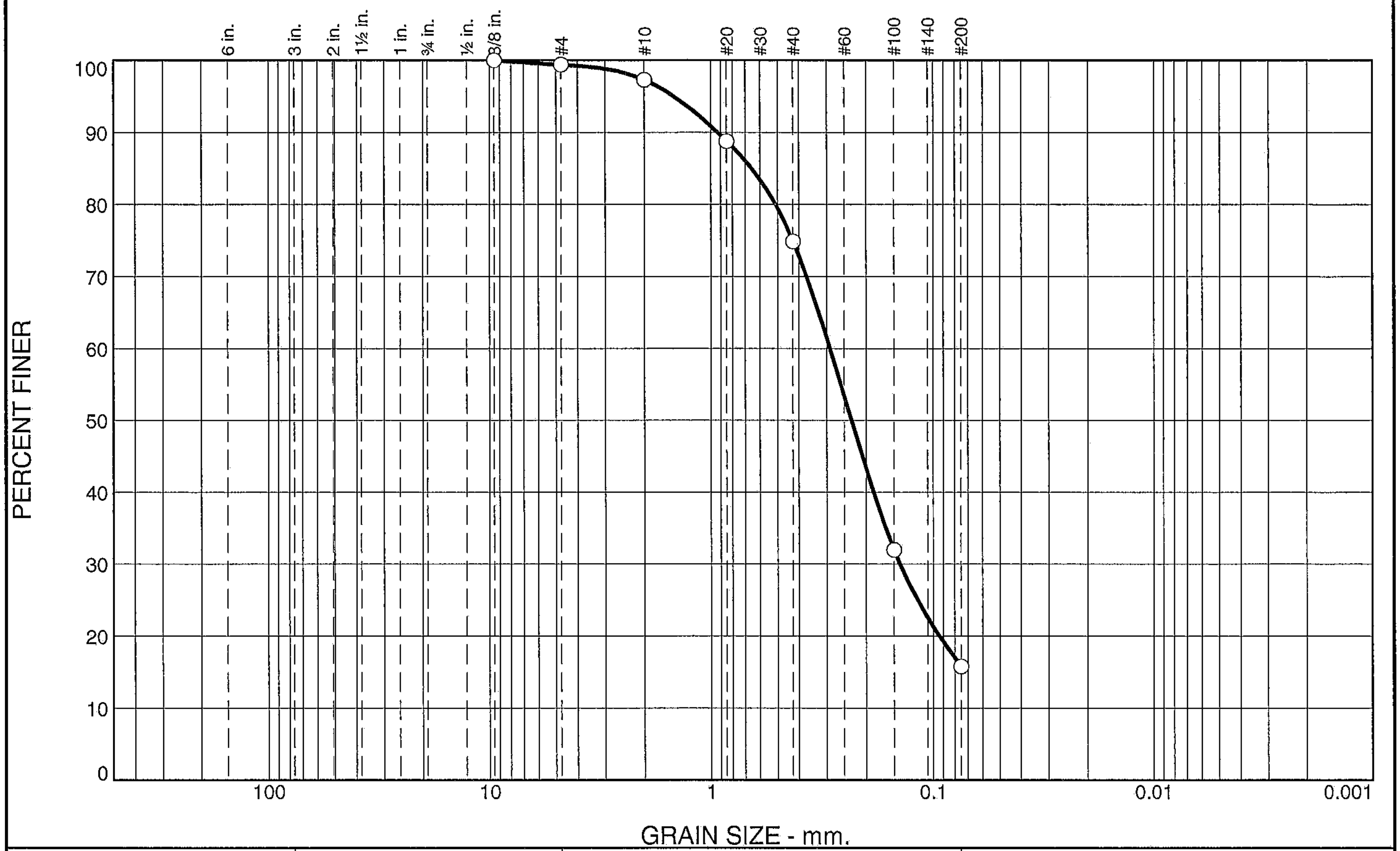
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	27.3	62.3	89.6	4.2	6.2	10.4

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0093	0.1014	0.1214	0.1598	0.2519	0.3141	0.5207	0.6128	0.7469	0.9909

Fineness Modulus	C_u	C_c
1.33	33.94	8.78

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.6	2.1	22.4	59.1	15.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	99.4		
#10	97.3		
#20	88.8		
#40	74.9		
#100	32.0		
#200	15.8		

* (no specification provided)

Material Description

Silty Sand, SM (#28901)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.9330 D_{85}= 0.6547 D_{60}= 0.2906
D_{50}= 0.2327 D_{30}= 0.1411 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: B1-16 **Depth:** 42.5'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project No: 5014-09-0006. **Figure** #28901

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 42.5' **Sample Number:** B1-16
Material Description: Silty Sand, SM (#28901)
Date: 12/12/14
USCS Classification: SM
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.375"	100.0
#4	99.4
#10	97.3
#20	88.8
#40	74.9
#100	32.0
#200	15.8

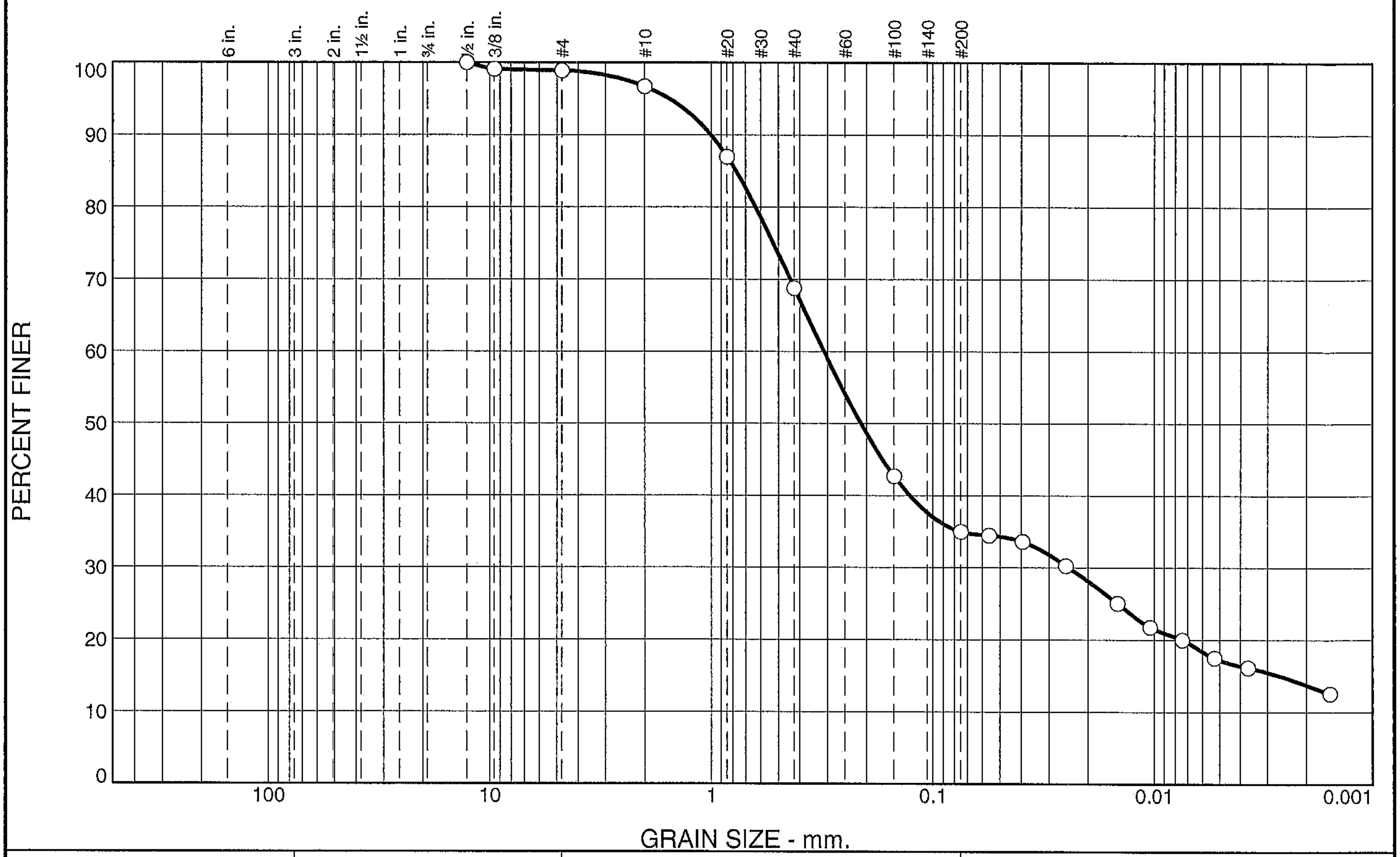
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.6	0.6	2.1	22.4	59.1	83.6			15.8

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0939	0.1411	0.2327	0.2906	0.5103	0.6547	0.9330	1.4715

Fineness Modulus
1.33

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	1.1	2.2	27.9	33.8	21.3	13.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	99.1		
#4	98.9		
#10	96.7		
#20	87.0		
#40	68.8		
#100	42.7		
#200	35.0		

* (no specification provided)

Material Description

Silty Sand, SC (#28902)

Atterberg Limits

PL= 18.2 LL= 30.8 PI= 12.6

Coefficients

D_{90}= 1.0041 D_{85}= 0.7741 D_{60}= 0.3120
D_{50}= 0.2120 D_{30}= 0.0245 D_{15}= 0.0026
D_{10}= C_u= C_c=

Classification

USCS= SC AASHTO= A-2-6(1)

Remarks

Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay

Sample Number: B1-17 **Depth:** 45.0'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28902

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/17/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 45.0'
Sample Number: B1-17
Material Description: Silty Sand, SC (#28902)
Date: 12/12/14
PL: 18.2
LL: 30.8
PI: 12.6
USCS Classification: SC
AASHTO Classification: A-2-6(1)
Testing Remarks: Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay
Tested by: R. Valles
Checked by: L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.5"	100.0
0.375"	99.1
#4	98.9
#10	96.7
#20	87.0
#40	68.8
#100	42.7
#200	35.0

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 96.7
Weight of hydrometer sample =57.88
Hygroscopic moisture correction:
Moist weight and tare = 35.37
Dry weight and tare = 35.14
Tare weight = 25.39
Hygroscopic moisture = 2.4%
Table of composite correction values:

Temp., deg. C:	18.6	20.2	21.7	22.3	23.2
Comp. corr.:	-6.0	-5.5	-5.0	-5.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 20.4 - .13 x Rm

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.7	25.5	20.2	0.0135	25.5	17.1	0.0559	34.5
2.00	20.7	25.0	19.7	0.0135	25.0	17.1	0.0396	33.6
5.00	20.8	23.0	17.7	0.0135	23.0	17.4	0.0252	30.3
15.00	20.7	20.0	14.7	0.0135	20.0	17.8	0.0147	25.1
30.00	20.9	18.0	12.7	0.0135	18.0	18.1	0.0105	21.8
60.00	20.8	17.0	11.7	0.0135	17.0	18.2	0.0074	20.0
120.00	20.9	15.5	10.2	0.0135	15.5	18.4	0.0053	17.5
250.00	20.1	15.0	9.5	0.0136	15.0	18.4	0.0037	16.2
1440.00	19.7	13.0	7.3	0.0137	13.0	18.7	0.0016	12.6

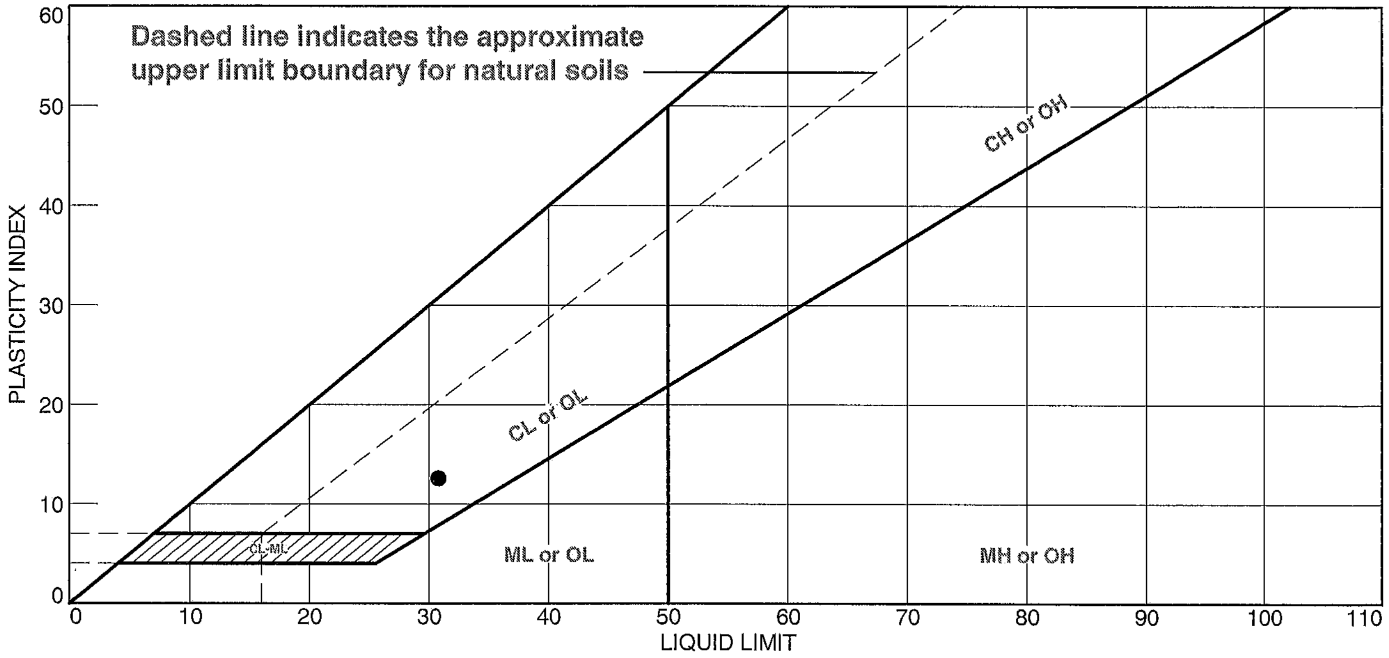
Fractional Components

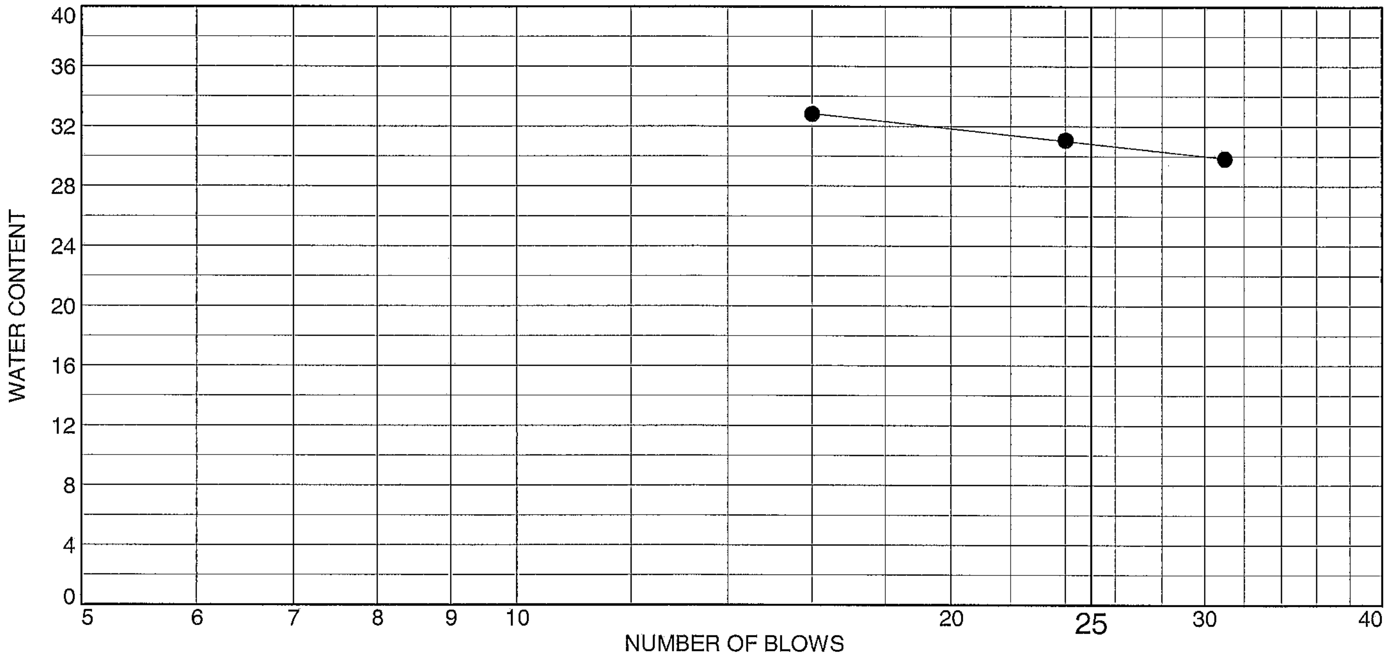
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.1	1.1	2.2	27.9	33.8	63.9	21.3	13.7	35.0

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0026	0.0074	0.0245	0.2120	0.3120	0.6318	0.7741	1.0041	1.5433

Fineness Modulus
1.32

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty Sand, SC (#28902)	30.8	18.2	12.6	68.8	35.0	SC

Project No. 5014-09- **Client:** TerraCosta Consulting Group, Inc.

Project: #2769A Harbor Island West Marina

Sample Number: B1-17 **Depth:** 45.0'

Remarks:

amec

Figure #28902

Tested By: R. Valles **Checked By:** L. Collins

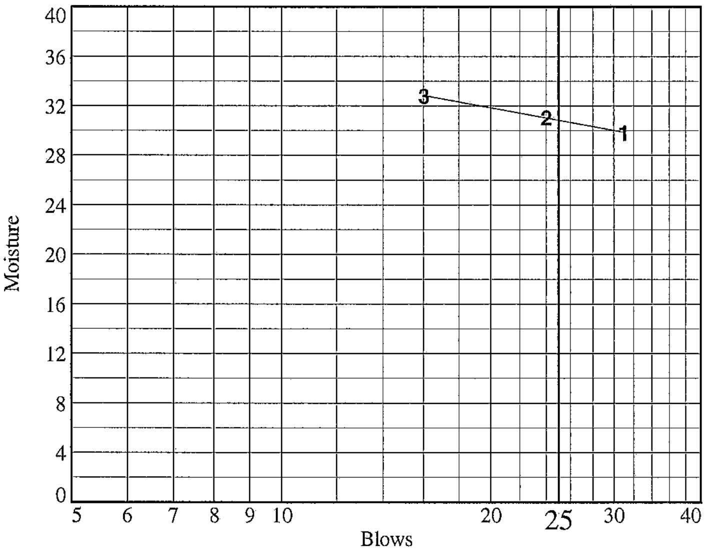
LIQUID AND PLASTIC LIMIT TEST DATA

12/17/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 45.0'
Sample Number: B1-17
Material Description: Silty Sand, SC (#28902)
%<#40: 68.8
%<#200: 35.0
USCS: SC
AASHTO: A-2-6(1)
Tested by: R. Valles
Checked by: L. Collins

Liquid Limit Data

Run No.	1	2	3	4	5	6
Wet+Tare	39.86	37.19	38.22			
Dry+Tare	35.50	33.41	33.95			
Tare	20.89	21.25	20.94			
# Blows	31	24	16			
Moisture	29.8	31.1	32.8			

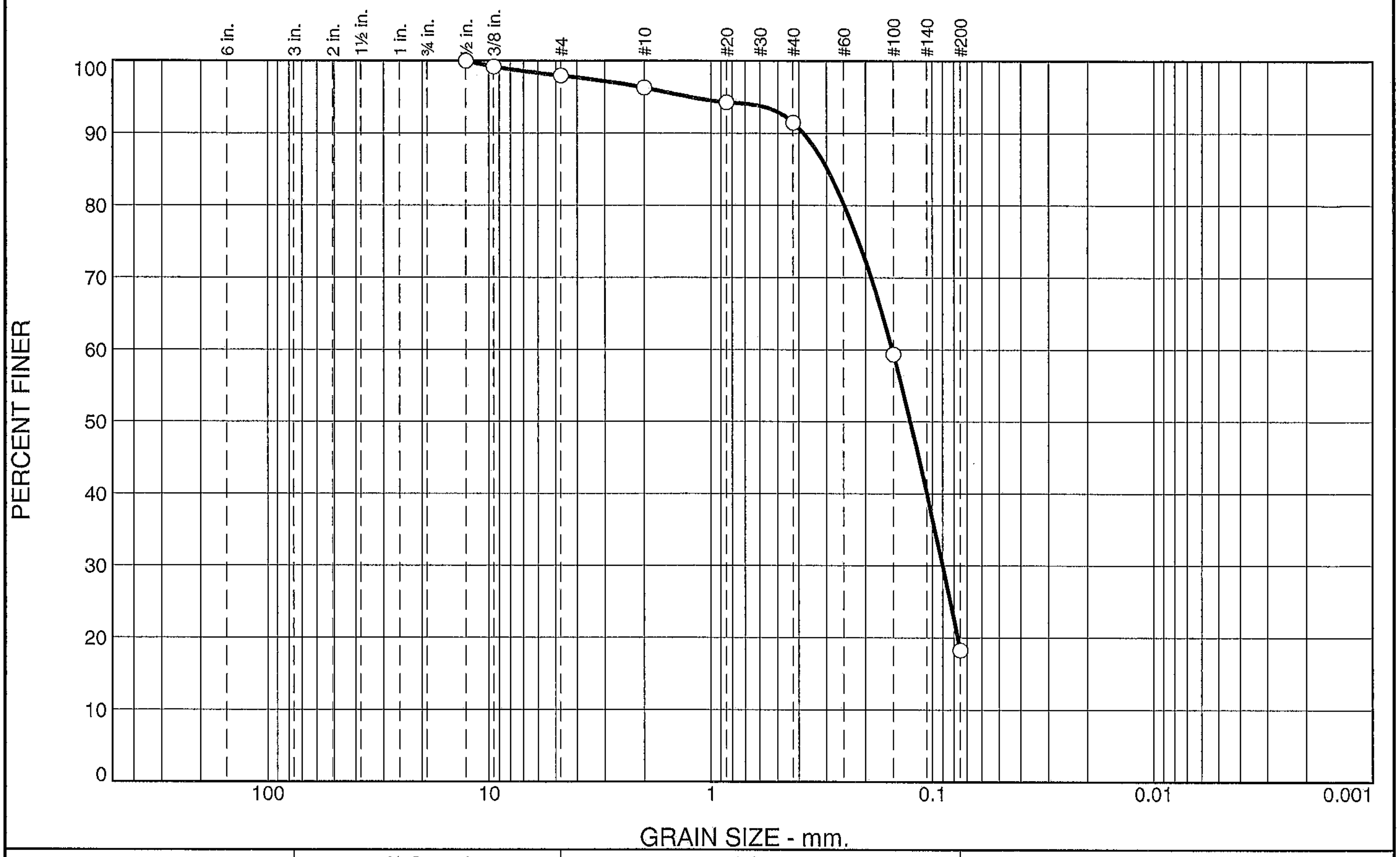


Liquid Limit= 30.8
Plastic Limit= 18.2
Plasticity Index= 12.6

Plastic Limit Data

Run No.	1	2	3	4	
Wet+Tare	30.26	30.14			
Dry+Tare	28.83	28.73			
Tare	20.86	21.09			
Moisture	17.9	18.5			

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	2.0	1.7	4.8	73.2	18.3	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.5"	100.0		
0.375"	99.2		
#4	98.0		
#10	96.3		
#20	94.3		
#40	91.5		
#100	59.4		
#200	18.3		

* (no specification provided)

Material Description

Silty Sand, SM (#28903)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3809 D_{85}= 0.2972 D_{60}= 0.1518
D_{50}= 0.1258 D_{30}= 0.0902 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: B4-6 **Depth:** 25.0'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28903

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 25.0'
Sample Number: B4-6
Material Description: Silty Sand, SM (#28903)
Date: 12/12/14
USCS Classification: SM
Tested by: R. Valles
Checked by: L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.5"	100.0
0.375"	99.2
#4	98.0
#10	96.3
#20	94.3
#40	91.5
#100	59.4
#200	18.3

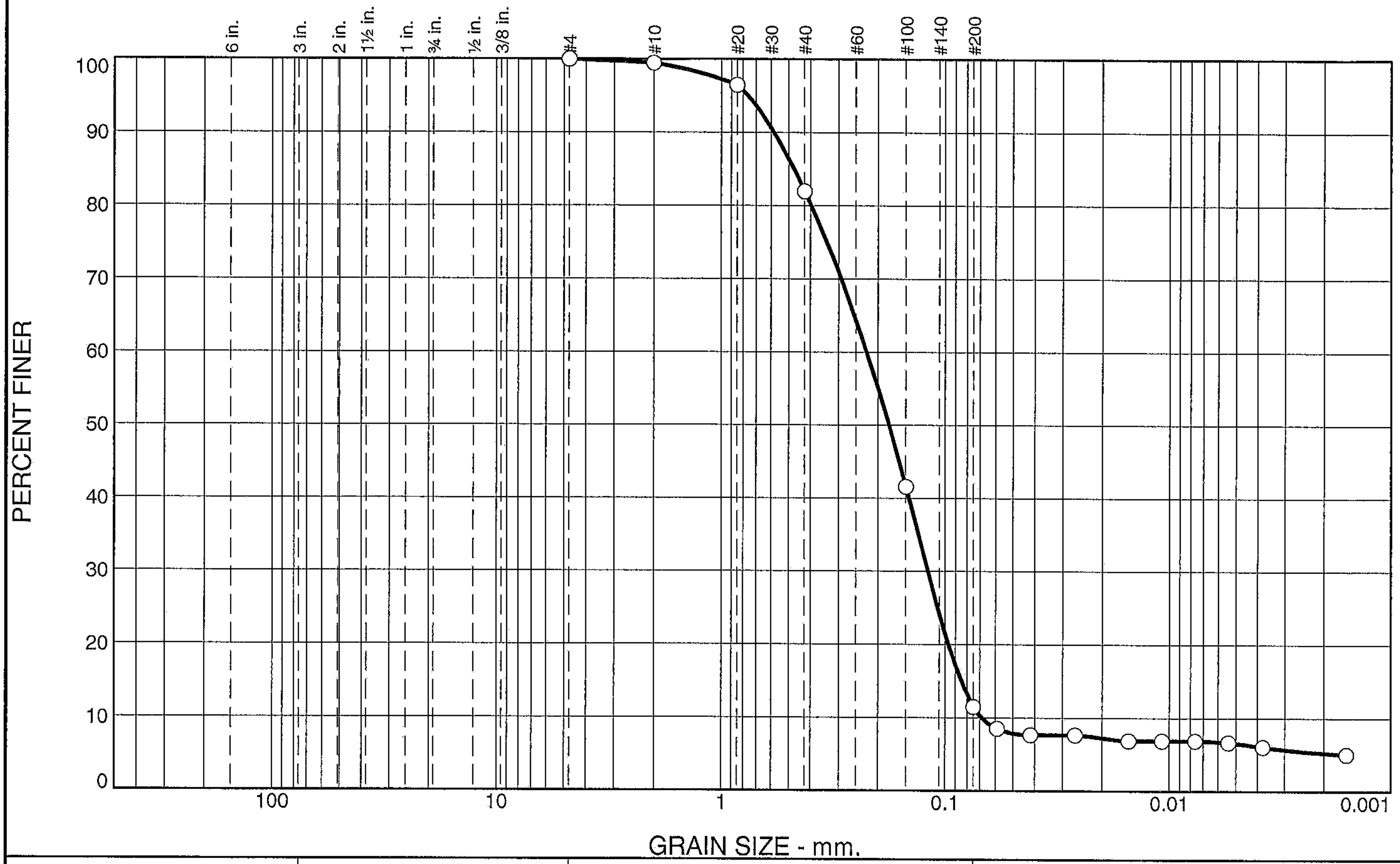
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.0	2.0	1.7	4.8	73.2	79.7			18.3

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0770	0.0902	0.1258	0.1518	0.2486	0.2972	0.3809	1.2326

Fineness Modulus
0.73

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.5	17.5	70.5	6.2	5.3

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.5		
#20	96.5		
#40	82.0		
#100	41.6		
#200	11.5		

* (no specification provided)

Material Description

Silty Sand, SM (#28904)

Atterberg Limits

PL= NP
LL= NV
PI= NP

Coefficients

D_{90}= 0.5820
D_{85}= 0.4739
D_{60}= 0.2249
D_{50}= 0.1787
D_{30}= 0.1196
D_{15}= 0.0850
D_{10}= 0.0690
C_u= 3.26
C_c= 0.92

Classification

USCS= SP-SM
AASHTO= A-2-4(0)

Remarks

Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay

Sample Number: B4-7 **Depth:** 30.0'

Date: 12/12/14

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28904

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/17/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 30.0' **Sample Number:** B4-7
Material Description: Silty Sand, SM (#28904)
Date: 12/12/14 **PL:** NP **LL:** NV **PI:** NP
USCS Classification: SP-SM **AASHTO Classification:** A-2-4(0)
Testing Remarks: Assumed specific gravity of 2.65 used for hydrometer calculations and soil particles smaller than 0.002mm have been classified as clay
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
#4	100.0
#10	99.5
#20	96.5
#40	82.0
#100	41.6
#200	11.5

Hydrometer Test Data

Hydrometer test uses material passing #10
Percent passing #10 based upon complete sample = 99.5
Weight of hydrometer sample =57.15
Hygroscopic moisture correction:
Moist weight and tare = 36.89
Dry weight and tare = 36.84
Tare weight = 26.81
Hygroscopic moisture = 0.5%
Table of composite correction values:

Temp., deg. C:	18.6	20.2	21.0	22.3	23.2
Comp. corr.:	-6.0	-5.5	-5.0	-5.0	-5.0

Meniscus correction only = 0.0
Specific gravity of solids = 2.65
Hydrometer type = 152H
Hydrometer effective depth equation: L = 20.4 - .13 **x Rm**

Elapsed Time (min.)	Temp. (deg. C.)	Actual Reading	Corrected Reading	K	Rm	Eff. Depth	Diameter (mm.)	Percent Finer
1.00	20.8	10.0	4.9	0.0135	10.0	19.1	0.0590	8.5
2.00	20.8	9.5	4.4	0.0135	9.5	19.2	0.0418	7.7
5.00	20.8	9.5	4.4	0.0135	9.5	19.2	0.0265	7.7
15.00	20.9	9.0	3.9	0.0135	9.0	19.2	0.0153	6.9
30.00	20.9	9.0	3.9	0.0135	9.0	19.2	0.0108	6.9
60.00	20.9	9.0	3.9	0.0135	9.0	19.2	0.0076	6.9
120.00	20.7	9.0	3.8	0.0135	9.0	19.2	0.0054	6.7
250.00	20.1	9.0	3.5	0.0136	9.0	19.2	0.0038	6.1
1440.00	19.8	8.5	2.9	0.0137	8.5	19.3	0.0016	5.0

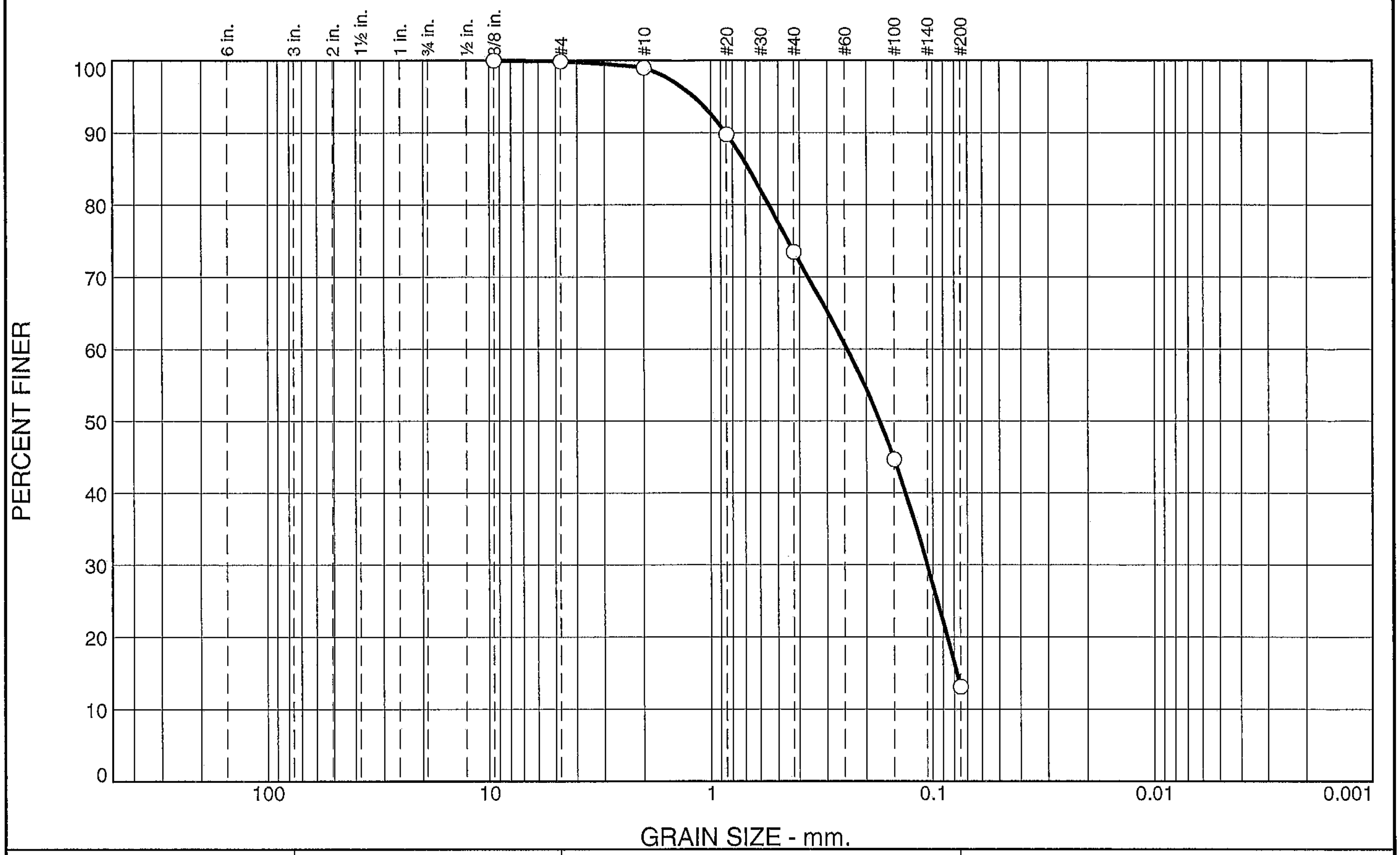
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.5	17.5	70.5	88.5	6.2	5.3	11.5

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
0.0690	0.0850	0.0968	0.1196	0.1787	0.2249	0.3968	0.4739	0.5820	0.7606

Fineness Modulus	C_u	C_c
0.99	3.26	0.92

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.9	25.5	60.4	13.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	99.9		
#10	99.0		
#20	89.8		
#40	73.5		
#100	44.7		
#200	13.1		

* (no specification provided)

Material Description

Silty Sand, SM (#28905)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.8590 D_{85}= 0.6782 D_{60}= 0.2444
D_{50}= 0.1741 D_{30}= 0.1063 D_{15}= 0.0779
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Sample Number: B4-8 **Depth:** 35.0'

Date: 12/12/14

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina

Project No: 5014-09-0006. **Figure** #28905

Tested By: R. Valles **Checked By:** L. Collins

GRAIN SIZE DISTRIBUTION TEST DATA

12/16/2014

Client: TerraCosta Consulting Group, Inc.
Project: #2769A Harbor Island West Marina
Project Number: 5014-09-0006.
Depth: 35.0' **Sample Number:** B4-8
Material Description: Silty Sand, SM (#28905)
Date: 12/12/14
USCS Classification: SM
Tested by: R. Valles **Checked by:** L. Collins

Sieve Test Data

Sieve Opening Size	Percent Finer
0.375"	100.0
#4	99.9
#10	99.0
#20	89.8
#40	73.5
#100	44.7
#200	13.1

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.1	0.1	0.9	25.5	60.4	86.8			13.1

D_{10}	D_{15}	D_{20}	D_{30}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0779	0.0863	0.1063	0.1741	0.2444	0.5515	0.6782	0.8590	1.1929

Fineness Modulus
1.14

APPENDIX C

EQSEARCH RESULTS

TerraCosta
Consulting Group

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                           *************************
                           *                       *
                           *    E Q S E A R C H    *
                           *                       *
                           *     Version 3.00      *
                           *                       *
                           *************************

                                 ESTIMATION OF
                            PEAK ACCELERATION FROM
                        CALIFORNIA EARTHQUAKE CATALOGS


JOB NUMBER: 0042-0000
                                                     DATE: 01-13-2015

JOB NAME: Harbor Island West Marina

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT


MAGNITUDE RANGE:
   MINIMUM MAGNITUDE:  4.00
   MAXIMUM MAGNITUDE:  9.00

SITE COORDINATES:
   SITE LATITUDE:  32.7222
   SITE LONGITUDE:  117.2106

SEARCH DATES:
           START DATE:   1800
           END DATE:   2000

SEARCH RADIUS:
           100.0 mi
           160.9 km

ATTENUATION RELATION:   3) Boore et al. (1997) Horiz. - NEHRP D (250)
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   ASSUMED SOURCE TYPE:  DS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]
   SCOND:   0  Depth Source:  A
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km):  0.0
```

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                         -------------------------
                         EARTHQUAKE SEARCH RESULTS
                         -------------------------

Page  1
-------------------------------------------------------------------------------
    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+-------+---------+-------+----+----+------+---+-----------
MGI |32.7000|117.2000|04/19/1906| 028 0.0|  0.0| 4.30| 0.167 |VIII|  1.6(  2.6)
MGI |32.7000|117.2000|09/08/1915| 742 0.0|  0.0| 4.00| 0.143 |VIII|  1.6(  2.6)
DMG |32.7000|117.2000|05/27/1862|20 0 0.0|  0.0| 5.90| 0.388 |  X |  1.6(  2.6)
MGI |32.7000|117.2000|05/20/1920|1330 0.0|  0.0| 4.00| 0.143 |VIII|  1.6(  2.6)
T-A |32.6700|117.1700|04/15/1865| 840 0.0|  0.0| 4.30| 0.126 |VIII|  4.3(  6.9)
T-A |32.6700|117.1700|05/24/1865| 0 0 0.0|  0.0| 5.00| 0.182 |VIII|  4.3(  6.9)
T-A |32.6700|117.1700|12/00/1856| 0 0 0.0|  0.0| 5.00| 0.182 |VIII|  4.3(  6.9)
T-A |32.6700|117.1700|10/21/1862| 0 0 0.0|  0.0| 5.00| 0.182 |VIII|  4.3(  6.9)
T-A |32.6700|117.1700|01/25/1863|1020 0.0|  0.0| 4.30| 0.126 |VIII|  4.3(  6.9)
PAS |32.6790|117.1510|06/18/1985| 32228.7|  5.7| 4.00| 0.104 | VII|  4.6(  7.3)
PAS |32.6150|117.1520|10/29/1986| 23815.3| 14.6| 4.10| 0.078 | VII|  8.1( 13.1)
MGI |32.8000|117.1000|05/25/1803| 0 0 0.0|  0.0| 5.00| 0.124 | VII|  8.4( 13.5)
PAS |32.6270|117.3770|06/29/1983| 8 836.4|  5.0| 4.60| 0.079 | VII| 11.7( 18.8)
DMG |32.8500|117.4830|02/23/1943| 92112.0|  0.0| 4.00| 0.042 | VI | 18.1( 29.1)
DMG |33.0000|117.3000|11/22/1800|2130 0.0|  0.0| 6.50| 0.146 |VIII| 19.9( 32.0)
DMG |33.0000|117.0000|03/03/1906|2025 0.0|  0.0| 4.50| 0.046 | VI | 22.7( 36.6)
MGI |33.0000|117.0000|12/29/1914|10 0 0.0|  0.0| 4.00| 0.035 |  V | 22.7( 36.6)
MGI |33.0000|117.0000|09/21/1856| 730 0.0|  0.0| 5.00| 0.060 | VI | 22.7( 36.6)
DMG |32.8000|116.8000|10/23/1894|23 3 0.0|  0.0| 5.70| 0.082 | VII| 24.4( 39.3)
MGI |32.8000|116.8000|08/14/1927|1448 0.0|  0.0| 4.60| 0.046 | VI | 24.4( 39.3)
MGI |32.7000|116.7000|03/21/1918|2325 0.0|  0.0| 4.00| 0.029 |  V | 29.7( 47.8)
GSP |33.0700|116.8000|12/04/1991|071057.5| 15.0| 4.20| 0.029 |  V | 33.8( 54.4)
PAS |32.9470|117.7360|01/15/1989|153955.2|  6.0| 4.20| 0.029 |  V | 34.2( 55.0)
PAS |32.3020|116.8810|08/19/1978| 931 5.7| 19.8| 4.10| 0.027 |  V | 34.8( 56.0)
MGI |33.2000|117.0000|07/20/1923| 7 0 0.0|  0.0| 4.00| 0.025 |  V | 35.2( 56.6)
MGI |33.1000|116.8000|06/22/1918| 557 0.0|  0.0| 4.00| 0.025 |  V | 35.3( 56.8)
DMG |32.5830|117.8000|04/19/1939| 741 0.0|  0.0| 4.50| 0.033 |  V | 35.6( 57.3)
DMG |32.7170|117.8330|11/06/1950|205546.0|  0.0| 4.40| 0.031 |  V | 36.2( 58.2)
DMG |32.8000|117.8330|01/24/1942|214148.0|  0.0| 4.00| 0.025 |  V | 36.5( 58.8)
T-A |32.2500|117.5000|01/13/1877|20 0 0.0|  0.0| 5.00| 0.041 |  V | 36.7( 59.1)
PAS |32.9450|117.8060|09/07/1984|11 313.4|  6.0| 4.30| 0.028 |  V | 37.8( 60.8)
PAS |32.9700|117.8030|07/14/1986| 03246.2| 10.0| 4.00| 0.024 | IV | 38.4( 61.8)
GSP |32.9700|117.8100|04/04/1990|085439.3|  6.0| 4.00| 0.023 | IV | 38.7( 62.4)
PAS |32.9450|117.8310|07/29/1986| 81741.8| 10.0| 4.10| 0.025 |  V | 39.1( 63.0)
DMG |33.2670|117.0170|06/07/1935|1633 0.0|  0.0| 4.00| 0.023 | IV | 39.2( 63.2)
PAS |32.9330|117.8410|07/29/1986| 81741.6| 10.0| 4.30| 0.027 |  V | 39.4( 63.3)
GSP |32.9850|117.8180|06/21/1995|211736.2|  6.0| 4.30| 0.027 |  V | 39.6( 63.8)
MGI |33.0000|116.6000|06/11/1917| 354 0.0|  0.0| 4.00| 0.023 | IV | 40.3( 64.8)
PAS |32.7590|117.9060|10/18/1976|172753.1| 13.8| 4.20| 0.025 |  V | 40.5( 65.1)
USG |33.0170|117.8170|07/16/1986|1247 3.7| 10.0| 4.11| 0.024 |  V | 40.6( 65.4)
USG |33.0170|117.8170|07/14/1986| 11112.6| 10.0| 4.12| 0.024 |  V | 40.6( 65.4)
PAS |32.7140|117.9100|10/18/1976|172652.6| 15.1| 4.20| 0.025 |  V | 40.6( 65.4)
PAS |32.9860|117.8440|10/01/1986|201218.6|  6.0| 4.00| 0.022 | IV | 41.0( 66.0)
PAS |32.9900|117.8490|07/13/1986|14 133.0| 12.0| 4.60| 0.031 |  V | 41.4( 66.6)
PAS |32.9710|117.8700|07/13/1986|1347 8.2|  6.0| 5.30| 0.044 | VI | 41.9( 67.5)
MGI |32.6000|116.5000|05/03/1918| 425 0.0|  0.0| 4.00| 0.022 | IV | 42.2( 67.8)
DMG |33.1000|116.6330|02/08/1952|174028.0|  0.0| 4.00| 0.022 | IV | 42.4( 68.3)
DMG |33.2000|116.7200|05/12/1930|172548.5|  0.0| 4.20| 0.024 | IV | 43.5( 70.1)
MGI |33.1000|116.6000|05/28/1917|1017 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
MGI |33.1000|116.6000|03/04/1915|1250 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
MGI |33.1000|116.6000|05/11/1915|1145 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
MGI |33.1000|116.6000|08/10/1921|19 6 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
MGI |33.1000|116.6000|02/05/1922|1915 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+----------
MGI |33.1000|116.6000|02/16/1915|1330 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
MGI |33.1000|116.6000|08/10/1921|2151 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
MGI |33.1000|116.6000|08/19/1917| 710 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
MGI |33.1000|116.6000|02/09/1920| 220 0.0|  0.0| 4.00| 0.021 | IV | 44.0( 70.7)
DMG |33.2000|116.7000|01/01/1920| 235 0.0|  0.0| 5.00| 0.036 |  V | 44.3( 71.3)
PAS |32.7560|117.9880|01/12/1975|212214.8| 15.3| 4.80| 0.032 |  V | 45.2( 72.7)
DMG |32.0830|117.0000|05/10/1948| 34925.0|  0.0| 4.00| 0.021 | IV | 45.8( 73.7)
DMG |32.1670|117.6670|10/29/1935|1017 0.0|  0.0| 4.50| 0.026 |  V | 46.7( 75.1)
DMG |33.1500|116.5830|12/02/1935| 319 0.0|  0.0| 4.00| 0.020 | IV | 46.8( 75.4)
PAS |32.6250|118.0090|07/11/1981|215029.4|  5.0| 4.30| 0.024 | IV | 46.9( 75.4)
PAS |33.0330|117.9440|02/22/1983| 21830.4| 10.0| 4.30| 0.023 | IV | 47.6( 76.6)
DMG |33.1100|116.5230|01/24/1957|205449.9|  3.9| 4.60| 0.027 |  V | 48.0( 77.3)
MGI |33.2000|116.6000|10/12/1920|1748 0.0|  0.0| 5.30| 0.039 |  V | 48.4( 77.8)
DMG |32.1130|116.7850|04/23/1968|131825.4| 10.0| 4.20| 0.022 | IV | 48.8( 78.6)
DMG |33.0020|116.4360|07/02/1957| 65638.5| 12.8| 4.10| 0.021 | IV | 48.9( 78.7)
DMG |33.0000|116.4330|06/04/1940|1035 8.3|  0.0| 5.10| 0.035 |  V | 49.0( 78.9)
GSP |32.7260|118.0680|12/27/2000|002714.1|  6.0| 4.10| 0.020 | IV | 49.8( 80.1)
DMG |32.6800|116.3540|01/21/1970|1124 0.4|  8.0| 4.10| 0.020 | IV | 49.9( 80.2)
PAS |33.1380|116.5010|10/10/1984|212258.9| 11.6| 4.50| 0.025 |  V | 50.1( 80.7)
DMG |32.6800|118.0770|10/28/1973|22 0 2.7|  8.0| 4.50| 0.025 |  V | 50.4( 81.1)
DMG |32.0000|117.0670|06/23/1939|2048 0.0|  0.0| 4.50| 0.025 |  V | 50.6( 81.4)
DMG |32.9670|116.3830|10/31/1942|15 758.0|  0.0| 4.00| 0.019 | IV | 50.9( 81.9)
DMG |32.3330|116.4670|01/13/1935| 224 0.0|  0.0| 4.00| 0.019 | IV | 50.9( 82.0)
DMG |33.1000|116.4500|11/23/1953|1339 7.0|  0.0| 4.30| 0.022 | IV | 51.2( 82.4)
DMG |32.0000|117.0000|04/27/1942|112754.0|  0.0| 4.00| 0.019 | IV | 51.4( 82.6)
DMG |32.0000|117.0000|02/11/1949| 95725.0|  0.0| 4.00| 0.019 | IV | 51.4( 82.6)
DMG |33.1670|116.5000|06/23/1932| 22552.7|  0.0| 4.00| 0.019 | IV | 51.4( 82.7)
DMG |33.1670|116.5000|06/23/1932| 23037.1|  0.0| 4.00| 0.019 | IV | 51.4( 82.7)
DMG |33.0970|116.4440|08/18/1959|215221.3| 17.3| 4.30| 0.022 | IV | 51.4( 82.7)
GSP |32.6810|118.1090|06/20/1997|043540.5|  6.0| 4.70| 0.027 |  V | 52.3( 84.1)
DMG |32.5290|118.0820|05/26/1973|234633.3|  8.0| 4.30| 0.022 | IV | 52.4( 84.3)
DMG |32.6000|116.3170|06/15/1946|194653.0|  0.0| 4.80| 0.028 |  V | 52.6( 84.7)
DMG |32.0000|117.5000|05/03/1939| 828 0.0|  0.0| 4.00| 0.019 | IV | 52.6( 84.7)
DMG |32.0000|117.5000|06/24/1939|1627 0.0|  0.0| 5.00| 0.031 |  V | 52.6( 84.7)
DMG |32.0000|117.5000|06/25/1939| 1 9 0.0|  0.0| 4.00| 0.019 | IV | 52.6( 84.7)
DMG |32.0000|117.5000|05/03/1939|2358 0.0|  0.0| 4.50| 0.024 |  V | 52.6( 84.7)
DMG |32.0000|117.5000|05/01/1939|2353 0.0|  0.0| 5.00| 0.031 |  V | 52.6( 84.7)
DMG |32.0000|117.5000|05/01/1939|2357 0.0|  0.0| 4.50| 0.024 |  V | 52.6( 84.7)
DMG |32.2000|116.5500|11/06/1949|23 510.0|  0.0| 4.00| 0.019 | IV | 52.7( 84.9)
DMG |32.2000|116.5500|11/05/1949| 43524.0|  0.0| 5.10| 0.033 |  V | 52.7( 84.9)
DMG |32.2000|116.5500|11/04/1949|204238.0|  0.0| 5.70| 0.045 | VI | 52.7( 84.9)
DMG |32.2000|116.5500|11/11/1949|1354 0.0|  0.0| 4.20| 0.021 | IV | 52.7( 84.9)
DMG |32.2000|116.5500|11/05/1949|20 2 7.0|  0.0| 4.00| 0.019 | IV | 52.7( 84.9)
DMG |33.1670|116.4670|08/01/1960|193930.0|  0.0| 4.20| 0.021 | IV | 52.9( 85.1)
DMG |32.7000|116.3000|02/24/1892| 720 0.0|  0.0| 6.70| 0.077 | VII| 52.9( 85.2)
DMG |31.9920|116.9270|04/10/1968|104237.8| 10.0| 4.50| 0.024 |  V | 53.1( 85.4)
DMG |33.1170|116.4170|10/21/1940| 64933.0|  0.0| 4.50| 0.024 | IV | 53.5( 86.0)
DMG |33.1170|116.4170|06/04/1940|103656.0|  0.0| 4.00| 0.018 | IV | 53.5( 86.0)
DMG |33.4540|116.8980|07/29/1936|142252.8| 10.0| 4.00| 0.018 | IV | 53.7( 86.4)
DMG |33.4560|116.8960|06/16/1938| 55916.9| 10.0| 4.00| 0.018 | IV | 53.8( 86.6)
DMG |33.0380|116.3610|02/26/1957|211652.2|  0.0| 4.10| 0.019 | IV | 53.9( 86.7)
GSP |32.6850|118.1380|06/20/1997|053855.0|  6.0| 4.20| 0.020 | IV | 53.9( 86.8)
GSP |33.1100|116.4000|04/01/1984|071702.3| 11.0| 4.00| 0.018 | IV | 54.1( 87.0)
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                            EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec | (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+---------+-----+-----+-------+----+-----------
T-A |33.5000|117.0700|12/29/1880| 7 0 0.0|  0.0| 4.30| 0.021 | IV | 54.3( 87.4)
DMG |32.0830|116.6670|10/12/1938|1231 0.0|  0.0| 4.00| 0.018 | IV | 54.3( 87.4)
DMG |32.0830|116.6670|09/27/1934|2140 0.0|  0.0| 4.00| 0.018 | IV | 54.3( 87.4)
DMG |32.0830|116.6670|11/25/1934| 818 0.0|  0.0| 5.00| 0.031 |  V | 54.3( 87.4)
GSP |32.6260|118.1510|06/20/1997|080413.6|  6.0| 4.60| 0.025 |  V | 55.1( 88.6)
DMG |33.5000|117.0000|08/08/1925|1013 0.0|  0.0| 4.50| 0.023 | IV | 55.1( 88.6)
DMG |33.1670|116.4170|12/05/1939|173352.0|  0.0| 4.00| 0.018 | IV | 55.3( 89.0)
DMG |33.1670|116.4170|07/10/1938|18 6 0.0|  0.0| 4.00| 0.018 | IV | 55.3( 89.0)
DMG |33.1670|116.4170|10/14/1935|1550 0.0|  0.0| 4.00| 0.018 | IV | 55.3( 89.0)
DMG |31.9540|117.5060|09/29/1972|141341.2|  8.0| 4.30| 0.021 | IV | 55.8( 89.7)
DMG |32.1000|116.6000|01/07/1950| 93735.0|  0.0| 4.00| 0.018 | IV | 55.8( 89.8)
DMG |32.7180|118.1720|04/28/1938| 6 728.0| 10.0| 4.50| 0.023 | IV | 55.8( 89.9)
DMG |32.9610|116.2900|08/25/1971|23 033.0|  8.0| 4.00| 0.018 | IV | 55.9( 89.9)
DMG |32.9230|116.2720|10/14/1969|131842.7| 10.0| 4.50| 0.023 | IV | 56.2( 90.4)
DMG |33.5000|116.9170|11/04/1935| 355 0.0|  0.0| 4.50| 0.023 | IV | 56.3( 90.6)
DMG |32.9520|116.2790|09/13/1973|173039.8|  8.0| 4.80| 0.027 |  V | 56.3( 90.6)
PAS |32.9050|116.2610|12/25/1975| 71852.3|  3.6| 4.00| 0.018 | IV | 56.5( 91.0)
PAS |33.4200|116.6980|06/05/1978|16 3 3.9| 11.9| 4.40| 0.022 | IV | 56.6( 91.0)
DMG |33.1210|116.3490|05/25/1971|10 252.9|  8.0| 4.10| 0.018 | IV | 57.0( 91.8)
DMG |32.0830|117.8330|09/13/1940|144548.0|  0.0| 4.50| 0.023 | IV | 57.1( 91.9)
DMG |31.9390|116.8930|04/10/1968|1055 3.2| 10.0| 4.30| 0.020 | IV | 57.2( 92.0)
DMG |33.0530|116.3060|04/02/1967|201538.6|  1.0| 4.30| 0.020 | IV | 57.2( 92.1)
DMG |32.7500|118.2000|06/25/1939| 149 0.0|  0.0| 4.50| 0.023 | IV | 57.5( 92.5)
DMG |33.1830|116.3830|10/14/1949| 02925.0|  0.0| 4.10| 0.018 | IV | 57.5( 92.6)
DMG |32.9900|116.2680|11/08/1958|132044.1|  2.4| 4.10| 0.018 | IV | 57.7( 92.9)
DMG |32.9500|116.2500|11/14/1951|2355 3.0|  0.0| 4.10| 0.018 | IV | 57.9( 93.2)
DMG |32.0000|116.7000|12/02/1929|1124 0.0|  0.0| 4.50| 0.022 | IV | 58.1( 93.5)
DMG |33.4880|116.7770|06/12/1959|11 313.0|  5.7| 4.00| 0.017 | IV | 58.5( 94.2)
MGI |33.5000|116.8000|06/02/1917| 435 0.0|  0.0| 4.00| 0.017 | IV | 58.7( 94.5)
MGI |33.5000|116.8000|03/30/1918|16 5 0.0|  0.0| 4.60| 0.023 | IV | 58.7( 94.5)
MGI |33.5000|116.8000|05/31/1917| 435 0.0|  0.0| 4.00| 0.017 | IV | 58.7( 94.5)
MGI |33.5000|116.8000|11/26/1916|17 5 0.0|  0.0| 4.00| 0.017 | IV | 58.7( 94.5)
DMG |33.4500|116.6830|04/25/1955| 25515.0|  0.0| 4.00| 0.017 | IV | 58.8( 94.6)
MGI |32.8000|116.2000|07/23/1929|1155 0.0|  0.0| 4.30| 0.020 | IV | 58.9( 94.8)
DMG |32.8170|116.2000|11/22/1953| 81138.0|  0.0| 4.10| 0.018 | IV | 59.0( 95.0)
DMG |33.0430|116.2600|08/22/1961|231933.6| 12.1| 4.40| 0.021 | IV | 59.4( 95.6)
DMG |32.1000|116.5000|01/08/1937|1246 0.0|  0.0| 4.00| 0.017 | IV | 59.7( 96.0)
DMG |33.4000|116.5670|02/04/1953| 43616.0|  0.0| 4.30| 0.020 | IV | 59.8( 96.2)
DMG |31.9700|116.6980|04/23/1968|132234.8| 10.0| 4.00| 0.017 | IV | 59.9( 96.4)
DMG |32.1670|116.4170|09/17/1950|194330.0|  0.0| 4.50| 0.022 | IV | 60.1( 96.7)
DMG |33.2670|116.4000|06/06/1940|2321 4.0|  0.0| 4.00| 0.017 | IV | 60.1( 96.8)
DMG |33.4830|116.7000|12/28/1948|125341.0|  0.0| 4.00| 0.017 | IV | 60.3( 97.0)
GSG |31.8490|117.1980|01/29/1995|160231.5| 12.0| 4.40| 0.021 | IV | 60.3( 97.0)
GSP |32.8220|116.1750|05/24/1992|122225.8| 12.0| 4.10| 0.018 | IV | 60.5( 97.4)
DMG |33.0330|116.2330|09/20/1961| 5 410.0|  0.0| 4.00| 0.017 | IV | 60.6( 97.5)
DMG |33.0190|116.2250|08/20/1969|152957.2|  0.6| 4.00| 0.017 | IV | 60.7( 97.7)
DMG |33.4170|116.5670|12/22/1950| 2 536.0|  0.0| 4.00| 0.017 | IV | 60.7( 97.7)
DMG |33.0500|116.2380|08/23/1961| 1 047.8| 11.9| 4.70| 0.024 |  V | 60.8( 97.8)
DMG |33.0210|116.2230|01/13/1963| 23938.9| 13.0| 4.20| 0.018 | IV | 60.9( 98.0)
DMG |32.8670|118.2500|02/13/1952|151337.0|  0.0| 4.70| 0.024 | IV | 61.1( 98.4)
DMG |32.5330|116.1830|02/22/1939|1030 0.0|  0.0| 4.00| 0.016 | IV | 61.2( 98.4)
DMG |32.5330|116.1830|11/12/1939|1849 0.0|  0.0| 4.00| 0.016 | IV | 61.2( 98.4)
DMG |33.4670|116.6330|02/20/1934|1035 0.0|  0.0| 4.00| 0.016 | IV | 61.3( 98.7)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
GSP |32.5880|116.1670|03/13/1999|133120.4|  6.0| 4.30| 0.019 | IV | 61.4( 98.8)
GSP |32.5920|116.1650|02/19/1999|030832.2|  3.0| 4.20| 0.018 | IV | 61.4( 98.9)
GSP |32.5930|116.1630|04/07/1999|062640.1|  8.0| 4.00| 0.016 | IV | 61.5( 99.0)
GSP |32.5870|116.1630|04/18/1999|155301.1|  7.0| 4.20| 0.018 | IV | 61.6( 99.1)
DMG |33.3330|116.4330|02/12/1954| 94428.0|  0.0| 4.50| 0.021 | IV | 61.7( 99.3)
DMG |33.2000|116.3000|05/12/1930| 414 0.0|  0.0| 4.00| 0.016 | IV | 62.2(100.1)
DMG |33.4000|116.5000|10/11/1918| 4 0 0.0|  0.0| 4.00| 0.016 | IV | 62.3(100.2)
PAS |33.0580|116.2110|03/22/1982| 85328.6|  4.6| 4.50| 0.021 | IV | 62.4(100.4)
DMG |33.3680|116.4440|03/25/1937|232026.7| 10.0| 4.00| 0.016 | IV | 62.9(101.2)
DMG |33.4670|116.5830|03/26/1937|2124 0.0|  0.0| 4.00| 0.016 | IV | 62.9(101.3)
DMG |33.4670|116.5830|03/27/1937| 742 0.0|  0.0| 4.50| 0.021 | IV | 62.9(101.3)
DMG |33.4670|116.5830|03/27/1937| 528 0.0|  0.0| 4.00| 0.016 | IV | 62.9(101.3)
DMG |33.4670|116.5830|01/04/1938| 029 0.0|  0.0| 4.50| 0.021 | IV | 62.9(101.3)
DMG |31.8110|117.1310|12/22/1964|205433.2|  2.3| 5.60| 0.037 |  V | 63.1(101.5)
DMG |33.2830|116.3500|04/13/1949| 75336.0|  0.0| 4.10| 0.017 | IV | 63.1(101.5)
DMG |32.9500|116.1500|10/25/1942|185939.0|  0.0| 4.00| 0.016 | IV | 63.5(102.2)
DMG |33.4200|116.4900|03/29/1937|17 316.8| 10.0| 4.00| 0.016 | IV | 63.7(102.5)
DMG |33.5080|116.6310|08/11/1967| 05711.4| 10.7| 4.10| 0.017 | IV | 63.8(102.6)
DMG |32.8940|116.1190|09/16/1961|194939.4| 18.5| 4.40| 0.020 | IV | 64.4(103.7)
DMG |33.2910|116.3170|03/19/1966|142156.0| 10.9| 4.00| 0.016 | IV | 65.0(104.5)
DMG |33.5060|116.5850|05/21/1967|144234.4| 19.4| 4.70| 0.023 | IV | 65.1(104.8)
DMG |32.6000|116.1000|12/24/1941| 73012.0|  0.0| 4.50| 0.020 | IV | 65.1(104.8)
PAS |31.7940|117.4100|03/31/1979|213656.7|  5.0| 4.70| 0.023 | IV | 65.1(104.8)
DMG |33.2350|116.2660|04/09/1968| 93833.0|  5.2| 4.00| 0.016 | IV | 65.2(104.9)
DMG |33.5330|116.6330|09/21/1942| 7 754.0|  0.0| 4.00| 0.016 | IV | 65.2(104.9)
USG |32.7700|118.3340|06/16/1985|1027 0.7|  5.0| 4.14| 0.017 | IV | 65.3(105.1)
DMG |33.2000|116.2330|04/05/1942| 92039.0|  0.0| 4.00| 0.016 | IV | 65.5(105.5)
PAS |33.5580|116.6670|06/15/1982|234921.3| 12.2| 4.80| 0.024 | IV | 65.7(105.7)
DMG |33.3430|116.3460|04/28/1969|232042.9| 20.0| 5.80| 0.040 |  V | 65.9(106.0)
DMG |33.3000|116.3000|01/04/1940| 8 711.0|  0.0| 4.00| 0.016 | IV | 66.1(106.4)
DMG |32.3340|116.1700|08/24/1963|204749.5|  4.8| 4.10| 0.016 | IV | 66.2(106.6)
PAS |33.4840|116.5130|08/11/1976|152455.5| 15.4| 4.30| 0.018 | IV | 66.3(106.7)
DMG |33.4170|116.4170|01/02/1943|141118.0|  0.0| 4.50| 0.020 | IV | 66.4(106.9)
DMG |33.5450|117.8070|10/27/1969|1316 2.3|  6.5| 4.50| 0.020 | IV | 66.5(106.9)
DMG |32.8170|118.3500|12/26/1951| 04654.0|  0.0| 5.90| 0.042 | VI | 66.5(107.0)
DMG |32.0250|116.4240|08/20/1961| 42843.0| 12.6| 4.60| 0.021 | IV | 66.5(107.0)
DMG |33.3150|116.3050|04/09/1968|1831 3.8| 12.6| 4.70| 0.022 | IV | 66.5(107.0)
DMG |33.4260|116.4210|03/25/1937|20 4 8.3| 10.0| 4.00| 0.015 | IV | 66.7(107.3)
DMG |33.4830|116.5000|02/15/1951|104759.0|  0.0| 4.80| 0.024 | IV | 66.7(107.3)
DMG |33.4830|116.5000|02/15/1951|104957.0|  0.0| 4.80| 0.024 | IV | 66.7(107.3)
PAS |33.5200|116.5580|08/02/1975| 014 7.7| 13.4| 4.70| 0.022 | IV | 66.8(107.4)
DMG |33.2000|116.2000|05/28/1892|1115 0.0|  0.0| 6.30| 0.052 | VI | 67.2(108.1)
PAS |33.5010|116.5130|02/25/1980|104738.5| 13.6| 5.50| 0.034 |  V | 67.2(108.2)
DMG |32.7860|116.0550|07/04/1938|215945.3| 10.0| 4.00| 0.015 | IV | 67.2(108.2)
DMG |32.7960|116.0550|11/30/1965| 84325.1| 16.4| 4.00| 0.015 | IV | 67.3(108.3)
DMG |33.5340|116.5610|09/23/1956|112441.9| 12.2| 4.30| 0.018 | IV | 67.5(108.6)
DMG |33.3330|116.3000|08/05/1933|2331 0.0|  0.0| 4.40| 0.019 | IV | 67.5(108.6)
DMG |33.3330|116.3000|08/06/1933| 332 0.0|  0.0| 4.70| 0.022 | IV | 67.5(108.6)
PAS |32.2020|116.2290|12/12/1979|213741.0|  5.5| 4.00| 0.015 | IV | 67.5(108.7)
DMG |33.5000|116.5000|09/30/1916| 211 0.0|  0.0| 5.00| 0.026 |  V | 67.6(108.8)
DMG |33.2790|116.2490|01/07/1966|191023.0| -1.7| 4.00| 0.015 | IV | 67.7(108.9)
DMG |31.8590|116.6570|11/15/1972|205117.4|  8.0| 4.00| 0.015 | IV | 67.8(109.1)
DMG |33.7000|117.1000|06/11/1902| 245 0.0|  0.0| 4.50| 0.020 | IV | 67.8(109.1)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
PAS |33.4580|116.4340|02/12/1979| 44842.3|  3.9| 4.20| 0.017 | IV | 67.8(109.1)
DMG |33.1670|116.1670|11/16/1937|1057 0.0|  0.0| 4.00| 0.015 | IV | 67.8(109.1)
DMG |33.0020|116.0850|11/21/1964|172559.7|  4.1| 4.20| 0.017 | IV | 68.1(109.6)
GSP |33.3990|116.3540|07/26/1997|031456.0| 11.0| 4.80| 0.023 | IV | 68.1(109.6)
DMG |33.5000|116.4830|02/23/1941|183614.0|  0.0| 4.50| 0.020 | IV | 68.2(109.8)
DMG |33.4670|116.4330|05/12/1939|1925 2.2|  0.0| 4.50| 0.020 | IV | 68.3(109.9)
DMG |33.7000|117.4000|04/11/1910| 757 0.0|  0.0| 5.00| 0.026 |  V | 68.4(110.1)
DMG |33.7000|117.4000|05/13/1910| 620 0.0|  0.0| 5.00| 0.026 |  V | 68.4(110.1)
DMG |33.7000|117.4000|05/15/1910|1547 0.0|  0.0| 6.00| 0.043 | VI | 68.4(110.1)
DMG |32.7170|116.0330|06/01/1959|163536.0|  0.0| 4.60| 0.021 | IV | 68.4(110.1)
PAS |32.0580|116.3370|01/29/1980|1949 3.3|  5.0| 4.40| 0.019 | IV | 68.5(110.3)
GSP |33.6320|116.7190|07/19/1999|220927.5| 14.0| 4.20| 0.017 | IV | 68.9(110.9)
PAS |33.4830|116.4380|07/02/1988| 02658.2| 12.6| 4.00| 0.015 | IV | 69.0(111.0)
DMG |33.2370|116.1900|04/14/1968|125558.7| 10.8| 4.30| 0.018 | IV | 69.0(111.0)
DMG |33.1170|116.1170|06/18/1943|161546.0|  0.0| 4.50| 0.020 | IV | 69.0(111.0)
DMG |32.2000|116.2000|03/03/1957|11 6 3.0|  0.0| 4.40| 0.019 | IV | 69.0(111.1)
DMG |33.6820|117.5530|07/05/1938|18 655.7| 10.0| 4.50| 0.020 | IV | 69.2(111.3)
DMG |33.6500|116.7500|09/05/1950|191956.0|  0.0| 4.80| 0.023 | IV | 69.4(111.6)
GSP |33.6500|116.7400|12/02/1989|231647.8| 14.0| 4.20| 0.017 | IV | 69.6(112.0)
DMG |33.6990|117.5110|05/31/1938| 83455.4| 10.0| 5.50| 0.033 |  V | 69.6(112.1)
DMG |31.8670|116.5710|02/27/1937| 12918.4| 10.0| 5.00| 0.025 |  V | 69.9(112.4)
GSP |33.5100|116.4500|02/18/1990|155259.9|  9.0| 4.10| 0.016 | IV | 69.9(112.6)
DMG |33.3100|116.2240|05/22/1968|132655.4|  7.5| 4.40| 0.018 | IV | 70.1(112.8)
DMG |32.1020|116.2580|05/07/1966| 32657.4| 12.7| 4.50| 0.019 | IV | 70.1(112.8)
DMG |33.7380|117.1870|04/27/1962| 91232.1|  5.7| 4.10| 0.016 | IV | 70.1(112.9)
DMG |33.7100|116.9250|09/23/1963|144152.6| 16.5| 5.00| 0.025 |  V | 70.2(112.9)
DMG |31.9940|116.3700|08/20/1961|125245.9|  8.2| 4.00| 0.015 | IV | 70.2(113.0)
DMG |33.5010|116.4290|02/23/1971| 0 739.2|  8.0| 4.20| 0.016 | IV | 70.2(113.0)
DMG |33.3670|118.1500|04/16/1942| 72833.0|  0.0| 4.00| 0.015 | IV | 70.3(113.1)
DMG |32.7500|116.0000|02/19/1919| 458 0.0|  0.0| 4.50| 0.019 | IV | 70.3(113.2)
DMG |33.1670|116.1170|04/09/1968| 23930.0|  0.0| 4.40| 0.018 | IV | 70.4(113.3)
DMG |33.1670|116.1170|04/09/1968| 233 9.0|  0.0| 4.30| 0.017 | IV | 70.4(113.3)
PAS |33.4600|116.3700|09/07/1984|175730.3| 15.2| 4.10| 0.016 | IV | 70.4(113.3)
DMG |33.3330|116.2360|10/05/1962|1529 2.6| 13.9| 4.10| 0.016 | IV | 70.4(113.3)
DMG |33.4000|116.3000|02/09/1890|12 6 0.0|  0.0| 6.30| 0.050 | VI | 70.5(113.4)
DMG |33.1900|116.1290|04/09/1968| 22859.1| 11.1| 6.40| 0.052 | VI | 70.5(113.4)
DMG |32.0280|116.3230|09/20/1961|1036 2.6| 11.4| 4.20| 0.016 | IV | 70.5(113.5)
DMG |33.3330|116.2330|06/09/1942| 5 633.0|  0.0| 4.00| 0.015 | IV | 70.6(113.6)
DMG |33.7170|117.5070|08/06/1938|22 056.0| 10.0| 4.00| 0.015 | IV | 70.8(113.9)
DMG |33.7170|117.5170|06/19/1935|1117 0.0|  0.0| 4.00| 0.015 | IV | 70.9(114.1)
PAS |33.7010|116.8370|08/22/1979| 2 136.3|  5.0| 4.10| 0.015 | IV | 70.9(114.2)
DMG |32.0320|116.3090|08/27/1963| 121 1.8| 14.6| 4.00| 0.015 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954|101957.0|  0.0| 4.50| 0.019 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954|101522.0|  0.0| 4.50| 0.019 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954|14 057.0|  0.0| 4.10| 0.015 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954|10 139.0|  0.0| 4.20| 0.016 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954|13 8 4.0|  0.0| 4.30| 0.017 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954|102610.0|  0.0| 4.00| 0.015 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/20/1954| 41919.0|  0.0| 4.90| 0.024 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954| 95748.0|  0.0| 4.00| 0.015 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954| 95556.0|  0.0| 5.00| 0.025 |  V | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954| 957 7.0|  0.0| 4.60| 0.020 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954|143750.0|  0.0| 4.00| 0.015 | IV | 71.0(114.2)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME   |     |      | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC.  | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g    |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
DMG |33.2830|116.1830|04/04/1954| 42920.0|  0.0| 4.10| 0.015 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/20/1954| 6 353.0|  0.0| 4.30| 0.017 | IV | 71.0(114.2)
DMG |33.2830|116.1830|10/26/1944|225410.0|  0.0| 4.20| 0.016 | IV | 71.0(114.2)
DMG |33.2830|116.1830|03/23/1954| 41450.0|  0.0| 5.10| 0.026 |  V | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954| 95429.0|  0.0| 6.20| 0.047 | VI | 71.0(114.2)
DMG |33.2830|116.1830|03/19/1954|102117.0|  0.0| 5.50| 0.032 |  V | 71.0(114.2)
DMG |33.2170|116.1330|08/15/1945|175624.0|  0.0| 5.70| 0.036 |  V | 71.2(114.5)
DMG |33.7250|117.4980|01/03/1956| 02548.9| 13.7| 4.70| 0.021 | IV | 71.2(114.6)
DMG |33.1330|116.0830|10/16/1940|175213.0|  0.0| 4.00| 0.015 | IV | 71.2(114.6)
DMG |33.1330|116.0830|10/06/1940|181953.0|  0.0| 4.00| 0.015 | IV | 71.2(114.6)
DMG |33.1330|116.0830|05/07/1936|1147 0.0|  0.0| 4.50| 0.019 | IV | 71.2(114.6)
DMG |33.1330|116.0830|02/28/1940|1728 7.0|  0.0| 4.50| 0.019 | IV | 71.2(114.6)
DMG |33.7330|117.4670|10/26/1954|162226.0|  0.0| 4.10| 0.015 | IV | 71.3(114.8)
PAS |33.4710|118.0610|02/27/1984|101815.0|  6.0| 4.00| 0.015 | IV | 71.4(114.8)
DMG |33.2000|116.1170|12/28/1950| 52211.0|  0.0| 4.20| 0.016 | IV | 71.4(114.9)
DMG |33.1030|116.0610|04/09/1968|111754.5|  4.8| 4.00| 0.015 | IV | 71.6(115.3)
PAS |33.1360|116.0710|02/29/1984| 2 731.7|  6.6| 4.30| 0.017 | IV | 72.0(115.8)
DMG |33.7500|117.0000|06/06/1918|2232 0.0|  0.0| 5.00| 0.025 |  V | 72.0(115.9)
DMG |33.7500|117.0000|04/21/1918|223225.0|  0.0| 6.80| 0.064 | VI | 72.0(115.9)
DMG |32.9670|116.0000|11/02/1943|1753 5.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|03/26/1943| 62957.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/21/1942|162654.0|  0.0| 5.00| 0.025 |  V | 72.2(116.2)
DMG |32.9670|116.0000|10/21/1942|162519.0|  0.0| 5.00| 0.025 |  V | 72.2(116.2)
DMG |32.9670|116.0000|08/20/1944|113310.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|04/07/1943| 34614.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/21/1942|1638 6.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/29/1942|1556 0.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|03/07/1943|205631.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|02/24/1943| 15831.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/29/1942|162157.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/21/1942|191028.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/07/1942| 439 6.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/22/1942|113951.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/21/1942|163439.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/22/1942|125553.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|08/17/1943|155058.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/12/1942| 0 737.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/21/1942|162213.0|  0.0| 6.50| 0.054 | VI | 72.2(116.2)
DMG |32.9670|116.0000|01/08/1943| 024 3.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/22/1942| 63951.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/30/1942| 53545.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/02/1943|18 134.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/29/1942|173552.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/16/1943|18 9 9.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/02/1943|164759.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/03/1942|101834.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/22/1942|181326.0|  0.0| 5.00| 0.025 |  V | 72.2(116.2)
DMG |32.9670|116.0000|11/03/1942| 5 629.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/02/1943|165716.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/21/1942|214928.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|04/30/1943|155256.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/02/1943|175041.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |32.9670|116.0000|04/27/1943| 32833.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec | (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+---------+-----+-----+-------+----+-----------
DMG |32.9670|116.0000|10/26/1942| 434 4.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|10/21/1942|225031.0|  0.0| 4.00| 0.014 | IV | 72.2(116.2)
DMG |32.9670|116.0000|11/02/1942|125942.0|  0.0| 4.50| 0.019 | IV | 72.2(116.2)
DMG |33.7480|117.4790|06/22/1971|104119.0|  8.0| 4.20| 0.016 | IV | 72.5(116.7)
DMG |33.4080|116.2610|03/25/1937|1649 1.8| 10.0| 6.00| 0.041 |  V | 72.5(116.7)
DMG |33.0000|116.0000|05/18/1920| 625 0.0|  0.0| 4.50| 0.019 | IV | 72.8(117.1)
DMG |33.0500|116.0170|08/26/1955| 52322.0|  0.0| 4.30| 0.017 | IV | 72.8(117.2)
DMG |31.7000|116.9000|11/21/1952|192618.0|  0.0| 4.10| 0.015 | IV | 72.9(117.3)
DMG |33.1040|116.0360|04/09/1968| 34810.3|  4.8| 4.70| 0.021 | IV | 73.0(117.5)
DMG |33.1130|116.0370|04/09/1968| 3 353.5|  5.0| 5.20| 0.027 |  V | 73.2(117.8)
DMG |33.0400|116.0050|05/11/1968| 810 4.0|  8.8| 4.20| 0.016 | IV | 73.3(117.9)
DMG |33.3490|116.1880|05/19/1969|144033.0|  8.6| 4.50| 0.019 | IV | 73.3(118.0)
DMG |32.9830|115.9830|05/23/1942|154729.0|  0.0| 5.00| 0.024 |  V | 73.4(118.2)
DMG |33.5670|117.9830|07/07/1937|1112 0.0|  0.0| 4.00| 0.014 | IV | 73.5(118.2)
DMG |33.5670|117.9830|04/17/1934|1833 0.0|  0.0| 4.00| 0.014 | IV | 73.5(118.2)
PAS |33.5080|118.0710|11/20/1988| 53928.7|  6.0| 4.50| 0.019 | IV | 73.6(118.5)
GSP |33.2240|116.0880|07/10/1998|212913.8| 12.0| 4.10| 0.015 | IV | 73.7(118.6)
GSP |33.6200|117.9000|04/07/1989|200730.2| 13.0| 4.50| 0.019 | IV | 73.7(118.6)
DMG |33.5750|117.9830|03/11/1933| 518 4.0|  0.0| 5.20| 0.027 |  V | 73.9(118.9)
DMG |33.2330|116.0860|08/26/1965|133814.0| -2.0| 4.50| 0.019 | IV | 74.1(119.2)
DMG |32.3830|116.0000|01/03/1956|1424 1.0|  0.0| 4.70| 0.021 | IV | 74.2(119.5)
DMG |33.0560|115.9930|04/09/1968| 35836.0|  7.9| 4.30| 0.017 | IV | 74.3(119.5)
DMG |31.9670|116.3000|05/31/1961| 72339.0|  0.0| 4.00| 0.014 | IV | 74.4(119.8)
DMG |33.0480|115.9860|04/16/1968| 33029.9|  8.3| 4.80| 0.022 | IV | 74.5(119.9)
DMG |33.2670|116.1000|01/04/1954|233152.0|  0.0| 4.20| 0.016 | IV | 74.5(119.9)
GSP |32.7270|115.9260|01/13/1999|132056.0|  2.0| 4.40| 0.017 | IV | 74.6(120.1)
DMG |33.1070|116.0070|04/09/1968| 8 038.5|  4.0| 4.00| 0.014 | IV | 74.6(120.1)
DMG |33.5170|118.1000|03/22/1941| 82240.0|  0.0| 4.00| 0.014 | IV | 75.2(121.0)
DMG |33.0830|115.9830|12/15/1937| 958 0.0|  0.0| 4.00| 0.014 | IV | 75.4(121.3)
DMG |33.0830|115.9830|03/02/1934|2130 0.0|  0.0| 4.50| 0.018 | IV | 75.4(121.3)
DMG |33.0830|115.9830|07/13/1940|163923.0|  0.0| 4.00| 0.014 | IV | 75.4(121.3)
DMG |33.0830|115.9830|07/14/1940| 0 144.0|  0.0| 4.00| 0.014 | IV | 75.4(121.3)
DMG |33.0830|115.9830|12/10/1938| 312 0.0|  0.0| 4.00| 0.014 | IV | 75.4(121.3)
DMG |33.8000|117.0000|12/25/1899|1225 0.0|  0.0| 6.40| 0.050 | VI | 75.4(121.3)
DMG |32.7920|115.9140|10/12/1936|135631.8| 10.0| 4.00| 0.014 | IV | 75.4(121.4)
DMG |33.2780|116.0850|08/26/1965|125351.0|  1.0| 4.20| 0.016 | IV | 75.6(121.7)
DMG |33.6170|117.9670|03/11/1933| 154 7.8|  0.0| 6.30| 0.047 | VI | 75.7(121.8)
DMG |32.7640|115.9080|10/12/1936|17 750.1| 10.0| 4.00| 0.014 | IV | 75.7(121.8)
DMG |33.5610|118.0580|01/15/1937|183547.0| 10.0| 4.00| 0.014 | IV | 75.9(122.1)
DMG |33.6000|118.0000|03/11/1933| 231 0.0|  0.0| 4.40| 0.017 | IV | 75.9(122.1)
DMG |33.6000|118.0000|03/11/1933| 217 0.0|  0.0| 4.50| 0.018 | IV | 75.9(122.1)
DMG |33.0390|115.9490|05/06/1968|173147.6|  6.7| 4.00| 0.014 | IV | 76.3(122.9)
DMG |33.6000|118.0170|12/25/1935|1715 0.0|  0.0| 4.50| 0.018 | IV | 76.5(123.0)
GSP |33.2500|116.0500|08/31/1990|033800.0|  8.0| 4.20| 0.015 | IV | 76.5(123.0)
DMG |32.0500|116.1670|02/06/1958|111530.0|  0.0| 4.50| 0.018 | IV | 76.5(123.1)
MGI |33.8000|116.9000|12/18/1920|1726 0.0|  0.0| 4.00| 0.014 | IV | 76.5(123.2)
MGI |33.8000|116.9000|04/29/1918| 2 0 0.0|  0.0| 4.00| 0.014 | IV | 76.5(123.2)
MGI |33.8000|116.9000|06/14/1918|1024 0.0|  0.0| 4.00| 0.014 | IV | 76.5(123.2)
MGI |33.8000|116.9000|04/23/1918|1415 0.0|  0.0| 4.00| 0.014 | IV | 76.5(123.2)
DMG |33.2400|116.0360|04/28/1961| 63021.2| -1.2| 4.20| 0.015 | IV | 76.8(123.7)
DMG |33.3330|116.1000|06/12/1943|192141.0|  0.0| 4.00| 0.014 | IV | 76.9(123.7)
DMG |32.9550|115.9110|04/10/1967| 04717.3|  4.4| 4.00| 0.014 | IV | 77.1(124.0)
DMG |32.0500|116.1500|03/01/1945|111958.0|  0.0| 4.40| 0.017 | IV | 77.3(124.4)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+---+-----------
DMG |33.6170|118.0170|10/02/1933|1326 1.0|  0.0| 4.00| 0.014 | III| 77.4(124.5)
DMG |33.6170|118.0170|03/14/1933|19 150.0|  0.0| 5.10| 0.025 |  V | 77.4(124.5)
DMG |33.6170|118.0170|03/15/1933|111332.0|  0.0| 4.90| 0.022 | IV | 77.4(124.5)
DMG |33.8330|117.4000|06/05/1940| 82727.0|  0.0| 4.00| 0.014 | III| 77.5(124.7)
DMG |33.1670|115.9830|07/21/1940| 836 3.0|  0.0| 4.40| 0.017 | IV | 77.5(124.7)
DMG |33.2000|116.0000|08/15/1951|1227 9.0|  0.0| 4.00| 0.014 | III| 77.5(124.7)
DMG |33.8000|117.6000|09/16/1903|1210 0.0|  0.0| 4.00| 0.014 | III| 77.7(125.1)
MGI |33.8000|117.6000|04/22/1918|2115 0.0|  0.0| 5.00| 0.023 | IV | 77.7(125.1)
DMG |32.5000|115.9000|06/25/1941|1715 0.0|  0.0| 4.00| 0.014 | III| 77.7(125.1)
DMG |32.1170|116.0830|07/09/1951| 9 622.0|  0.0| 4.20| 0.015 | IV | 77.9(125.3)
DMG |33.3170|116.0670|09/04/1944|125528.0|  0.0| 4.10| 0.014 | IV | 77.9(125.4)
DMG |33.6170|118.0330|05/21/1938| 944 0.0|  0.0| 4.00| 0.014 | III| 77.9(125.4)
DMG |31.9670|116.2170|02/18/1955|152728.0|  0.0| 4.70| 0.020 | IV | 78.0(125.5)
PAS |31.8640|116.3420|12/09/1984| 8 3 9.0|  6.0| 4.30| 0.016 | IV | 78.0(125.5)
DMG |31.8990|116.2900|06/04/1964|10 341.3| -0.5| 4.10| 0.014 | IV | 78.2(125.9)
DMG |33.2310|116.0040|05/26/1957|155933.6| 15.1| 5.00| 0.023 | IV | 78.2(125.9)
MGI |33.7000|117.9000|07/08/1902| 945 0.0|  0.0| 4.00| 0.014 | III| 78.4(126.1)
DMG |33.2830|116.0330|03/16/1949|18 027.0|  0.0| 4.00| 0.014 | III| 78.4(126.2)
DMG |33.2830|116.0330|03/29/1951|233929.0|  0.0| 4.40| 0.017 | IV | 78.4(126.2)
DMG |33.6590|117.9810|10/20/1961|20 714.5|  6.1| 4.00| 0.014 | III| 78.5(126.4)
DMG |33.6540|117.9940|10/20/1961|194950.5|  4.6| 4.30| 0.016 | IV | 78.7(126.6)
DMG |33.6650|117.9790|10/20/1961|214240.7|  7.2| 4.00| 0.014 | III| 78.8(126.8)
DMG |33.0360|115.9030|10/05/1964| 121 9.5| -2.0| 4.10| 0.014 | IV | 78.9(126.9)
DMG |32.8850|115.8650|10/27/1963|145822.4| -2.0| 4.40| 0.017 | IV | 78.9(127.0)
DMG |31.7500|116.5000|04/29/1935|20 8 0.0|  0.0| 5.00| 0.023 | IV | 78.9(127.0)
DMG |31.7500|116.5000|05/01/1935| 655 0.0|  0.0| 4.00| 0.014 | III| 78.9(127.0)
DMG |31.7500|116.5000|05/01/1935|1823 0.0|  0.0| 4.00| 0.014 | III| 78.9(127.0)
DMG |31.7500|116.5000|05/01/1935| 0 7 0.0|  0.0| 4.50| 0.018 | IV | 78.9(127.0)
DMG |31.7500|116.5000|04/29/1935|2149 0.0|  0.0| 4.00| 0.014 | III| 78.9(127.0)
DMG |31.7500|116.5000|05/01/1935| 352 0.0|  0.0| 4.00| 0.014 | III| 78.9(127.0)
DMG |31.7500|116.5000|05/01/1935|1825 0.0|  0.0| 4.00| 0.014 | III| 78.9(127.0)
DMG |32.7000|115.8500|11/01/1941|142434.0|  0.0| 4.00| 0.014 | III| 79.1(127.2)
DMG |33.2880|116.0180|07/27/1965|14 441.4|  0.6| 4.30| 0.016 | IV | 79.3(127.7)
GSP |33.2100|115.9700|07/19/1991|024136.8|  3.0| 4.00| 0.013 | III| 79.4(127.7)
DMG |32.5000|118.5500|02/24/1948| 81510.0|  0.0| 5.30| 0.027 |  V | 79.4(127.8)
PAS |33.0290|115.8880|11/26/1987|1739 2.0|  1.8| 4.30| 0.016 | IV | 79.6(128.0)
USG |32.6450|115.8440|02/28/1988| 5 259.5|  7.1| 4.21| 0.015 | IV | 79.6(128.1)
PAS |33.0170|115.8810|11/24/1987|185040.3|  0.0| 4.30| 0.016 | IV | 79.7(128.3)
DMG |32.1520|116.0200|02/16/1967|194127.4|  5.3| 4.00| 0.013 | III| 79.8(128.4)
PAS |32.9930|115.8720|11/24/1987|133259.9|  0.0| 4.20| 0.015 | IV | 79.9(128.5)
DMG |33.0330|115.8830|08/27/1945|112520.0|  0.0| 4.00| 0.013 | III| 79.9(128.6)
DMG |31.8330|116.3330|06/26/1932|103222.0|  0.0| 4.00| 0.013 | III| 80.0(128.7)
DMG |31.8330|116.3330|06/27/1932|1016 9.0|  0.0| 4.00| 0.013 | III| 80.0(128.7)
DMG |31.8330|116.3330|06/27/1932| 94643.0|  0.0| 4.00| 0.013 | III| 80.0(128.7)
DMG |31.8330|116.3330|06/27/1932|10 720.0|  0.0| 4.50| 0.017 | IV | 80.0(128.7)
DMG |33.8000|116.7000|08/11/1911|1820 0.0|  0.0| 4.00| 0.013 | III| 80.0(128.8)
DMG |33.8000|116.7000|08/11/1911|2340 0.0|  0.0| 4.50| 0.017 | IV | 80.0(128.8)
DMG |33.6800|117.9930|11/20/1961| 85334.7|  4.4| 4.00| 0.013 | III| 80.1(128.9)
DMG |33.7670|117.8170|08/22/1936| 521 0.0|  0.0| 4.00| 0.013 | III| 80.2(129.0)
DMG |33.6710|118.0120|10/20/1961|223534.2|  5.6| 4.10| 0.014 | IV | 80.2(129.1)
GSP |33.8060|117.7150|03/07/2000|002028.2| 11.0| 4.00| 0.013 | III| 80.3(129.2)
DMG |33.1000|115.9000|04/25/1957|22 5 0.0|  0.0| 4.20| 0.015 | IV | 80.3(129.3)
DMG |33.1000|115.9000|04/25/1957|2248 0.0|  0.0| 4.10| 0.014 | IV | 80.3(129.3)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec | (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+---------+-----+-----+-------+----+-----------
DMG |33.1000|115.9000|04/25/1957|2249 0.0|  0.0| 4.20| 0.015 | IV | 80.3(129.3)
PAS |32.9320|115.8470|09/05/1982| 52126.6|  4.2| 4.40| 0.016 | IV | 80.4(129.4)
PAS |33.5380|118.2070|05/25/1982|134430.3| 13.7| 4.10| 0.014 | IV | 80.6(129.7)
DMG |33.5000|118.2500|06/18/1920|10 8 0.0|  0.0| 4.50| 0.017 | IV | 80.6(129.7)
DMG |33.6170|118.1170|01/20/1934|2117 0.0|  0.0| 4.50| 0.017 | IV | 81.0(130.3)
DMG |31.5700|117.4880|05/01/1939|202223.3| 10.0| 4.00| 0.013 | III| 81.2(130.7)
DMG |33.0450|115.8630|12/17/1968|225351.2|  8.0| 4.70| 0.019 | IV | 81.2(130.8)
DMG |33.9000|117.2000|12/19/1880| 0 0 0.0|  0.0| 6.00| 0.038 |  V | 81.3(130.9)
DMG |32.0000|116.1000|12/15/1959|152419.0|  0.0| 4.30| 0.015 | IV | 81.7(131.5)
PAS |31.9430|116.1550|08/06/1980| 94622.7|  7.4| 4.00| 0.013 | III| 81.8(131.6)
MGI |33.8000|117.8000|11/09/1926|1535 0.0|  0.0| 4.60| 0.018 | IV | 81.8(131.7)
MGI |33.8000|117.8000|05/20/1917| 945 0.0|  0.0| 4.00| 0.013 | III| 81.8(131.7)
MGI |33.8000|117.8000|11/07/1926|1948 0.0|  0.0| 4.60| 0.018 | IV | 81.8(131.7)
MGI |33.8000|117.8000|11/10/1926|1723 0.0|  0.0| 4.60| 0.018 | IV | 81.8(131.7)
MGI |33.8000|117.8000|05/19/1917| 635 0.0|  0.0| 4.00| 0.013 | III| 81.8(131.7)
MGI |33.8000|117.8000|05/19/1917| 719 0.0|  0.0| 4.00| 0.013 | III| 81.8(131.7)
MGI |33.8000|117.8000|11/04/1926|2238 0.0|  0.0| 4.60| 0.018 | IV | 81.8(131.7)
DMG |33.0530|115.8550|10/05/1964| 12455.5|  0.0| 4.40| 0.016 | IV | 81.8(131.7)
DMG |31.9000|116.2000|08/21/1960|212732.0|  0.0| 4.00| 0.013 | III| 81.9(131.7)
DMG |31.7000|116.5000|01/12/1941|12 8 0.0|  0.0| 4.00| 0.013 | III| 81.9(131.8)
DMG |31.5500|116.9830|09/05/1959| 91744.0|  0.0| 4.00| 0.013 | III| 82.0(132.0)
PAS |33.0130|115.8390|11/24/1987|131556.5|  2.4| 6.00| 0.038 |  V | 82.0(132.0)
DMG |31.7920|116.3340|06/12/1963|221516.9|  8.8| 4.80| 0.020 | IV | 82.1(132.2)
DMG |33.0000|115.8330|01/08/1946|185418.0|  0.0| 5.40| 0.027 |  V | 82.2(132.2)
DMG |33.6830|118.0500|03/11/1933| 658 3.0|  0.0| 5.50| 0.029 |  V | 82.2(132.2)
DMG |33.6830|118.0500|03/11/1933|1250 0.0|  0.0| 4.40| 0.016 | IV | 82.2(132.2)
PAS |31.9370|116.1520|11/07/1984|142326.8|  6.0| 4.00| 0.013 | III| 82.2(132.2)
DMG |33.8000|116.6000|09/10/1931| 436 0.0|  0.0| 4.00| 0.013 | III| 82.3(132.5)
PAS |31.7820|116.3400|07/24/1981|113846.2| 15.0| 4.60| 0.018 | IV | 82.4(132.7)
PAS |33.1330|115.8730|11/24/1987|133355.8|  0.0| 4.00| 0.013 | III| 82.5(132.8)
DMG |32.1000|116.0000|02/03/1960| 83718.0|  0.0| 4.50| 0.017 | IV | 82.6(132.9)
PAS |32.9790|115.8160|11/25/1987|135410.0|  0.6| 4.20| 0.014 | IV | 82.8(133.3)
DMG |33.2670|115.9330|12/30/1960|214025.0|  0.0| 4.00| 0.013 | III| 83.0(133.6)
PAS |32.9960|115.8160|11/27/1987| 11010.5|  6.0| 4.70| 0.019 | IV | 83.1(133.7)
DMG |32.9310|115.7980|01/12/1972|1231 9.6|  0.0| 4.00| 0.013 | III| 83.2(133.9)
PAS |32.9950|115.8130|12/02/1987| 4 3 6.2|  1.7| 4.00| 0.013 | III| 83.2(133.9)
PAS |32.9800|115.8090|11/28/1987| 03910.9|  0.8| 4.20| 0.014 | IV | 83.2(133.9)
DMG |33.0330|115.8210|09/30/1971|224611.3|  8.0| 5.10| 0.023 | IV | 83.4(134.2)
PAS |33.0140|115.8150|11/24/1987|131848.9|  6.0| 4.10| 0.014 | III| 83.4(134.2)
PAS |33.0360|115.8200|11/24/1987| 21435.5|  4.7| 4.50| 0.017 | IV | 83.5(134.4)
DMG |31.7870|116.3000|01/18/1965| 65719.5|  6.3| 4.00| 0.013 | III| 83.6(134.6)
DMG |33.7000|118.0670|03/11/1933| 51022.0|  0.0| 5.10| 0.023 | IV | 83.7(134.7)
DMG |33.7000|118.0670|03/11/1933| 85457.0|  0.0| 5.10| 0.023 | IV | 83.7(134.7)
DMG |33.7000|118.0670|07/20/1940| 4 113.0|  0.0| 4.00| 0.013 | III| 83.7(134.7)
DMG |33.7000|118.0670|02/08/1940|165617.0|  0.0| 4.00| 0.013 | III| 83.7(134.7)
DMG |32.5510|115.7850|01/23/1971|22 736.0|  8.0| 4.10| 0.014 | III| 83.7(134.7)
PAS |33.0330|115.8140|11/24/1987| 22159.6|  4.5| 4.00| 0.013 | III| 83.8(134.8)
PAS |33.0220|115.8080|11/24/1987| 62323.1|  3.4| 4.00| 0.013 | III| 83.9(135.1)
PAS |33.0400|115.8120|11/24/1987| 253 0.7|  3.5| 4.70| 0.019 | IV | 84.0(135.2)
DMG |33.9330|117.3670|10/24/1943| 02921.0|  0.0| 4.00| 0.013 | III| 84.1(135.3)
DMG |33.8540|117.7520|10/04/1961| 22131.6|  4.3| 4.10| 0.014 | III| 84.2(135.4)
DMG |31.8000|116.2670|06/20/1963| 446 8.0|  0.0| 4.00| 0.013 | III| 84.2(135.5)
DMG |31.8000|116.2670|06/11/1963|154948.0|  0.0| 4.00| 0.013 | III| 84.2(135.5)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
DMG |31.8000|116.2670|06/12/1963|221556.0|  0.0| 4.70| 0.019 | IV | 84.2(135.5)
DMG |31.8000|116.2670|06/12/1963| 85536.0|  0.0| 4.00| 0.013 | III| 84.2(135.5)
DMG |33.2830|115.9170|03/28/1952| 11622.0|  0.0| 4.20| 0.014 | IV | 84.3(135.7)
DMG |31.7960|116.2690|06/11/1963|152338.3| -2.0| 5.80| 0.033 |  V | 84.3(135.7)
DMG |33.7500|118.0000|11/16/1934|2126 0.0|  0.0| 4.00| 0.013 | III| 84.3(135.7)
PAS |33.0470|115.8080|11/24/1987|143629.9|  0.0| 4.00| 0.013 | III| 84.4(135.8)
MGI |33.8000|117.9000|05/22/1902| 740 0.0|  0.0| 4.30| 0.015 | IV | 84.4(135.8)
DMG |32.2000|115.9000|05/31/1960|191736.0|  0.0| 4.00| 0.013 | III| 84.4(135.9)
DMG |32.4170|115.8000|05/13/1960|123640.0|  0.0| 4.10| 0.014 | III| 84.7(136.4)
DMG |33.6300|118.2000|09/13/1929|132338.2|  0.0| 4.00| 0.013 | III| 84.8(136.5)
PAS |33.0500|115.8000|11/24/1987| 21647.2|  6.0| 4.00| 0.013 | III| 84.9(136.6)
PAS |33.0480|115.7980|11/24/1987| 21523.2|  5.0| 4.80| 0.019 | IV | 84.9(136.7)
PAS |33.0080|115.7860|11/24/1987|1321 0.2|  6.0| 4.10| 0.013 | III| 84.9(136.7)
DMG |33.6330|118.2000|11/01/1940|20 046.0|  0.0| 4.00| 0.013 | III| 85.0(136.8)
DMG |33.1830|115.8500|04/25/1957|222148.0|  0.0| 4.20| 0.014 | IV | 85.0(136.8)
DMG |33.1830|115.8500|04/25/1957|222412.0|  0.0| 5.10| 0.023 | IV | 85.0(136.8)
DMG |32.8330|115.7500|02/24/1933|1933 0.0|  0.0| 4.50| 0.017 | IV | 85.1(137.0)
PAS |32.9420|115.7630|11/24/1987|133439.9| 14.0| 4.80| 0.019 | IV | 85.3(137.3)
PAS |33.0670|115.7810|11/24/1987| 13248.1|  4.0| 4.20| 0.014 | IV | 86.2(138.8)
PAS |33.0720|115.7820|11/24/1987| 153 3.2|  4.2| 4.00| 0.013 | III| 86.3(138.8)
DMG |32.0000|116.0000|02/07/1930|2323 0.0|  0.0| 4.50| 0.016 | IV | 86.4(139.1)
DMG |32.0000|116.0000|07/19/1954|20 154.0|  0.0| 4.80| 0.019 | IV | 86.4(139.1)
DMG |32.0000|116.0000|07/20/1963| 14518.0|  0.0| 4.20| 0.014 | IV | 86.4(139.1)
DMG |33.5430|118.3400|09/14/1963| 35116.2|  2.2| 4.20| 0.014 | IV | 86.5(139.1)
DMG |33.7330|118.1000|03/11/1933|1350 0.0|  0.0| 4.40| 0.016 | IV | 86.7(139.4)
DMG |33.7330|118.1000|03/11/1933|15 9 0.0|  0.0| 4.40| 0.016 | IV | 86.7(139.4)
DMG |33.7330|118.1000|03/11/1933|1447 0.0|  0.0| 4.40| 0.016 | IV | 86.7(139.4)
DMG |33.9170|116.7500|01/25/1933|1444 0.0|  0.0| 4.00| 0.013 | III| 86.7(139.5)
PAS |33.0820|115.7750|11/24/1987| 15414.5|  4.9| 5.80| 0.032 |  V | 86.8(139.8)
DMG |33.7500|118.0830|03/12/1933|2354 0.0|  0.0| 4.50| 0.016 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 347 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/25/1933|1346 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 323 0.0|  0.0| 5.00| 0.021 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|2232 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 211 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/15/1933| 432 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|2231 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 252 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933| 616 0.0|  0.0| 4.60| 0.017 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/21/1933| 326 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933| 034 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 311 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/23/1933| 840 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 3 5 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 2 9 0.0|  0.0| 5.00| 0.021 | IV | 87.0(140.0)
DMG |33.7500|118.0830|04/02/1933| 8 0 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1129 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/13/1933|1532 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/19/1933|2123 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1653 0.0|  0.0| 4.80| 0.019 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/23/1933|1831 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 230 0.0|  0.0| 5.10| 0.022 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 837 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          |H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
DMG |33.7500|118.0830|03/11/1933|1357 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933| 6 1 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 436 0.0|  0.0| 4.60| 0.017 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 440 0.0|  0.0| 4.70| 0.018 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933|2128 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1956 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1547 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/15/1933| 540 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 2 5 0.0|  0.0| 4.30| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/13/1933| 343 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933| 027 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|23 5 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 751 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 222 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933| 546 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933| 448 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 832 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/20/1933|1358 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/30/1933|1225 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 258 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933|1825 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 3 9 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933|1738 0.0|  0.0| 4.50| 0.016 | IV | 87.0(140.0)
DMG |33.7500|118.0830|04/02/1933|1536 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1045 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 336 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/16/1933|1529 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/13/1933| 617 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/13/1933|131828.0|  0.0| 5.30| 0.025 |  V | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 439 0.0|  0.0| 4.90| 0.020 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1147 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/13/1933|1929 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 227 0.0|  0.0| 4.60| 0.017 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/14/1933|1219 0.0|  0.0| 4.50| 0.016 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 210 0.0|  0.0| 4.60| 0.017 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 2 4 0.0|  0.0| 4.90| 0.020 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/15/1933| 2 8 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/31/1933|1049 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 524 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 555 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|04/01/1933| 642 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|11 0 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 216 0.0|  0.0| 4.80| 0.019 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|2240 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/16/1933|1530 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/18/1933|2052 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 8 8 0.0|  0.0| 4.50| 0.016 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 926 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 759 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/14/1933| 036 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 515 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 910 0.0|  0.0| 5.10| 0.022 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1944 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
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                            EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
DMG |33.7500|118.0830|03/12/1933| 835 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1138 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 553 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 259 0.0|  0.0| 4.60| 0.017 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1025 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 339 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/13/1933| 432 0.0|  0.0| 4.70| 0.018 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|1141 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933|15 2 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933|1651 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 257 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 911 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 635 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933|22 0 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/12/1933| 740 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/17/1933|1651 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 611 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 513 0.0|  0.0| 4.70| 0.018 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 618 0.0|  0.0| 4.20| 0.014 | IV | 87.0(140.0)
DMG |33.7500|118.0830|03/14/1933|2242 0.0|  0.0| 4.10| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/16/1933|1456 0.0|  0.0| 4.00| 0.013 | III| 87.0(140.0)
DMG |33.7500|118.0830|03/11/1933| 521 0.0|  0.0| 4.40| 0.015 | IV | 87.0(140.0)
DMG |33.2330|115.8330|06/14/1942|222549.0|  0.0| 4.00| 0.013 | III| 87.2(140.4)
DMG |33.2330|115.8330|06/14/1942|213623.0|  0.0| 4.00| 0.013 | III| 87.2(140.4)
DMG |33.2330|115.8330|06/24/1942|235240.0|  0.0| 4.00| 0.013 | III| 87.2(140.4)
DMG |33.8000|118.0000|10/21/1913| 938 0.0|  0.0| 4.00| 0.013 | III| 87.3(140.4)
DMG |33.9500|116.8500|09/28/1946| 719 9.0|  0.0| 5.00| 0.021 | IV | 87.3(140.5)
DMG |33.9500|117.5830|04/11/1941| 12024.0|  0.0| 4.00| 0.012 | III| 87.4(140.7)
DMG |32.2830|115.8000|09/26/1959| 34050.0|  0.0| 4.30| 0.015 | IV | 87.6(140.9)
DMG |32.9830|115.7330|01/24/1951| 733 7.0|  0.0| 4.00| 0.012 | III| 87.6(140.9)
DMG |32.9830|115.7330|01/24/1951| 717 2.6|  0.0| 5.60| 0.029 |  V | 87.6(140.9)
DMG |32.8560|115.7100|09/18/1936|144032.1| 10.0| 4.50| 0.016 | IV | 87.6(140.9)
DMG |33.9170|116.7000|11/17/1943|112841.0|  0.0| 4.50| 0.016 | IV | 87.6(141.0)
DMG |33.9330|116.7500|08/06/1938| 228 0.0|  0.0| 4.00| 0.012 | III| 87.7(141.2)
DMG |33.9330|116.7500|10/28/1944|183016.0|  0.0| 4.40| 0.015 | IV | 87.7(141.2)
DMG |32.7330|115.7000|04/21/1960|233920.0|  0.0| 4.20| 0.014 | IV | 87.7(141.2)
DMG |31.6670|116.3670|07/17/1959| 72630.0|  0.0| 4.90| 0.020 | IV | 88.0(141.6)
DMG |33.9960|117.2700|02/17/1952|123658.3| 16.0| 4.50| 0.016 | IV | 88.0(141.6)
DMG |32.9500|115.7170|06/14/1953| 41729.9|  0.0| 5.50| 0.027 |  V | 88.1(141.7)
DMG |32.9500|115.7170|06/14/1953| 42958.0|  0.0| 4.80| 0.019 | IV | 88.1(141.7)
DMG |33.9680|116.8820|06/27/1959|162211.1| 13.8| 4.00| 0.012 | III| 88.1(141.7)
DMG |33.2160|115.8080|04/25/1957|215738.7| -0.3| 5.20| 0.023 | IV | 88.1(141.8)
DMG |32.6000|115.7000|12/19/1958|1437 0.0|  0.0| 4.10| 0.013 | III| 88.2(141.9)
DMG |32.6000|115.7000|04/26/1963| 1 342.0|  0.0| 4.00| 0.012 | III| 88.2(141.9)
MGI |33.5000|116.0000|09/30/1916| 425 0.0|  0.0| 4.00| 0.012 | III| 88.2(142.0)
DMG |34.0000|117.2500|07/23/1923| 73026.0|  0.0| 6.25| 0.041 |  V | 88.3(142.0)
DMG |34.0000|117.2500|11/01/1932| 445 0.0|  0.0| 4.00| 0.012 | III| 88.3(142.0)
DMG |34.0000|117.2830|11/07/1939|1852 8.4|  0.0| 4.70| 0.018 | IV | 88.3(142.1)
DMG |32.9000|115.7000|10/02/1928|19 1 0.0|  0.0| 5.00| 0.021 | IV | 88.5(142.4)
DMG |33.7500|118.1330|03/11/1933|11 4 0.0|  0.0| 4.60| 0.017 | IV | 88.7(142.8)
DMG |32.9150|115.6970|05/23/1963| 63635.7|  1.2| 4.30| 0.014 | IV | 88.8(142.9)
MGI |34.0000|117.4000|05/22/1907| 652 0.0|  0.0| 4.60| 0.017 | IV | 88.9(143.1)
T-A |34.0000|117.4200|04/12/1888|1315 0.0|  0.0| 4.30| 0.014 | IV | 89.0(143.3)
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                    EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
T-A |34.0000|117.4200|09/10/1920|1415 0.0|  0.0| 4.30| 0.014 | IV | 89.0(143.3)
DMG |34.0000|117.0000|06/30/1923| 022 0.0|  0.0| 4.50| 0.016 | IV | 89.1(143.3)
DMG |33.1670|115.7670|05/10/1955| 43840.0|  0.0| 4.30| 0.014 | IV | 89.1(143.4)
DMG |31.5000|117.7000|10/12/1940| 34542.0|  0.0| 4.00| 0.012 | III| 89.1(143.4)
DMG |33.7670|118.1170|11/04/1939|2141 0.0|  0.0| 4.00| 0.012 | III| 89.1(143.4)
DMG |33.9500|116.7330|04/26/1942|151023.0|  0.0| 4.00| 0.012 | III| 89.1(143.4)
DMG |33.9670|116.8000|09/07/1945|153424.0|  0.0| 4.30| 0.014 | IV | 89.1(143.5)
DMG |32.3330|115.7500|12/15/1938| 0 2 0.0|  0.0| 4.00| 0.012 | III| 89.2(143.5)
DMG |33.8980|116.5690|11/17/1964|145228.2| 10.3| 4.00| 0.012 | III| 89.2(143.6)
MGI |33.7000|116.2000|08/12/1917|11 0 0.0|  0.0| 4.00| 0.012 | III| 89.2(143.6)
GSG |31.8060|116.1280|03/23/1994|025916.2| 22.0| 5.00| 0.021 | IV | 89.4(143.9)
DMG |33.1750|115.7640|10/28/1963| 81417.1|  0.9| 4.00| 0.012 | III| 89.5(144.0)
PAS |32.9140|115.6840|01/28/1988| 254 2.4|  5.9| 4.70| 0.018 | IV | 89.6(144.1)
GSP |33.9510|117.7090|01/05/1998|181406.5| 11.0| 4.30| 0.014 | IV | 89.6(144.2)
DMG |34.0000|117.5000|07/03/1908|1255 0.0|  0.0| 4.00| 0.012 | III| 89.8(144.5)
MGI |34.0000|117.5000|12/16/1858|10 0 0.0|  0.0| 7.00| 0.060 | VI | 89.8(144.5)
PAS |34.0230|117.2450|10/02/1985|234412.4| 15.2| 4.80| 0.019 | IV | 89.8(144.6)
DMG |34.0170|117.0500|02/19/1940|12 655.7|  0.0| 4.60| 0.017 | IV | 89.9(144.6)
GSP |34.0240|117.2300|03/11/1998|121851.8| 14.0| 4.50| 0.016 | IV | 89.9(144.7)
DMG |33.7500|118.1670|05/16/1933|205855.0|  0.0| 4.00| 0.012 | III| 89.9(144.7)
DMG |32.1330|115.8330|06/10/1961| 21742.0|  0.0| 4.10| 0.013 | III| 90.0(144.8)
DMG |33.9730|116.7690|06/10/1944|111531.9| 10.0| 4.00| 0.012 | III| 90.0(144.9)
MGI |33.7500|116.2500|11/19/1917|1730 0.0|  0.0| 4.00| 0.012 | III| 90.1(144.9)
DMG |33.9760|116.7750|10/17/1965| 94519.0| 17.0| 4.90| 0.020 | IV | 90.1(145.1)
DMG |32.0000|118.5000|07/15/1943|2138 0.0|  0.0| 4.00| 0.012 | III| 90.2(145.2)
DMG |33.7500|118.1830|08/04/1933| 41748.0|  0.0| 4.00| 0.012 | III| 90.5(145.6)
DMG |33.7830|118.1330|10/02/1933| 91017.6|  0.0| 5.40| 0.025 |  V | 90.6(145.7)
DMG |33.7830|118.1330|11/20/1933|1032 0.0|  0.0| 4.00| 0.012 | III| 90.6(145.7)
DMG |33.7830|118.1330|01/13/1940| 749 7.0|  0.0| 4.00| 0.012 | III| 90.6(145.7)
DMG |32.9900|115.6820|11/29/1964|142526.4| 13.8| 4.20| 0.014 | III| 90.6(145.7)
DMG |34.0330|117.3170|09/03/1935| 647 0.0|  0.0| 4.50| 0.016 | IV | 90.7(146.0)
DMG |33.7830|116.2830|03/04/1937|16 4 0.0|  0.0| 4.00| 0.012 | III| 90.7(146.0)
DMG |34.0330|117.3500|04/18/1940|184343.9|  0.0| 4.40| 0.015 | IV | 90.9(146.2)
DMG |31.8000|116.1000|10/10/1953|1849 6.0|  0.0| 5.00| 0.021 | IV | 90.9(146.2)
DMG |33.0380|118.7340|09/13/1937|221439.5| 10.0| 4.00| 0.012 | III| 91.0(146.4)
DMG |33.9760|116.7210|06/12/1944|104534.7| 10.0| 5.10| 0.022 | IV | 91.1(146.5)
DMG |32.5000|115.6670|02/12/1932| 23021.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/22/1959| 631 0.0|  0.0| 4.40| 0.015 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/01/1958| 6 3 0.0|  0.0| 4.60| 0.017 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/20/1958| 0 6 0.0|  0.0| 4.30| 0.014 | IV | 91.1(146.6)
DMG |32.2500|115.7500|02/16/1959| 643 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/18/1959|1813 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/19/1958|1533 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/07/1959|1514 0.0|  0.0| 4.30| 0.014 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/25/1958| 127 0.0|  0.0| 4.60| 0.017 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/02/1958| 957 0.0|  0.0| 4.30| 0.014 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/04/1958| 142 0.0|  0.0| 4.20| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/25/1959| 345 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|02/26/1959| 3 3 0.0|  0.0| 4.50| 0.016 | IV | 91.1(146.6)
DMG |32.2500|115.7500|01/25/1959|10 1 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/22/1959| 023 0.0|  0.0| 4.60| 0.017 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/15/1958| 621 0.0|  0.0| 4.60| 0.017 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/14/1958| 0 7 0.0|  0.0| 4.20| 0.013 | III| 91.1(146.6)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
DMG |32.2500|115.7500|12/01/1958| 843 0.0|  0.0| 4.10| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/01/1958| 6 2 0.0|  0.0| 5.50| 0.027 |  V | 91.1(146.6)
DMG |32.2500|115.7500|12/08/1958| 051 0.0|  0.0| 4.40| 0.015 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/08/1958| 052 0.0|  0.0| 4.50| 0.016 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/02/1958|1156 0.0|  0.0| 4.10| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/09/1959|1835 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/23/1958| 653 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/20/1958| 3 5 0.0|  0.0| 4.50| 0.016 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/06/1958| 324 0.0|  0.0| 4.40| 0.015 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/01/1958| 350 0.0|  0.0| 5.00| 0.021 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/24/1958|2027 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/15/1959| 635 0.0|  0.0| 4.10| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/01/1958| 331 0.0|  0.0| 4.10| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/01/1958| 426 0.0|  0.0| 4.80| 0.018 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/02/1958| 054 0.0|  0.0| 4.70| 0.018 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/09/1958|1922 0.0|  0.0| 4.10| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/18/1959|1933 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/06/1958| 331 0.0|  0.0| 4.50| 0.016 | IV | 91.1(146.6)
DMG |32.2500|115.7500|03/22/1961|151115.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/20/1958| 0 7 0.0|  0.0| 4.70| 0.018 | IV | 91.1(146.6)
DMG |32.2500|115.7500|12/02/1958|1358 0.0|  0.0| 4.20| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/17/1958|1330 0.0|  0.0| 4.30| 0.014 | IV | 91.1(146.6)
DMG |32.2500|115.7500|03/04/1959|1659 0.0|  0.0| 4.10| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/14/1959| 332 0.0|  0.0| 4.20| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/01/1958| 32118.0|  0.0| 5.80| 0.031 |  V | 91.1(146.6)
DMG |32.2500|115.7500|12/01/1958| 340 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/10/1959|15 2 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
DMG |32.2500|115.7500|12/03/1958|19 6 0.0|  0.0| 4.10| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/22/1959| 820 0.0|  0.0| 4.10| 0.013 | III| 91.1(146.6)
DMG |32.2500|115.7500|01/22/1959| 739 0.0|  0.0| 4.00| 0.012 | III| 91.1(146.6)
PAS |31.8940|115.9940|03/04/1979|183746.0|  5.0| 4.00| 0.012 | III| 91.2(146.7)
DMG |33.0270|115.6810|05/23/1963|1553 1.8|  0.4| 4.80| 0.018 | IV | 91.2(146.7)
DMG |34.0430|117.2280|04/03/1939| 25044.7| 10.0| 4.00| 0.012 | III| 91.2(146.8)
PAS |33.9760|116.7130|08/06/1984| 81436.6| 14.2| 4.30| 0.014 | IV | 91.2(146.8)
DMG |31.8540|116.0320|07/23/1970|125947.0|  8.0| 4.40| 0.015 | IV | 91.2(146.8)
DMG |33.9590|116.6510|09/23/1949|214440.1| 12.2| 4.00| 0.012 | III| 91.3(146.9)
GSP |34.0470|117.2550|02/21/2000|134943.1| 15.0| 4.50| 0.016 | IV | 91.5(147.3)
DMG |33.8800|116.4370|04/17/1959|1619 0.2| 22.2| 4.20| 0.013 | III| 91.6(147.3)
DMG |33.9810|116.7020|06/12/1944|222119.5| 10.0| 4.20| 0.013 | III| 91.7(147.6)
PAS |33.9790|116.6810|12/16/1988| 553 5.0|  8.1| 4.80| 0.018 | IV | 92.0(148.0)
DMG |33.0080|115.6600|06/17/1965| 74013.5|  8.8| 4.10| 0.013 | III| 92.1(148.2)
PAS |33.0790|115.6800|04/26/1981|124043.4|  6.0| 4.20| 0.013 | III| 92.1(148.2)
GSP |32.6120|115.6280|07/27/1992|204008.8| 15.0| 4.10| 0.013 | III| 92.3(148.5)
DMG |33.9940|116.7120|06/12/1944|111636.0| 10.0| 5.30| 0.024 | IV | 92.4(148.7)
PAS |33.9670|116.6170|07/08/1986|155526.2|  6.0| 4.00| 0.012 | III| 92.5(148.9)
PAS |33.9670|116.6170|07/08/1986|102240.6|  6.0| 4.40| 0.015 | IV | 92.5(148.9)
PAS |32.7880|115.6180|10/15/1979|2355 2.6|  5.0| 4.20| 0.013 | III| 92.6(149.0)
PAS |33.9530|116.5720|10/15/1986| 22847.8|  8.7| 4.70| 0.017 | IV | 92.6(149.0)
MGI |34.0000|117.7000|12/03/1929| 9 5 0.0|  0.0| 4.00| 0.012 | III| 92.6(149.1)
DMG |32.3000|115.7000|02/28/1961|212254.0|  0.0| 4.40| 0.015 | IV | 92.7(149.1)
DMG |34.0140|116.7710|06/10/1944|111150.5| 10.0| 4.50| 0.016 | IV | 92.7(149.2)
DMG |32.7940|115.6150|04/23/1968|1624 9.5|  5.0| 4.10| 0.013 | III| 92.8(149.3)
DMG |33.7830|118.2000|12/27/1939|192849.0|  0.0| 4.70| 0.017 | IV | 92.9(149.5)
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                             EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec | (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
DMG |32.1500|115.7670|06/10/1959|172046.0|  0.0| 4.10| 0.013 | III| 92.9(149.6)
DMG |34.0000|116.7000|08/25/1944| 73025.0|  0.0| 4.20| 0.013 | III| 93.0(149.7)
DMG |32.8830|115.6170|01/16/1946|11 654.0|  0.0| 4.20| 0.013 | III| 93.1(149.9)
DMG |33.6330|118.4000|10/17/1934| 938 0.0|  0.0| 4.00| 0.012 | III| 93.2(149.9)
PAS |33.9890|116.6490|07/17/1986|203515.0|  6.2| 4.00| 0.012 | III| 93.3(150.1)
GSP |32.9750|118.7910|03/04/1992|190627.0|  6.0| 4.20| 0.013 | III| 93.3(150.2)
DMG |32.0330|115.8330|01/28/1932|171749.0|  0.0| 4.50| 0.015 | IV | 93.4(150.2)
DMG |32.0330|115.8330|01/08/1932| 23445.0|  0.0| 4.00| 0.012 | III| 93.4(150.2)
PAS |33.9910|116.6490|07/17/1986|215445.2|  7.4| 4.40| 0.015 | IV | 93.4(150.3)
DMG |32.2670|115.7000|06/11/1960|213656.0|  0.0| 4.50| 0.015 | IV | 93.4(150.3)
DMG |33.2330|115.7170|10/22/1942| 15038.0|  0.0| 5.50| 0.026 |  V | 93.4(150.3)
DMG |33.2330|115.7170|10/26/1942| 615 4.0|  0.0| 4.50| 0.015 | IV | 93.4(150.3)
DMG |33.2330|115.7170|10/26/1942| 3 215.0|  0.0| 4.50| 0.015 | IV | 93.4(150.3)
DMG |33.2330|115.7170|10/26/1942| 34316.0|  0.0| 4.00| 0.012 | III| 93.4(150.3)
PAS |31.7760|116.0660|05/16/1976|232612.9|  5.0| 4.20| 0.013 | III| 93.5(150.4)
DMG |34.0290|116.7870|04/30/1954| 03623.9| 11.1| 4.20| 0.013 | III| 93.5(150.4)
DMG |33.7590|118.2530|08/31/1938| 31814.2| 10.0| 4.50| 0.015 | IV | 93.5(150.5)
DMG |31.8330|116.0000|06/07/1956| 6 4 0.0|  0.0| 4.10| 0.012 | III| 93.6(150.6)
DMG |31.8330|116.0000|04/28/1956| 641 0.0|  0.0| 4.30| 0.014 | IV | 93.6(150.6)
DMG |31.8330|116.0000|05/10/1956|114854.0|  0.0| 5.00| 0.020 | IV | 93.6(150.6)
DMG |33.7830|116.2000|10/31/1943|131210.0|  0.0| 4.50| 0.015 | IV | 93.6(150.7)
PAS |34.0060|117.7390|02/18/1989| 717 4.8|  3.3| 4.30| 0.014 | IV | 93.7(150.8)
PAS |33.0940|115.6550|06/13/1979|194645.9|  6.0| 4.10| 0.012 | III| 93.8(150.9)
T-A |34.0800|117.2500|10/07/1869| 0 0 0.0|  0.0| 4.30| 0.014 | IV | 93.8(150.9)
DMG |33.2840|115.7350|10/27/1963|145023.4| -2.0| 4.00| 0.012 | III| 93.8(151.0)
DMG |31.5680|116.3630|08/13/1967| 8 213.0| 10.0| 4.50| 0.015 | IV | 93.8(151.0)
DMG |31.7090|116.1370|02/16/1967|1738 8.0|  2.8| 4.20| 0.013 | III| 93.9(151.2)
DMG |31.5000|116.5000|10/17/1954|225718.0|  0.0| 5.70| 0.029 |  V | 94.1(151.4)
DMG |31.5000|116.5000|02/18/1939| 557 0.0|  0.0| 4.00| 0.012 | III| 94.1(151.4)
PAS |33.9650|117.8860|01/01/1976|172012.9|  6.2| 4.20| 0.013 | III| 94.2(151.6)
DMG |33.2330|115.7000|08/30/1946|111645.0|  0.0| 4.60| 0.016 | IV | 94.3(151.8)
DMG |32.4500|115.6170|01/31/1939|1616 0.0|  0.0| 4.00| 0.012 | III| 94.6(152.2)
DMG |32.4500|115.6170|06/20/1935| 724 0.0|  0.0| 4.00| 0.012 | III| 94.6(152.2)
DMG |32.4500|115.6170|03/21/1939|1351 0.0|  0.0| 4.00| 0.012 | III| 94.6(152.2)
DMG |32.4500|115.6170|04/17/1938| 347 0.0|  0.0| 4.00| 0.012 | III| 94.6(152.2)
DMG |32.4500|115.6170|03/25/1939| 259 0.0|  0.0| 4.00| 0.012 | III| 94.6(152.2)
PAS |32.6630|115.5830|10/31/1980|125536.7|  3.6| 4.40| 0.015 | IV | 94.7(152.3)
DMG |33.7830|118.2500|11/14/1941| 84136.3|  0.0| 5.40| 0.025 |  V | 94.7(152.4)
PAS |33.9980|116.6060|07/08/1986| 92044.5| 11.7| 5.60| 0.027 |  V | 94.7(152.5)
PAS |33.9870|116.5690|07/09/1986| 01232.1|  6.0| 4.40| 0.014 | IV | 94.8(152.6)
DMG |32.5000|115.6000|12/08/1933| 437 0.0|  0.0| 4.00| 0.012 | III| 94.9(152.7)
DMG |32.1590|115.7240|01/19/1972| 15942.8|  8.0| 4.00| 0.012 | III| 94.9(152.8)
GSP |34.0850|116.9890|06/30/1992|214900.3|  3.0| 4.40| 0.014 | IV | 95.0(152.8)
PAS |32.0880|115.7650|04/13/1984| 32835.6|  6.0| 4.10| 0.012 | III| 95.0(152.8)
DMG |33.0560|115.6200|06/16/1965| 242 6.1| -0.5| 4.40| 0.014 | IV | 95.1(153.0)
DMG |32.2000|115.7000|10/16/1954| 8 518.0|  0.0| 4.00| 0.012 | III| 95.1(153.0)
DMG |32.8830|115.5830|04/13/1938|1929 0.0|  0.0| 4.50| 0.015 | IV | 95.1(153.0)
DMG |33.6630|118.4130|01/08/1967| 738 5.3| 17.7| 4.00| 0.012 | III| 95.1(153.1)
PAS |33.0980|115.6320|04/26/1981|12 928.4|  3.8| 5.70| 0.029 |  V | 95.1(153.1)
PAS |32.8390|115.5780|10/15/1979|232552.6|  8.1| 4.00| 0.012 | III| 95.1(153.1)
MGI |34.1000|117.2000|04/23/1923|2113 0.0|  0.0| 4.00| 0.012 | III| 95.1(153.1)
DMG |32.2670|115.6670|05/17/1959|1257 0.0|  0.0| 4.00| 0.012 | III| 95.2(153.2)
PAS |33.0990|115.6300|04/26/1981|12 557.4|  4.2| 4.00| 0.012 | III| 95.2(153.3)
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                            EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+----------
MGI |34.1000|117.3000|11/22/1911| 257 0.0|  0.0| 4.00| 0.012 | III| 95.3(153.3)
MGI |34.1000|117.3000|07/15/1905|2041 0.0|  0.0| 5.30| 0.023 | IV | 95.3(153.3)
MGI |34.1000|117.3000|12/27/1901|11 0 0.0|  0.0| 4.60| 0.016 | IV | 95.3(153.3)
DMG |34.1000|117.3000|02/16/1931|1327 0.0|  0.0| 4.00| 0.012 | III| 95.3(153.3)
DMG |33.8170|118.2170|10/22/1941| 65718.5|  0.0| 4.90| 0.019 | IV | 95.3(153.4)
PAS |33.1100|115.6270|04/25/1981| 21155.3|  4.8| 4.10| 0.012 | III| 95.6(153.9)
DMG |32.2500|115.6670|04/29/1932|165233.0|  0.0| 4.00| 0.012 | III| 95.6(153.9)
DMG |31.6250|116.2110|06/10/1969| 34132.7| -2.0| 5.00| 0.020 | IV | 95.7(153.9)
PAS |32.9040|115.5760|10/17/1979|191438.4| 15.9| 4.10| 0.012 | III| 95.7(154.0)
GSP |34.0970|116.9960|12/05/1997|170438.9|  4.0| 4.10| 0.012 | III| 95.7(154.0)
PAS |33.1030|115.6220|11/04/1976|133127.7|  3.7| 4.20| 0.013 | III| 95.8(154.1)
DMG |33.9330|116.4000|12/10/1948|204257.0|  0.0| 4.40| 0.014 | IV | 95.8(154.1)
PAS |33.1030|115.6210|11/04/1976|1139 8.4|  0.9| 4.10| 0.012 | III| 95.8(154.2)
PAS |34.0310|116.6570|07/08/1986| 92412.8|  6.0| 4.40| 0.014 | IV | 95.8(154.2)
DMG |33.0120|115.5920|04/11/1965| 04646.1| -2.0| 4.10| 0.012 | III| 96.0(154.4)
DMG |33.6320|118.4670|01/08/1967| 73730.4| 11.4| 4.00| 0.012 | III| 96.0(154.5)
PAS |33.1090|115.6190|11/04/1976|114940.4|  2.2| 4.10| 0.012 | III| 96.0(154.5)
DMG |33.9000|118.1000|07/08/1929|1646 6.7| 13.0| 4.70| 0.017 | IV | 96.2(154.7)
DMG |33.9330|116.3830|12/04/1948|234317.0|  0.0| 6.50| 0.043 | VI | 96.3(154.9)
PAS |32.9070|115.5660|10/16/1979|114655.3| 11.4| 4.80| 0.018 | IV | 96.3(154.9)
PAS |33.1170|115.6150|04/26/1976| 64637.5| 14.8| 4.00| 0.012 | III| 96.4(155.1)
DMG |32.1500|115.7000|09/26/1959| 75316.0|  0.0| 4.10| 0.012 | III| 96.5(155.3)
DMG |33.9670|116.4500|12/11/1948|161220.0|  0.0| 4.50| 0.015 | IV | 96.5(155.3)
GSP |33.8760|116.2670|06/29/1992|160142.8|  1.0| 5.20| 0.022 | IV | 96.5(155.3)
GSP |33.9450|116.3990|07/05/1992|054938.2|  3.0| 4.00| 0.012 | III| 96.5(155.4)
DMG |34.1180|117.3410|09/22/1951| 82239.1| 11.9| 4.30| 0.014 | III| 96.7(155.6)
T-A |33.5000|115.8200|05/00/1868| 0 0 0.0|  0.0| 6.30| 0.039 |  V | 96.7(155.6)
DMG |33.9330|116.3670|12/05/1948| 0 721.0|  0.0| 4.90| 0.019 | IV | 96.7(155.7)
PAS |33.0010|115.5760|10/16/1979| 74947.2|  8.5| 4.00| 0.012 | III| 96.7(155.7)
DMG |34.1120|117.4260|03/19/1937| 12338.4| 10.0| 4.00| 0.012 | III| 96.8(155.7)
DMG |33.0370|115.5840|06/17/1965| 73020.9| -1.3| 4.30| 0.014 | III| 96.8(155.8)
DMG |33.1310|115.6110|10/27/1963|181250.7|  7.8| 4.20| 0.013 | III| 96.9(155.9)
GSP |33.0300|115.5800|03/24/1989|231648.0|  6.0| 4.00| 0.012 | III| 96.9(156.0)
DMG |33.9630|116.4250|01/13/1950| 5 719.4|  5.9| 4.10| 0.012 | III| 96.9(156.0)
DMG |33.9670|116.4330|12/05/1948| 04235.0|  0.0| 4.60| 0.016 | IV | 96.9(156.0)
DMG |33.2670|115.6670|08/10/1951|1130 8.0|  0.0| 4.40| 0.014 | IV | 97.0(156.1)
DMG |34.1000|116.8830|10/24/1935|1527 0.0|  0.0| 4.00| 0.012 | III| 97.0(156.1)
DMG |34.1000|116.8830|10/24/1935|1451 0.0|  0.0| 4.50| 0.015 | IV | 97.0(156.1)
DMG |34.1000|116.8830|10/24/1935|1452 0.0|  0.0| 4.50| 0.015 | IV | 97.0(156.1)
DMG |32.4170|115.5830|01/03/1936|14 7 0.0|  0.0| 4.00| 0.012 | III| 97.0(156.1)
DMG |32.9820|115.5660|05/23/1963| 9 6 4.7| 25.4| 4.60| 0.016 | IV | 97.1(156.2)
DMG |33.0190|115.5730|06/17/1965| 743 5.0| -2.0| 4.20| 0.013 | III| 97.1(156.3)
DMG |33.2000|115.6330|10/27/1963|145245.2| -2.0| 4.10| 0.012 | III| 97.2(156.4)
GSP |33.9460|116.3790|04/24/1992|123605.7| 10.0| 4.10| 0.012 | III| 97.2(156.4)
PAS |32.9500|115.5570|10/16/1979| 33934.3| 12.1| 4.50| 0.015 | IV | 97.2(156.4)
DMG |33.9330|116.3500|12/05/1948| 04032.0|  0.0| 4.40| 0.014 | IV | 97.2(156.5)
DMG |34.1270|117.3380|02/23/1936|222042.7| 10.0| 4.50| 0.015 | IV | 97.3(156.5)
GSP |34.1200|116.9980|06/29/1992|144126.0|  4.0| 4.40| 0.014 | IV | 97.3(156.6)
DMG |32.1830|115.6670|09/21/1959| 11753.0|  0.0| 4.30| 0.013 | III| 97.3(156.6)
GSP |34.1120|116.9200|10/01/1998|181816.0|  4.0| 4.70| 0.017 | IV | 97.4(156.8)
DMG |34.1160|117.4750|06/28/1960|20 048.0| 12.0| 4.10| 0.012 | III| 97.4(156.8)
DMG |33.8000|118.3000|11/03/1931|16 5 0.0|  0.0| 4.00| 0.011 | III| 97.4(156.8)
MGI |33.8000|118.3000|12/31/1928|1045 0.0|  0.0| 4.00| 0.011 | III| 97.4(156.8)
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    |       |        |          |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec | (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+---------+-----+-----+-------+----+-----------
GSP |33.9020|116.2840|07/24/1992|181436.2|  9.0| 5.00| 0.019 | IV | 97.4(156.8)
GSP |33.9050|116.2880|05/07/1995|110333.0| 10.0| 4.80| 0.018 | IV | 97.5(156.9)
DMG |33.8670|118.2000|11/13/1933|2128 0.0|  0.0| 4.00| 0.011 | III| 97.5(156.9)
PAS |33.1170|115.5950|11/04/1976|141250.2|  5.0| 4.40| 0.014 | IV | 97.5(156.9)
DMG |32.3540|115.5930|03/17/1972| 029 1.2|  8.0| 4.50| 0.015 | IV | 97.5(156.9)
PAS |33.1180|115.5950|11/04/1976| 62110.7|  5.0| 4.10| 0.012 | III| 97.5(157.0)
PAS |33.1230|115.5960|11/04/1976| 54820.9|  5.0| 4.20| 0.013 | III| 97.6(157.0)
PAS |33.1180|115.5900|11/04/1976| 635 3.5|  4.5| 4.10| 0.012 | III| 97.8(157.4)
GSP |33.7300|116.0200|12/18/1989|062704.5| 10.0| 4.20| 0.013 | III| 97.8(157.4)
GSP |33.9400|116.3410|05/04/1992|011602.6|  6.0| 4.00| 0.011 | III| 97.9(157.6)
PAS |33.1810|115.6110|03/07/1989| 02458.2|  2.8| 4.10| 0.012 | III| 97.9(157.6)
GSP |34.1210|116.9280|08/16/1998|133440.2|  6.0| 4.70| 0.017 | IV | 97.9(157.6)
PAS |32.9270|115.5400|10/16/1979| 54910.2| 10.4| 5.10| 0.020 | IV | 98.0(157.6)
PAS |32.9450|115.5430|10/16/1979| 31625.4|  7.2| 4.10| 0.012 | III| 98.0(157.6)
DMG |32.5830|115.5330|04/02/1947|151539.0|  0.0| 4.20| 0.013 | III| 98.0(157.7)
PAS |32.9280|115.5390|10/16/1979| 61948.7|  9.2| 5.10| 0.020 | IV | 98.0(157.7)
DMG |34.1240|117.4800|05/15/1955|17 326.0|  7.6| 4.00| 0.011 | III| 98.0(157.7)
DMG |34.1000|116.8000|10/24/1935|1448 7.6|  0.0| 5.10| 0.020 | IV | 98.0(157.8)
PAS |32.9600|115.5440|10/16/1979| 31047.1|  9.4| 4.50| 0.015 | IV | 98.1(157.8)
DMG |33.8670|118.2170|06/19/1944| 0 333.0|  0.0| 4.50| 0.015 | IV | 98.1(157.8)
DMG |33.8670|118.2170|06/19/1944| 3 6 7.0|  0.0| 4.40| 0.014 | IV | 98.1(157.8)
DMG |34.0000|116.4670|12/05/1948| 05057.0|  0.0| 4.40| 0.014 | IV | 98.1(157.9)
DMG |34.0000|116.4670|12/06/1948| 246 8.0|  0.0| 4.30| 0.013 | III| 98.1(157.9)
PAS |33.0140|115.5550|10/16/1979| 65842.8|  9.1| 5.50| 0.025 |  V | 98.1(157.9)
DMG |34.1320|117.4260|04/15/1965|20 833.3|  5.5| 4.50| 0.015 | IV | 98.1(157.9)
DMG |34.1400|117.3390|02/26/1936| 93327.6| 10.0| 4.00| 0.011 | III| 98.2(158.0)
PAS |32.9130|115.5340|10/16/1979| 6 439.0|  8.0| 4.00| 0.011 | III| 98.2(158.0)
DMG |32.3000|115.6000|01/07/1960|175130.0|  0.0| 4.10| 0.012 | III| 98.2(158.0)
DMG |34.0170|116.5000|07/25/1947| 15647.0|  0.0| 4.60| 0.016 | IV | 98.3(158.3)
DMG |34.0170|116.5000|07/30/1947| 52217.0|  0.0| 4.20| 0.013 | III| 98.3(158.3)
DMG |34.0170|116.5000|08/01/1947|17 137.0|  0.0| 4.10| 0.012 | III| 98.3(158.3)
DMG |34.0170|116.5000|07/25/1947| 75730.0|  0.0| 4.20| 0.013 | III| 98.3(158.3)
DMG |34.0170|116.5000|07/26/1947| 24941.0|  0.0| 5.10| 0.020 | IV | 98.3(158.3)
DMG |34.0170|116.5000|07/24/1947|225426.0|  0.0| 4.90| 0.018 | IV | 98.3(158.3)
DMG |34.0170|116.5000|07/25/1947| 61949.0|  0.0| 5.20| 0.021 | IV | 98.3(158.3)
DMG |34.0170|116.5000|07/29/1947|163615.0|  0.0| 4.20| 0.013 | III| 98.3(158.3)
DMG |34.0170|116.5000|07/25/1947|161453.0|  0.0| 4.50| 0.015 | IV | 98.3(158.3)
DMG |34.0170|116.5000|07/26/1947|231351.0|  0.0| 4.10| 0.012 | III| 98.3(158.3)
DMG |34.0170|116.5000|07/25/1947| 04631.0|  0.0| 5.00| 0.019 | IV | 98.3(158.3)
DMG |34.0170|116.5000|07/24/1947|221046.0|  0.0| 5.50| 0.025 |  V | 98.3(158.3)
DMG |34.0170|116.5000|08/08/1947| 64745.0|  0.0| 4.00| 0.011 | III| 98.3(158.3)
DMG |34.0170|116.5000|07/26/1947| 12415.0|  0.0| 4.20| 0.013 | III| 98.3(158.3)
DMG |34.0170|116.5000|07/24/1947|225341.0|  0.0| 4.30| 0.013 | III| 98.3(158.3)
DMG |34.0170|116.5000|07/25/1947| 51752.0|  0.0| 4.30| 0.013 | III| 98.3(158.3)
DMG |34.0170|116.5000|07/26/1947|23 425.0|  0.0| 4.50| 0.015 | IV | 98.3(158.3)
USG |34.1390|117.3860|02/21/1987|231530.1|  2.6| 4.07| 0.012 | III| 98.3(158.3)
GSP |33.1920|115.6080|12/31/1997|122245.1| 10.0| 4.10| 0.012 | III| 98.3(158.3)
DMG |33.9960|117.9750|06/15/1967| 458 5.5| 10.0| 4.10| 0.012 | III| 98.4(158.3)
PAS |32.8920|115.5260|01/12/1980|2011 6.4|  5.0| 4.10| 0.012 | III| 98.5(158.4)
PAS |32.9090|115.5280|10/16/1979| 1 013.9|  4.8| 4.60| 0.016 | IV | 98.5(158.5)
PAS |34.1350|117.4480|01/08/1983| 71930.4|  4.6| 4.10| 0.012 | III| 98.5(158.5)
DMG |34.1330|116.9500|06/10/1938|1440 0.0|  0.0| 4.00| 0.011 | III| 98.6(158.6)
GSG |33.9430|116.3250|04/23/1992|052316.2|  5.0| 4.00| 0.011 | III| 98.6(158.6)
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                         EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+------------
PAS |32.9320|115.5300|10/16/1979| 61346.5|  8.0| 4.10| 0.012 | III| 98.6(158.6)
PAS |33.1820|115.5990|03/06/1989|221647.6|  1.0| 4.30| 0.013 | III| 98.6(158.7)
DMG |34.1270|117.5210|12/27/1938|10 928.6| 10.0| 4.00| 0.011 | III| 98.6(158.7)
DMG |33.9670|118.0500|01/30/1941| 13446.9|  0.0| 4.10| 0.012 | III| 98.6(158.7)
GSP |33.9470|116.3300|09/09/1992|125045.1|  5.0| 4.30| 0.013 | III| 98.6(158.7)
GSP |33.9510|116.3380|05/18/1992|154418.0|  7.0| 4.90| 0.018 | IV | 98.6(158.7)
DMG |33.7710|116.0500|09/02/1956| 24637.0| 14.1| 4.20| 0.013 | III| 98.7(158.8)
GSP |33.9330|116.3020|04/27/1992|031119.3|  0.0| 4.20| 0.013 | III| 98.7(158.8)
DMG |32.9670|115.5330|02/13/1951|174634.0|  0.0| 4.10| 0.012 | III| 98.8(158.9)
DMG |32.9670|115.5330|02/13/1951|1716 0.0|  0.0| 4.20| 0.013 | III| 98.8(158.9)
PDP |33.9370|116.3060|07/25/1992|043160.0|  5.0| 4.90| 0.018 | IV | 98.8(159.0)
DMG |33.9580|116.3460|01/08/1952| 63427.4| 11.4| 4.40| 0.014 | IV | 98.8(159.0)
GSP |33.9430|116.3150|05/06/1992|023843.3|  7.0| 4.50| 0.015 | IV | 98.9(159.1)
PAS |33.9850|116.4020|02/15/1985|232626.6|  2.3| 4.00| 0.011 | III| 98.9(159.1)
PAS |33.1820|115.5940|03/07/1989| 74344.1|  0.5| 4.20| 0.013 | III| 98.9(159.1)
DMG |33.8500|118.2670|03/11/1933|1425 0.0|  0.0| 5.00| 0.019 | IV | 98.9(159.1)
DMG |33.8500|118.2670|03/11/1933| 629 0.0|  0.0| 4.40| 0.014 | IV | 98.9(159.1)
PAS |32.8990|115.5190|10/16/1979| 72324.2|  9.0| 4.20| 0.013 | III| 98.9(159.2)
PAS |32.9260|115.5230|10/16/1979| 11421.3|  9.6| 4.30| 0.013 | III| 98.9(159.2)
DMG |34.1000|117.6830|01/18/1934| 214 0.0|  0.0| 4.00| 0.011 | III| 98.9(159.2)
DMG |34.1000|117.6830|01/09/1934|1410 0.0|  0.0| 4.50| 0.015 | IV | 98.9(159.2)
DMG |33.2000|115.6000|11/12/1942|175612.0|  0.0| 4.00| 0.011 | III| 99.0(159.3)
PAS |32.9470|115.5250|10/16/1979| 139 3.3|  2.0| 4.00| 0.011 | III| 99.0(159.3)
DMG |32.2620|115.6000|07/13/1967| 94253.4| 10.0| 4.10| 0.012 | III| 99.0(159.4)
DMG |33.1170|115.5670|07/28/1950|1624 0.0|  0.0| 4.00| 0.011 | III| 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950|1727 0.0|  0.0| 4.70| 0.016 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950|2113 0.0|  0.0| 4.10| 0.012 | III| 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950|1730 0.0|  0.0| 4.10| 0.012 | III| 99.1(159.4)
DMG |33.1170|115.5670|07/29/1950|1714 0.0|  0.0| 4.30| 0.013 | III| 99.1(159.4)
DMG |33.1170|115.5670|07/27/1950| 954 0.0|  0.0| 4.10| 0.012 | III| 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950|1949 0.0|  0.0| 4.20| 0.013 | III| 99.1(159.4)
DMG |33.1170|115.5670|08/14/1950|1916 0.0|  0.0| 4.70| 0.016 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/29/1950| 017 0.0|  0.0| 4.50| 0.015 | IV | 99.1(159.4)
DMG |33.1170|115.5670|08/01/1950| 83720.0|  0.0| 4.70| 0.016 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/27/1950|12 2 0.0|  0.0| 4.20| 0.013 | III| 99.1(159.4)
DMG |33.1170|115.5670|07/29/1950|143632.0|  0.0| 5.50| 0.025 |  V | 99.1(159.4)
DMG |33.1170|115.5670|07/29/1950|1843 0.0|  0.0| 4.70| 0.016 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950|1840 0.0|  0.0| 4.00| 0.011 | III| 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950|1817 0.0|  0.0| 4.20| 0.013 | III| 99.1(159.4)
DMG |33.1170|115.5670|07/27/1950|2251 0.0|  0.0| 4.50| 0.015 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/27/1950|112926.0|  0.0| 4.80| 0.017 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/29/1950|15 9 0.0|  0.0| 4.50| 0.015 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950| 325 0.0|  0.0| 4.70| 0.016 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950|175812.0|  0.0| 4.80| 0.017 | IV | 99.1(159.4)
DMG |33.1170|115.5670|07/28/1950|175048.0|  0.0| 5.40| 0.024 | IV | 99.1(159.4)
GSP |33.9420|116.3040|05/04/1992|161949.7| 12.0| 4.80| 0.017 | IV | 99.1(159.5)
DMG |33.0000|115.5330|10/25/1955|174942.0|  0.0| 4.30| 0.013 | III| 99.2(159.6)
MGI |34.0000|118.0000|05/05/1929| 1 7 0.0|  0.0| 4.60| 0.016 | IV | 99.3(159.8)
MGI |34.0000|118.0000|12/25/1903|1745 0.0|  0.0| 5.00| 0.019 | IV | 99.3(159.8)
MGI |34.0000|118.0000|05/05/1929| 735 0.0|  0.0| 4.00| 0.011 | III| 99.3(159.8)
MGI |33.9000|118.2000|10/08/1927|1914 0.0|  0.0| 4.60| 0.016 | IV | 99.4(159.9)
DMG |32.7330|115.5000|05/19/1940| 43640.9|  0.0| 6.70| 0.047 | VI | 99.4(159.9)
DMG |33.9170|116.2500|08/15/1946|19 1 8.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
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                             EARTHQUAKE SEARCH RESULTS
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
PAS |31.8900|115.8210|05/08/1985|234020.8|  6.0| 5.00| 0.019 | IV | 99.4(159.9)
MGI |32.7000|115.5000|01/01/1927|1010 0.0|  0.0| 4.60| 0.016 | IV | 99.4(159.9)
MGI |32.7000|115.5000|01/16/1927|19 5 0.0|  0.0| 4.60| 0.016 | IV | 99.4(159.9)
MGI |32.7000|115.5000|10/14/1918|12 5 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|01/13/1927|1048 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|12/09/1926| 548 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|11/03/1916| 555 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|12/08/1917| 945 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|06/08/1917| 031 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|01/01/1927|13 0 0.0|  0.0| 5.30| 0.022 | IV | 99.4(159.9)
MGI |32.7000|115.5000|01/01/1927| 9 5 0.0|  0.0| 4.60| 0.016 | IV | 99.4(159.9)
MGI |32.7000|115.5000|12/07/1916|1855 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|09/23/1928|1744 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|01/02/1927|16 0 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|05/02/1918|1712 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|10/01/1919|2350 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|12/07/1916|2045 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|07/16/1927| 155 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
MGI |32.7000|115.5000|11/17/1921|1958 0.0|  0.0| 4.00| 0.011 | III| 99.4(159.9)
PAS |32.9030|115.5110|10/21/1977|132424.6| 15.5| 4.20| 0.013 | III| 99.4(160.0)
PAS |32.9580|115.5200|10/16/1979| 02214.2| 10.0| 4.20| 0.013 | III| 99.4(160.0)
PAS |32.8730|115.5070|10/16/1979|12 145.6| 14.4| 4.00| 0.011 | III| 99.4(160.0)
DMG |34.1400|117.5150|01/01/1965| 8 418.0|  5.9| 4.40| 0.014 | IV | 99.4(160.0)
GSP |33.9510|116.3110|04/26/1992|062608.0|  0.0| 4.20| 0.013 | III| 99.4(160.0)
PAS |32.9340|115.5150|10/16/1979| 61160.0| 11.0| 4.00| 0.011 | III| 99.5(160.0)
T-A |32.6700|115.5000|01/02/1927|10 0 0.0|  0.0| 4.30| 0.013 | III| 99.5(160.0)
T-A |32.6700|115.5000|01/06/1927|1637 0.0|  0.0| 4.30| 0.013 | III| 99.5(160.0)
MGI |32.8000|115.5000|08/19/1915| 4 0 0.0|  0.0| 4.00| 0.011 | III| 99.5(160.1)
MGI |32.8000|115.5000|07/03/1915|2345 0.0|  0.0| 4.60| 0.016 | IV | 99.5(160.1)
DMG |32.8000|115.5000|06/23/1915| 456 0.0|  0.0| 6.25| 0.037 |  V | 99.5(160.1)
MGI |32.8000|115.5000|07/04/1915| 5 0 0.0|  0.0| 4.60| 0.016 | IV | 99.5(160.1)
MGI |32.8000|115.5000|08/18/1915|2240 0.0|  0.0| 4.00| 0.011 | III| 99.5(160.1)
MGI |32.8000|115.5000|02/12/1927| 858 0.0|  0.0| 4.60| 0.016 | IV | 99.5(160.1)
MGI |32.8000|115.5000|08/20/1915| 4 0 0.0|  0.0| 4.00| 0.011 | III| 99.5(160.1)
MGI |32.8000|115.5000|06/18/1917| 6 0 0.0|  0.0| 4.00| 0.011 | III| 99.5(160.1)
MGI |32.8000|115.5000|07/04/1915| 045 0.0|  0.0| 4.60| 0.016 | IV | 99.5(160.1)
DMG |32.8000|115.5000|06/23/1915| 359 0.0|  0.0| 6.25| 0.037 |  V | 99.5(160.1)
MGI |32.8000|115.5000|08/19/1915|2240 0.0|  0.0| 4.00| 0.011 | III| 99.5(160.1)
DMG |32.6670|115.5000|10/09/1932|2345 0.0|  0.0| 4.00| 0.011 | III| 99.5(160.1)
DMG |32.6670|115.5000|10/09/1932|2251 0.0|  0.0| 4.50| 0.015 | IV | 99.5(160.1)
DMG |32.6670|115.5000|10/10/1932| 129 0.0|  0.0| 4.00| 0.011 | III| 99.5(160.1)
GSP |33.9530|116.3140|11/27/1996|014243.8|  6.0| 4.10| 0.012 | III| 99.5(160.1)
DMG |33.7450|115.9970|09/01/1956| 55752.8| 15.1| 4.00| 0.011 | III| 99.5(160.1)
PAS |32.9390|115.5150|10/16/1979| 93641.1|  9.9| 4.00| 0.011 | III| 99.5(160.1)
PAS |32.8860|115.5070|10/20/1977|102935.9|  4.9| 4.00| 0.011 | III| 99.5(160.1)
DMG |31.8000|115.9000|01/18/1956|195724.0|  0.0| 4.10| 0.012 | III| 99.5(160.2)
DMG |31.7830|115.9170|12/22/1956| 518 0.0|  0.0| 4.50| 0.015 | IV | 99.5(160.2)
DMG |34.1000|116.7000|02/07/1889| 520 0.0|  0.0| 5.30| 0.022 | IV | 99.6(160.2)
PAS |34.1510|116.9720|11/20/1978| 655 9.5|  6.1| 4.30| 0.013 | III| 99.6(160.3)
GSG |31.9010|115.8070|03/20/1996|050309.4|  5.0| 4.00| 0.011 | III| 99.6(160.3)
GSP |32.8850|115.5050|06/14/2000|214918.7|  4.0| 4.50| 0.015 | IV | 99.6(160.3)
GSP |33.9570|116.3170|04/23/1992|022529.9| 11.0| 4.60| 0.015 | IV | 99.6(160.3)
PAS |32.8800|115.5040|10/30/1977| 53014.1|  4.5| 4.00| 0.011 | III| 99.6(160.3)
```

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                            -------------------------
                            EARTHQUAKE SEARCH RESULTS
                            -------------------------

Page  20
-------------------------------------------------------------------------------
    |       |        |           |  TIME   |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE    |  (UTC)  |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |           | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
PAS |32.8930|115.5050|10/21/1977| 61236.2|  5.9| 4.30| 0.013 | III| 99.7(160.4)
PAS |31.6840|116.0250|05/21/1983|204140.9|  5.0| 4.00| 0.011 | III| 99.7(160.4)
DMG |34.0650|116.5740|08/26/1959| 53250.2| 16.7| 4.30| 0.013 | III| 99.7(160.5)
GSP |33.9610|116.3180|04/23/1992|045023.0| 12.0| 6.10| 0.034 |  V | 99.8(160.7)
GSP |32.8960|115.5020|06/14/2000|190020.4|  5.0| 4.20| 0.013 | III| 99.9(160.7)
DMG |34.1170|116.7500|08/22/1942|125913.0|  0.0| 4.00| 0.011 | III| 99.9(160.8)
DMG |31.7000|116.0000|08/11/1955|174618.0|  0.0| 4.80| 0.017 | IV | 99.9(160.8)
PAS |31.9230|115.7830|06/24/1984|12 8 7.0|  6.0| 4.10| 0.012 | III| 99.9(160.8)
PAS |32.9090|115.5020|10/22/1977|183042.7|  5.0| 4.00| 0.011 | III|100.0(160.9)

*******************************************************************************
-END OF SEARCH-   1016 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH:   1800  TO  2000

LENGTH OF SEARCH TIME:   201  years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 1.6 MILES (2.7 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.0

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.388 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
  a-value=  4.010
  b-value=  0.839
  beta-value=  1.931


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TABLE OF MAGNITUDES AND EXCEEDANCES:
------------------------------------

  Earthquake | Number of Times | Cumulative
   Magnitude |    Exceeded     | No. / Year
  -----------+----------------+-----------
     4.0     |     1016       |   5.05473
     4.5     |      336       |   1.67164
     5.0     |      116       |   0.57711
     5.5     |       46       |   0.22886
     6.0     |       22       |   0.10945
     6.5     |        7       |   0.03483
     7.0     |        1       |   0.00498
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Appendix E

Geotechnical Investigation—Marine

TerraCosta
Consulting Group

Geotechnical Engineering
Coastal Engineering
Maritime Engineering

Project No. 2769
December 10, 2012

DRAFT

Mr. Eric Noegel
BELLINGHAM MARINE INDUSTRIES, INC.
1205 Business Park Drive
Dixon, California 95620-4303

GUIDE PILE AND APPROACH PIER/GANGWAY
FOUNDATION DESIGN CRITERIA
HARBOR ISLAND WEST MARINA
SAN DIEGO, CALIFORNIA

Dear Mr. Noegel:

TerraCosta Consulting Group, Inc. (TCG) is pleased to provide guide pile and approach pier/gangway foundation design criteria for the proposed replacement and associated upgrades for the Harbor Island West Marina, which comprises about the westerly quarter of Harbor Island at the northerly end of San Diego Bay. The project site is generally located at 32.726° north latitude, 117.211° west longitude (Figure 1).

Proposed improvements include the installation of new docks and guide piles, the reconfiguration of the existing marina to improve its use and capacity, and the construction of two ADA-compliant approach piers and gangways to service the facility. This report provides recommendations for laterally loaded guide piles, as well as recommendations for axially loaded approach piers to support the ADA-compliant gangways.

To aid in our understanding of the project, we have discussed the proposed new layout and construction with you and Craig Funston of Redpoint Structures, and received a preliminary design package prepared by Redpoint Structures, including a proposed marina layout with pile and mudline elevations. We also reviewed pertinent technical documents from our files, including three reports of field investigations prepared by our firm for the Harbor Cove Marina [Sunroad Marina] (May 22, 1986), the NTC Marina (April 4, 1988), and the NTC Onshore Marina Building (February 22, 1990). A list of documents reviewed is included in the References section at the end of this letter-report.

FIELD INVESTIGATION

Our field investigation, conducted between January 30 and February 6, 2012, included the drilling of seven test borings and 45 vane shear tests, all performed from the existing floating docks of the marina and fuel pier.

The test borings, drilled by the wash-boring method using a small tripod drill rig, ranged in depth from 11.5 feet to 25.5 feet below the bay floor mudline at the locations indicated on Figure 2. Samples were obtained from the test borings using a 2-inch I.D. Standard Penetration Sampler. The samplers were generally advanced 18 inches by driving with a 140-pound hammer falling 30 inches, at approximately 5-foot intervals. Disturbed samples were obtained from the test borings, sealed, and transported to the laboratory for more detailed inspection and testing. Drilling operations were supervised, and the borings sampled and logged, by the undersigned Project Geologist, Gregory Spaulding.

Field logs of the borings were prepared based on visual examination of the soils encountered and the action of the drilling equipment. A Key to Excavation Logs is presented in Appendix A as Figure A-1. Final logs of the test borings are presented on Figures A-2 through A-8. The descriptions on the logs are based on our field logs, sample inspections, and the results of laboratory testing.

A total of 45 field vane shear tests were conducted (from the deck of the fuel dock, as well as from all eleven floating marina docks) at the locations indicated on Figure 2 to evaluate variations in near-surface soil strengths. A summary of the relevant data obtained from field vane shear testing is presented in Table 1.

LABORATORY TESTING

Representative samples of the soils observed during our field exploration were inspected and tested in the laboratory to verify field classifications and to aid in developing pile design input. Laboratory test results are presented in Appendix B.

GEOLOGIC AND SUBSURFACE SOIL CONDITIONS

Geologic Conditions

The historical site conditions generally consist of reclaimed estuarine and low-lying tidelands located southerly and easterly of Loma Portal at the northerly end of San Diego Bay. Historically, prior to the early 1900s, the San Diego River would periodically overflow its banks and reestablish a new course southerly into San Diego Bay (Figure 3). In the early 1900s, the Army Corps of Engineers created a levee system to prevent flooding and to direct the San Diego River to the west into False Bay (currently Mission Bay). Over the next decades, the low-lying lands were developed into what is now the San Diego International Airport, Marine Corps Recruit Depot, U.S. Naval Training Center, Harbor Island, Shelter Island, and the remaining tidelands that surround the America’s Cup Harbor. Most of the man-placed fills are of hydraulic origin and generally consist of relatively clean sands placed over relatively granular bay deposits. All of these near-surface overburden soils are underlain at depth by relatively competent Pleistocene age marine and non-marine terrace deposits.

Subsurface Soil Conditions

Subsurface soil conditions encountered in our offshore borings and vane shear testing typically consisted of 6 to 12 inches of near-surface fine-grained colloidal flock, exhibiting essentially no shear strength, underlain by variable thickness (typically 1 to 2 feet thick) bay deposits consisting of very loose to medium dense, fine sands, and locally very soft to soft silts and clays. The underlying weathered Bay Point formational terrace deposits were generally encountered near elevation -13 feet, with the more competent Bay Point Formation below -20 feet. These soils are described in more detail below.

Recent Bay Deposits: The recent bay deposits consist of a relatively thin layer of colloidal flock underlain by very loose and soft, gray, very fine- to medium-grained sands and silt.

Bay Point Formation: The Bay Point Formation was generally encountered below -13 feet MLLW. The upper 5 to 10 feet are generally weathered, becoming more competent below -20 to -25 feet MLLW. The Bay Point Formation generally consists of old paralic deposits of late to middle Pleistocene age and is mostly poorly sorted, interfingered, beach estuarine and colluvial deposits comprised of siltstones and sandstones and occasional clays.

FAULTING AND SEISMICITY

The site is located in a seismically-active region of Southern California that is subject to significant hazards from moderate to large earthquakes. Ground shaking and surface rupture have occurred in this region in very recent times. Although there are many active fault zones throughout the Southern California region, potential earthquakes from two fault zones are most likely to affect the site: the Rose Canyon fault zone and the Coronado Banks fault zone. The nearest of these, the Rose Canyon fault zone, trends northwest-southeast, and is located approximately 2 miles northeasterly of the site. The Coronado Banks fault zone is 11.9 miles west-southwest of the site. Neither of these faults is known to have produced a moderate to large earthquake since European settlement. It is speculated that a damaging earthquake in 1862 may have originated on one of these faults.

Liquefaction

Liquefaction is a potential hazard in any water-saturated sandy soils. Since most of the fill soils and underlying embayment deposits are predominantly composed of sands, they should be considered to be susceptible to seismically-induced liquefaction. Spontaneous liquefaction develops within sandy soils when they are subjected to rapid buildup of pore pressure, such as that caused by seismic shock, and the result of this condition could be massive mobilization of the slopes surrounding Harbor Island, and the failure (settlement) of any non-pile-supported structural foundations, including the approach piers supporting the ADA-compliant gangways.

APPROACH PIER FOUNDATIONS

The two new approach piers may be supported on either a large gravity mat foundation enabling the approach pier to cantilever out over the rock revetment, on axially-loaded piles deriving their support from the dense formational soils at depth, or a combination of the two.

Gravity Mat Foundation

We recommend that a mat foundation alternative, if desired, be designed for a maximum soil bearing pressure of 2,500 psf (dead plus live loads), with no increase for wind or seismic forces. The mat foundation should extend a minimum of 2 feet below existing grade and the bottom toe of this mat foundation should be located a minimum of 5 feet from the outside face of the existing revetment.

For the gravity mat foundation alternative, with maximum cantilevered induced toe pressures of 2,500 psf, settlement along the outboard toe of the mat should be assumed to be 3/4 inch and zero at its heel, resulting in an angular rotation of 3/4 inch/mat footing length.

Lateral Resistance

Lateral loads may be resisted by passive resistance of the soil equal to a fluid pressure of 350 pounds per cubic foot, or by soil friction, assuming a friction coefficient of 0.4. If passive pressure is to be used in combination with soil friction, the friction value should be reduced to 0.25. The top 1 foot of soil providing passive resistance to lateral loads should not be used for lateral resistance, unless protected by pavement. Moreover, passive resistance should not be used to resist loads acting normal to the slope face in the direction of the slope face.

Pile-Supported Approach Pier Foundations

A pile-supported approach pier alternate minimizes differential settlements, and can be designed to resist lateral loads associated with liquefaction-induced slope movement in the event of a large magnitude earthquake. We suggest that, if this alternate is considered, pile foundations for the approach piers should be designed to have a tip elevation of –35 feet MLLW. This provides a minimum 10+ feet of penetration into competent formational terrace deposits. For this condition, we recommend an allowable design load of 20 tons. We estimate settlements for piles driven to –35 feet and loaded to 20 tons will be on the order of 1/2 inch.

GUIDE PILE DESIGN CONSIDERATIONS

As we understand, a variety of guide piles are currently being considered for use at the marina, including 14-, 16-, and 20-inch-diameter pre-stressed concrete piles, 12-, 14-, 18-, and 20-inch square pre-stressed concrete piles, and 12-, 14-, 18-, and 20-inch-diameter round fiberglass piles.

In order to evaluate the structural requirements and load deformation characteristics of the proposed guide piles, we have used the elastic theory approach developed by Matlock and Reese (1962). A condensed version of this approach is outlined in the NAVFAC Design Manual DM-7.02, Chapter 5, Section 7. A copy of this design section is included with our calculation package. We have also used a coefficient of variation of soil modulus of 15 pci as being representative of the near-surface weathered Bay Point Formation soils and the overlying medium dense alluvial sediments. For this condition, we have assumed a design bay floor elevation of -13 feet MLLW, with all piles jetted down to 2 feet above the design tip elevation.

Ultimate lateral load capacity was also evaluated using the approach developed by Broms (1965), which follows the general approach developed by Matlock and Reese.

We have used a roller assembly design load elevation of +8.5 feet, MLLW, as specified in the structural calculation package by Redpoint Structures. For this loading condition, we have calculated guide pile deflections for the above-referenced 11 pile types assuming jetting down to within 2 feet of design tip, and then driven the last 2 feet to redensify the jetted soils. Figures 4a, 4b, and 4c graphically depict the relationship between roller deflection and load application for the 11 pile types. As indicated in the attached calculation package, we have used a design cantilever length of 21.5 feet.

When using the Matlock and Reese solution, in order to minimize guide pile deflections and account for variabilities in subsurface soil conditions, we recommend a minimum embedment depth on the order of 3.5T or $3.5(EI/f)^{1/5}$. The recommended minimum embedment depth for the 11 pile types is also summarized in Figures 4a and 4b.

WINDS AND WAVES

Although the Harbor Island West Marina is reasonably well protected from wind-generated waves, the fuel dock and westerly most row of slips is exposed to wind-driven waves from the south through the main harbor entrance, in part reflected off Shelter Island. The longest unobstructed fetch is through a relatively narrow corridor of approach from about 200 to 220 degrees originating from Ballast Point. Storms originating from the south primarily result from tropical storms, with several storm events each season generating winds of 30+ knots developing wind waves of 2 to 3 feet, with periods of 3 to 4 seconds. This loading condition results in more severe cyclic loading for the fuel dock and westerly most boat slips, and tends to reduce the soil modulus over the course of time, resulting in slightly higher deflections, which for the fuel pier and westerly docks we would anticipate a 10 to 15 percent increase in calculated deflections over those presented in Figures 4a and 4b. Although we anticipate a reduction in soil modulus associated with this high cyclic loading and an associated 10 to 15 percent increase in laterally loaded deflections, given the relatively competent near-surface terrace deposits that underlie the marina, we do not recommend any additional embedment depth for these westerly most guide piles.

CONSTRUCTION ASPECTS

Subsurface data obtained from our borings suggests the presence of highly weathered near-surface Bay Point formational soils and less weathered formational soils at depth, which will require pre-jetting of both guide piles and the axially loaded approach pier piles to reach the required design tip elevation. To maximize the lateral load capacity and minimize the deformation in response to lateral loads, jetting should be terminated approximately 2 feet from the design tip elevation and the last 2 feet driven to aid in redensifying the soils disturbed by jetting. We recommend that jetting for the axially loaded approach pier piles be stopped at elevation -30 feet and driven the final 5 feet, with axial capacities determined using a dynamic pile driving formula such as the

Engineering News Record (ENR) formula. We would suggest the use of a minimum 50,000 foot-pound capacity pile hammer to achieve design tip elevations within the underlying terrace deposits.

The jetting of piles should be done using internal jet pipes, and jet volumes and velocities should be limited to the minimum flow needed to advance the piles. In this regard, it is important to recognize that excessive jetting will tend to enlarge the hole and significantly reduce the lateral load capacity of the soil. The proper jetting technique is to use a low-volume, low-pressure flow of water through the internal jet pipe while repeatedly lifting and dropping the pile to displace the formational soils beyond the pile tip and expel the sands up the annulus of the jetted hole without excessively disturbing the surrounding dense formational soils. The proper jetting technique essentially allows the lifting and repeated dropping of the pile to redensify the formational soils as the pile is advanced into the dense underlying formational soils.

We trust this information meets your current requirements. Please do not hesitate to contact us if you have any questions or require additional information.

Very truly yours,

TERRACOSTA CONSULTING GROUP, INC.

Walter F. Crampton, Principal Engineer
R.C.E. 23792, R.G.E. 245

Gregory A. Spaulding, Project Geologist
C.E.G. 1863, C.H.G. 351, P.G. 5892

WFC/GAS/jg
Attachments

REFERENCES

Broms, B.B., 1965, "Design of Laterally Loaded Piles," in *Journal of the Soil Mechanics and Foundations Division*, American Society of Civil Engineers, Vol. 91, No. SM3, May 1965, pp. 79-99.

Matlock, H., and L.C. Reese, 1962, "Generalized Solutions for Laterally Loaded Piles," in *Transactions of the American Society of Civil Engineers*, Vol. 127, Part 1, Paper No. 3370, pp. 1220-1251.

TerraCosta Consulting Group (formerly Group Delta Consultants-San Diego), May 22, 1986, Geotechnical Investigation and Design Criteria for Harbor Cove Marina, San Diego, California. Project No. 6S333A.

TerraCosta Consulting Group (formerly Group Delta Consultants-San Diego), February 22, 1990, Additional Geotechnical Investigation, Onshore Marina Building, Naval Training Center, San Diego, California. Project No. 1154.

TerraCosta Consulting Group (formerly Group Delta Consultants-San Diego), April 4, 1988, Geotechnical Investigation, NTC Marina, San Diego, California. Project No. 1154.

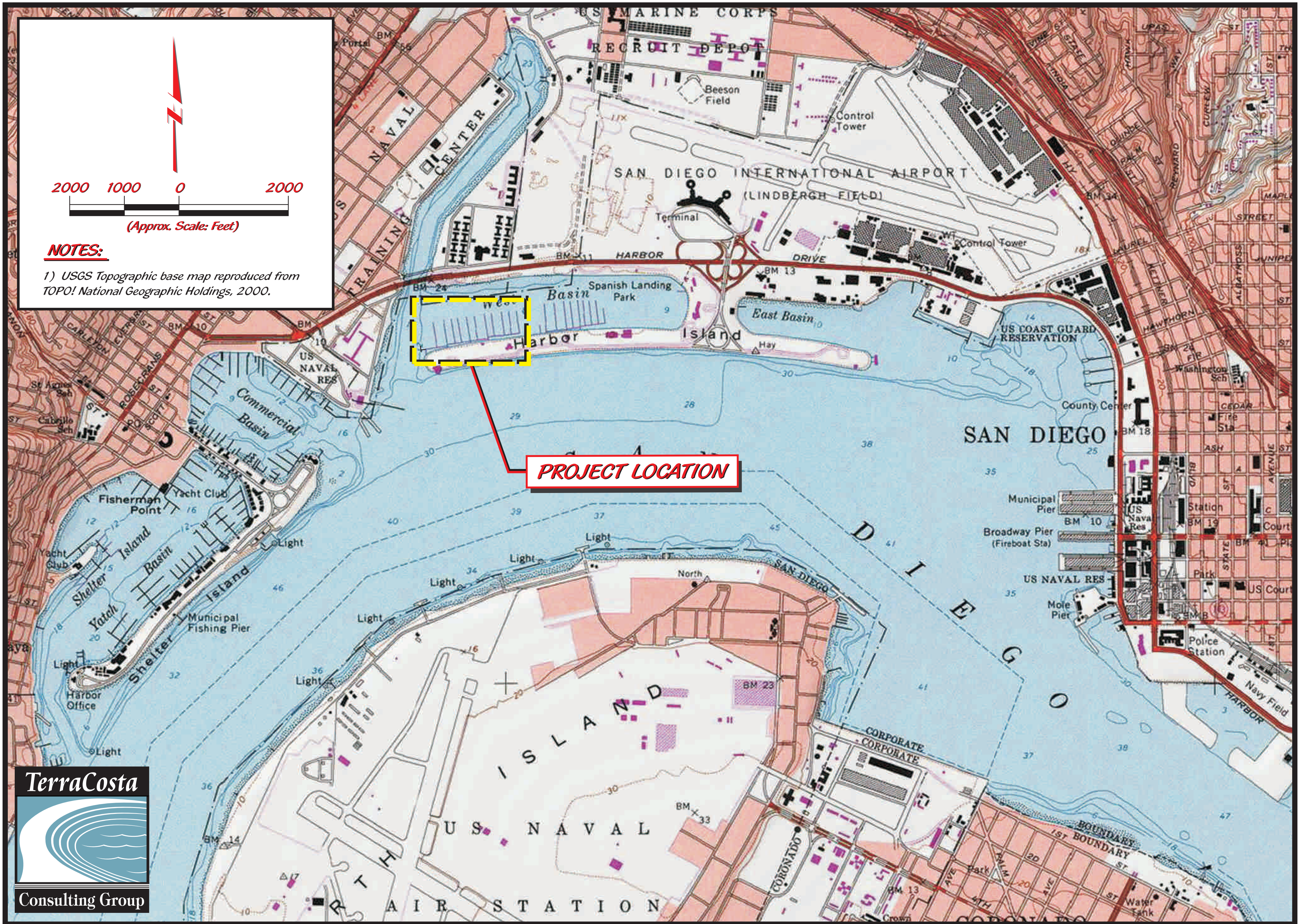
U.S. Department of the Navy, Naval Facilities Engineering Command, 1986, Foundations and Earth Structures, NAVFAC DM 7.02.

Harbor Island West Marina (Project No. 2769)

Date of Vane Shear Testing: 2/6/12

Vane Shear Number	Location	Time	Depth to Mudline (feet)	Tide Height (MLLW) (feet)	Bottom Elevation (feet)	Vane Shear Reading 20 x 40 mm vane (kPa)										
						(@ 1 foot)	(@ 2 feet)	(@ 3 feet)	(@ 4 feet)	(@ 5 feet)	(@ 6 feet)	(@ 7 feet)	(@ 8 feet)	(@ 9 feet)	(@ 10feet)	Refusal @ x feet
1	1100 Dock End	10:30	14.9	4.25	-10.7	10	12	*sandy bottom*								2.2
2	1100 Dock End	10:55	14.2	3.57	-10.6	14	24	*clayey bottom*								2.0
3	1100 Dock Middle	11:02	13.8	3.37	-10.4	12	76	*very soft first foot then sandy @ 2'*								2.0
4	1100 Dock Main Walk	11:07	8.3	3.22	-5.1	12	40	70	*sandy @ 2'*							3.2
5	1000 Dock Main Walk	11:12	11.0	3.08	-7.9	4	24	26	64	62	*very soft; sandy @ 2'*					5.0
6	1000 Dock Middle	11:20	13.4	2.85	-10.6	8	51	84	*very soft; sandy @ 2'*							3.0
7	1000 Dock Middle	11:25	13.4	2.70	-10.7	4	33	50	*very soft; sandy @ 2'*							3.5
8	1000 Dock End	11:31	13.7	2.53	-11.2	22	31	78	*6" soft; sandy @ 2.5'*							3.0
9	900 Dock End	11:42	12.7	2.21	-10.5	10	62	*soft; 1' sand; refusal below 2.5'*								2.5
10	900 Dock Middle	11:46	13.0	2.09	-10.9	18										1.5
11	900 Dock Middle	11:59	12.3	1.73	-10.6	15										1.7
12	900 Dock Main Walk	12:05	12.0	1.56	-10.4	14	10	20	78 @ 3.5	*very soft*						3.5
13	800 Dock End	12:12	11.9	1.37	-10.5	26	34	*sandy base*								2.5
14	800 Dock Middle	12:19	11.7	1.18	-10.5	24	50	92	*soft bottom w/shells; sandy @ 1.5'*							3.0
15	800 Dock Middle	12:24	11.7	1.05	-10.7	13	*sandy after 1'*									1.0
16	800 Dock Main Walk	12:27	8.9	0.97	-7.9	22	16	70	50	42	60	68	60	44	117	10.0
17	700 Dock End	12:41	11.9	0.62	-11.3	24	26	102	*sandy bottom; soft @ 2'*							3.0
18	700 Dock Middle	12:45	11.6	0.53	-11.1	10	44	50	*sandy @ 1'*							3.0
19	700 Dock Middle	12:50	12.7	0.41	-12.3	6	8	66	*sandy @ 2'+*							3.5
20	700 Dock Main Walk	12:54	7.9	0.32	-7.6	18	54	68	64	88	40	38	46	30		10.0
21	600 Dock End	1:40	11.0	-0.55	-11.6	38	62									2.5
22	600 Dock Middle	1:45	10.8	-0.65	-11.5	10	50									2.5
23	600 Dock Main Walk	1:49	7.1	-0.67	-7.8	23	45	78	42	102	78					6.0
24	500 Dock Main Walk	1:55	4.9	-0.74	-5.6	16	44	56	38	50	62	66				7.0
25	500 Dock Middle	2:03	10.8	-0.83	-11.6	10	58									3.0
26	500 Dock Middle	2:09	10.3	-0.89	-11.2	14	47	100								3.0
27	500 Dock End	2:13	10.2	-0.94	-11.1	22	28	108								3.6
28	400 Dock End	2:21	10.5	-0.98	-11.5	52	14	88	*sandy @ top*							3.5
29	400 Dock Middle	2:26	10.6	-1.01	-11.6	8	57	80	130+							4.0
30	400 Dock Middle	2:30	10.7	-1.02	-11.7	12	98	92								3.6
31	400 Dock Main Walk	2:35	5.0	-1.05	-6.1	27	26	38	32	24	94	130+	*sandy @ top*			7.0
32	300 Dock End	2:43	9.5	-1.06	-10.6	17	130+									2.0
33	300 Dock Middle	2:47	10.7	-1.07	-11.8	16	42	85								3.6
34	300 Dock Main Walk	2:53	5.7	-1.07	-6.8	18	25	130+	60	65	106	130+	*3' crunchy*			7.0
35	200 Dock End	3:04	10.8	-1.05	-11.9	22	54	130+								2.8
36	200 Dock Middle	3:09	11.0	-1.03	-12.0	11										1.5
37	200 Dock Middle	3:13	11.0	-1.01	-12.0	24										1.5
38	200 Dock Main Walk	3:17	4.6	-0.99	-5.6	40	21	26	55	36	130+	106	*shell or gravel*			7.0
39	100 Dock End	3:27	10.9	-0.92	-11.8	28										1.5
40	100 Dock Middle	3:32	11.5	-0.88	-12.4	27	130+									2.0
41	100 Dock Main Walk	3:37	6.8	-0.84	-7.6	*	48	42	68	120						5.0
42	Fuel Dock	3:42	11.7	-0.79	-12.5	24	40	104	130+							4.0
43	Fuel Dock	3:46	11.8	-0.74	-12.5	40	130+	*crunchy*								2.0
44	Fuel Dock	3:50	11.0	-0.70	-11.7	25	*	16	130+	*crunchy*						4.0
45	Fuel Dock	3:55	9.6	-0.64	-10.2	130+										6.0

* no reading taken



NOTES:

1) USGS Topographic base map reproduced from TOPO! National Geographic Holdings, 2000.

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Project: Harbor Island West Marina *Project No. 2769* *Figure 1*

Base map reproduced from: "Marina Soundings – Harbor Island West Marina," dated February 1998, San Diego Unified Port District.

Datum: Mean Lower Low Water (MLLW)

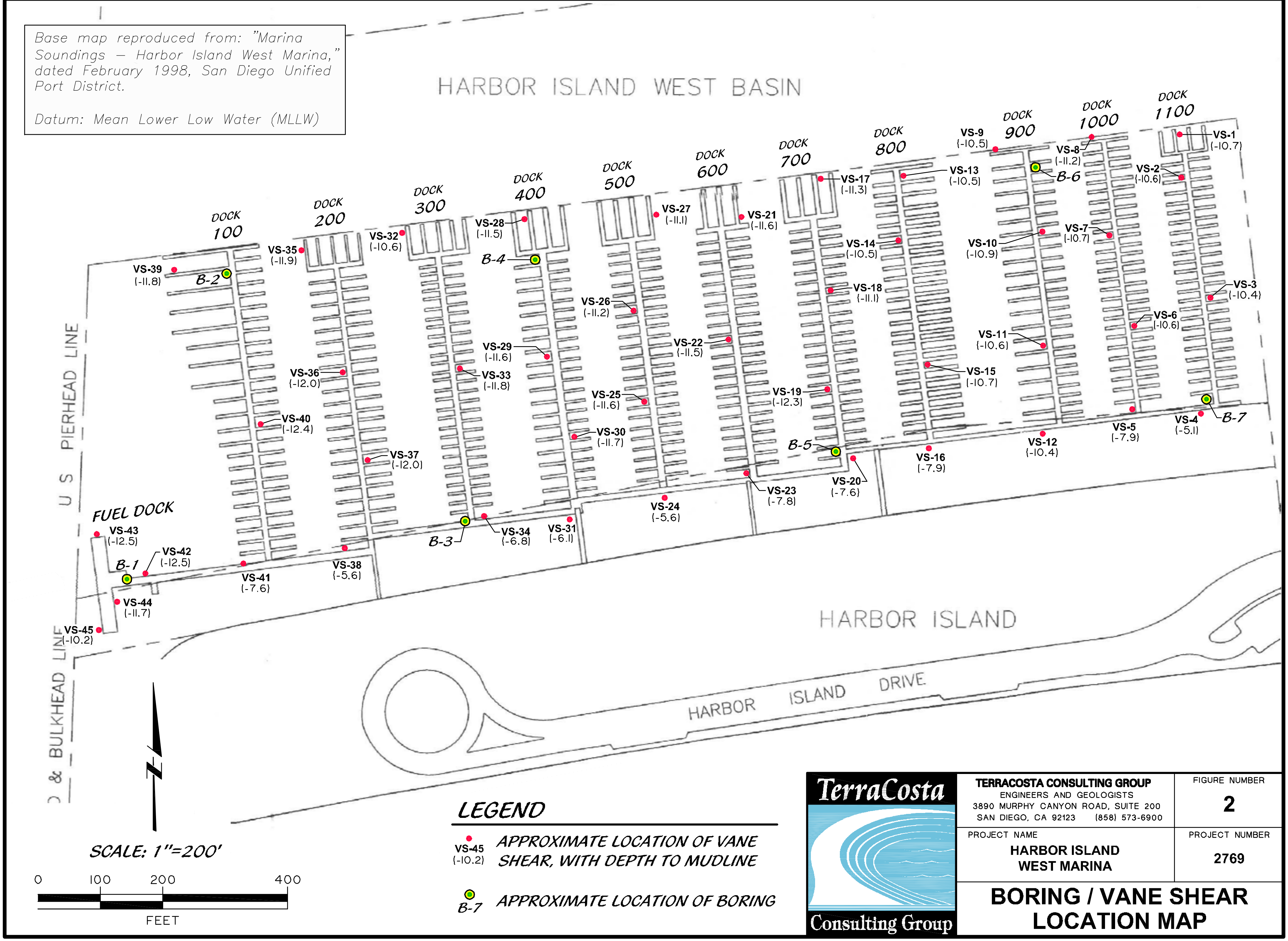

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FIGURE NUMBER
2

PROJECT NAME
HARBOR ISLAND WEST MARINA

PROJECT NUMBER
2769

BORING / VANE SHEAR LOCATION MAP

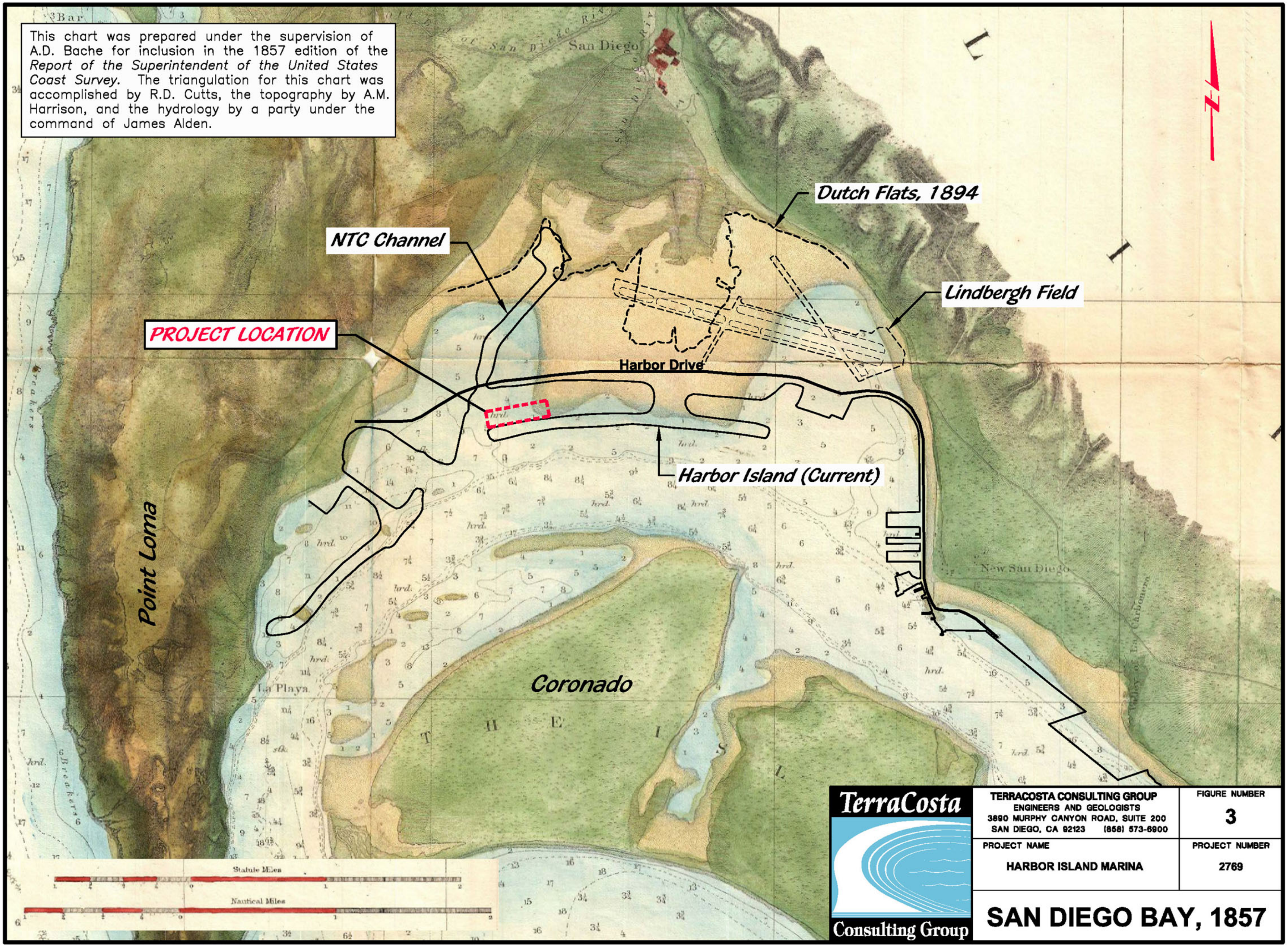
This chart was prepared under the supervision of A.D. Bache for inclusion in the 1857 edition of the *Report of the Superintendent of the United States Coast Survey.* The triangulation for this chart was accomplished by R.D. Cutts, the topography by A.M. Harrison, and the hydrology by a party under the command of James Alden.

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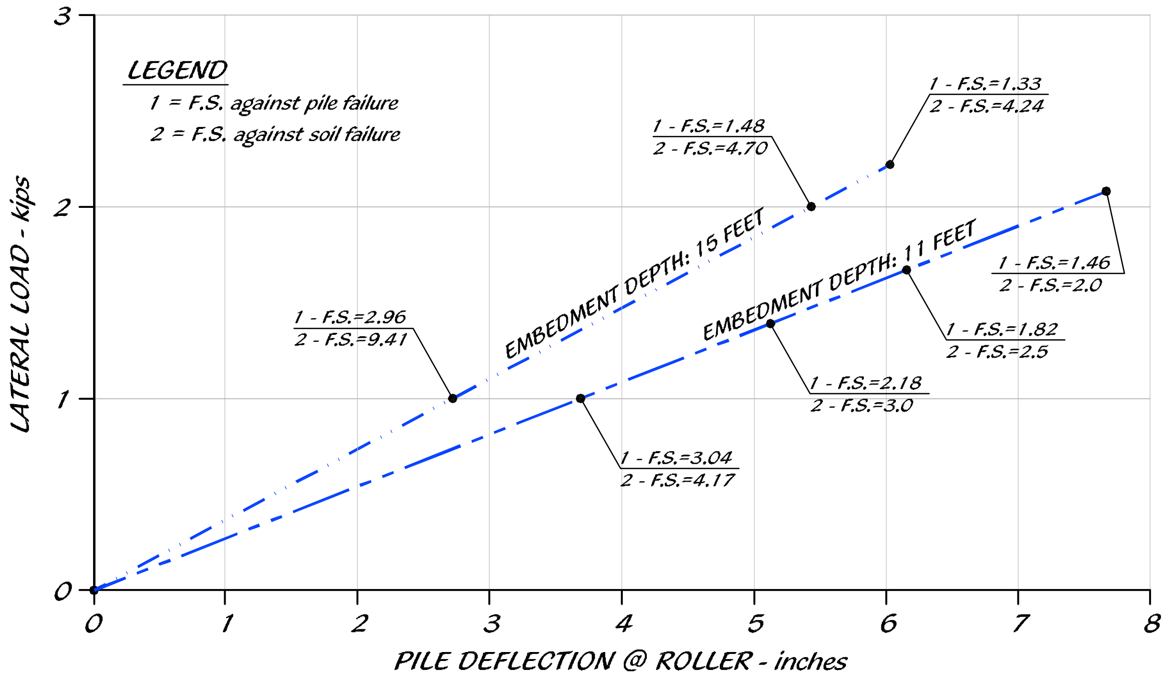
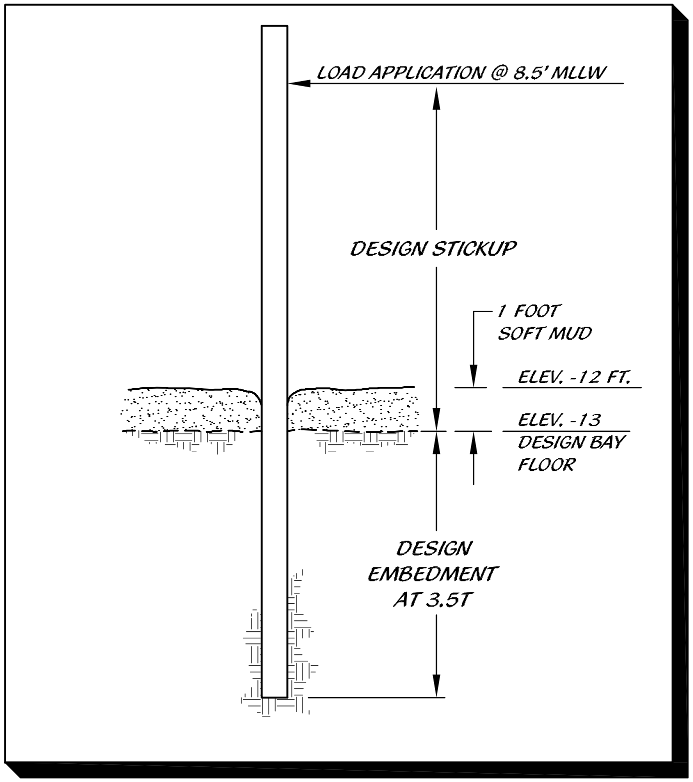
FIGURE NUMBER	3
PROJECT NAME	HARBOR ISLAND MARINA
PROJECT NUMBER	2769

SAN DIEGO BAY, 1857

ROLLER DEFLECTION VS. DESIGN LATERAL LOAD





Pile Size (Inches)	Pile Type	Design Embedment Depth, feet	Design Tip Elevation (feet, MLLW)	Design L/T	Max. Load & Deflection, kips (inches)
12	Square, Conc	15	-28	3.5	2.22k (6.03")
12	Square, Conc	11	-24	2.6	1.67k (6.13") *

* MAX. LOAD BASED ON A F.S. = 2.5 AGAINST SOIL FAILURE

NOTE:

ASSUMES: M yield 12" SQUARE = 67.7 k-ft

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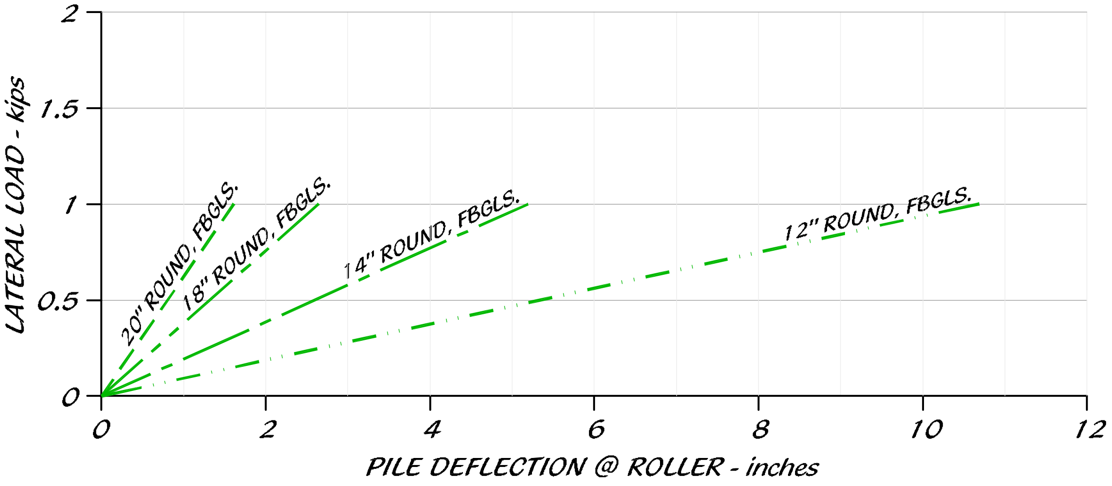
FIGURE NUMBER
4A

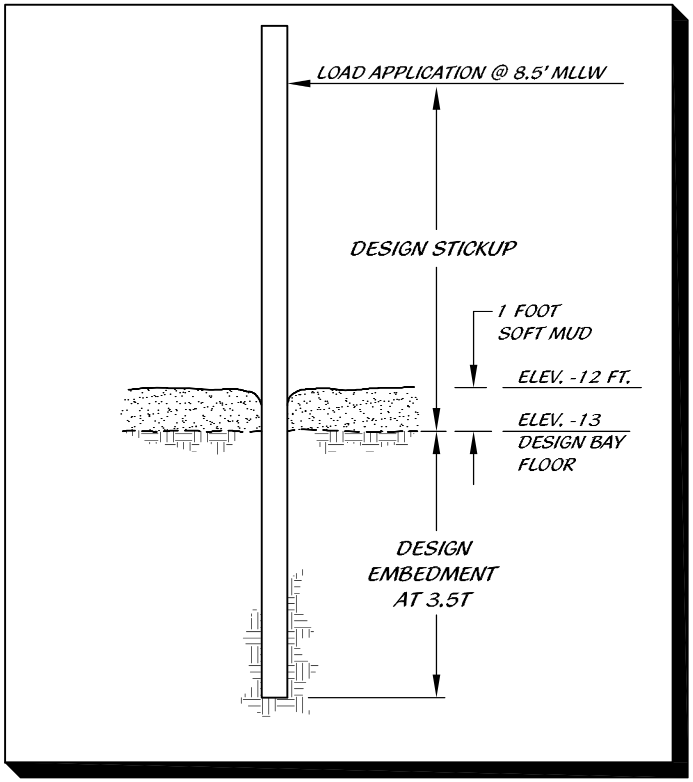
PROJECT NAME
HARBOR ISLAND MARINA

PROJECT NUMBER
2769

ROLLER DEFLECTION - CONCRETE PILES

ROLLER DEFLECTION VS. DESIGN LATERAL LOAD





Pile Size (Inches)	Pile Type	Design Embedment Depth, feet	Design Tip Elevation (feet, MLLW)	Deflection (inches) for a 1.00 kip load @ Elev. +8.5'
12	Rnd, Fbrgls	11	-24	10.68"
14	Rnd, Fbrgls	13	-26	5.09"
18	Rnd, Fbrgls	15	-28	2.64"
20	Rnd, Fbrgls	17	-30	1.61"

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FIGURE NUMBER
4B

PROJECT NAME
HARBOR ISLAND MARINA

PROJECT NUMBER
2769

ROLLER DEFLECTION - FIBERGLASS PILES

ROLLER DEFLECTION VS. DESIGN LATERAL LOAD

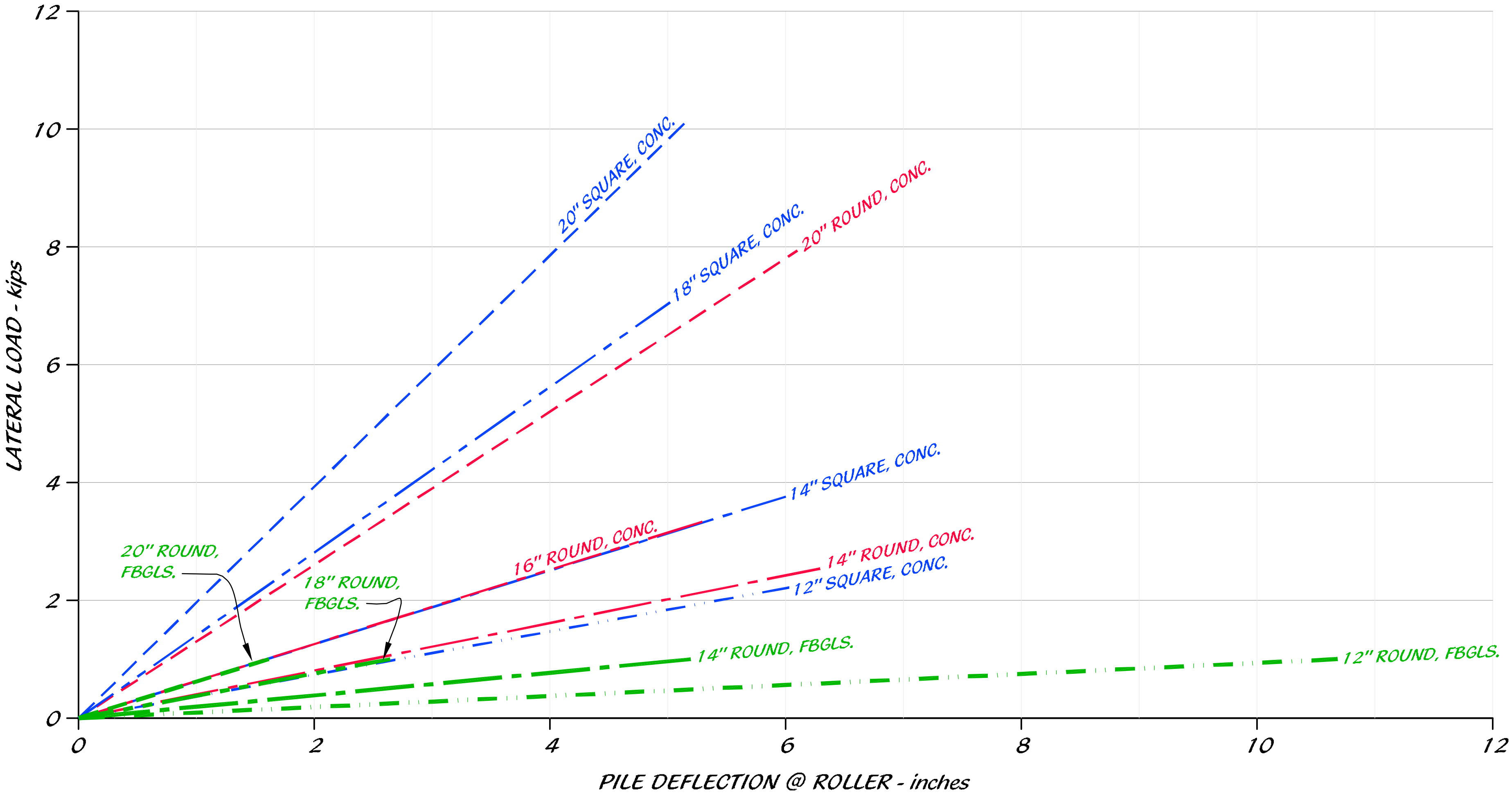

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FIGURE NUMBER	**4C**
PROJECT NAME	**HARBOR ISLAND MARINA**
PROJECT NUMBER	**2769**

ROLLER DEFLECTION -
CONCRETE VS. FIBERGLASS PILES

APPENDIX A

BORING LOGS

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
HARBOR ISLAND WEST MARINA	2769	**LEGEND**

SITE LOCATION	START	FINISH	SHEET NO.
Harbor Island, San Diego, CA	1/30/2012	2/2/2012	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Wash Boring	G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (in)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
TriPod	3	20		▼ n/a_

SAMPLING METHOD	NOTES
SPT	

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
5									
		S	1						
10									
15									

KEY TO EXCAVATION LOGS

▼ WATER TABLE MEASURED AT TIME OF DRILLING

OTHER TESTS

GS Grain Size Analysis

PENETRATION RESISTANCE (BLOWS/ft)

Number of blows required to advance the sampler 1 foot.

SAMPLE TYPE

S ("SPT") - a.k.a. Standard Penetration Test, an 18-inch-long, 2-inch O.D., 1-3/8-inch I.D. drive sampler.

NOTES ON FIELD INVESTIGATION

Borings were advanced using a limited-access TriPod drill rig. Holes were advanced by jetting a 3-inch-diameter casing down to the desired sample depth.

Once the desired sample depth was reached, a Standard Penetration Test (SPT) Sampler was used to obtain soil samples. The SPT Sampler was driven into the soil at the bottom of the borings with a 140-pound hammer falling 30 inches. When the sampler was withdrawn from the boring, the sample was removed, visually classified, sealed in plastic containers, and taken to the laboratory for detailed inspection.

Classifications are based upon the Unified Soil Classification System and include color, moisture, and consistency. Field descriptions have been modified to reflect results of laboratory inspection where deemed appropriate.

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FIGURE A-1

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA
PROJECT NUMBER 2769
BORING B-1
SITE LOCATION Harbor Island, San Diego, CA
START 1/30/2012
FINISH 1/30/2012
SHEET NO. 1 of 1
DRILLING COMPANY Pacific Drilling
DRILLING METHOD Wash Boring
LOGGED BY G. Spaulding
CHECKED BY
DRILLING EQUIPMENT TriPod
BORING DIA. (in) 3
TOTAL DEPTH (ft) 15.5
GROUND ELEV (ft) -12.10
DEPTH/*ELEV.* GROUND WATER (ft) ▼ n/a_
SAMPLING METHOD SPT
NOTES

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		S	1	PUSH					**MUD LINE** RECENT BAY DEPOSITS **Silty Fine SAND (SM)**, very loose, gray, wet, with shell fragments
	-15								
									WEATHERED BAY POINT FORMATION **Find Sandy SILT (ML)**, medium dense, olive to olive-brown, wet, micaceous
5		S	2	15			GS		
	-20								
									Silty SAND (SP-SM), grades to medium dense, olive-gray, wet, micaceous
10		S	3	16					
	-25								BAY POINT FORMATION **SAND to Silty SAND (SP/SM)**, dense, interbedded gray-brown / olive-gray, wet, micaceous
15		S	4	35					
									Hole sanding in. *Boring terminated at depth of 15.5 feet due to refusal.*
	-30								

TCG_METRIC_LOG(3) 2769.GPJ GDCLOGMT.GDT 8/17/12

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FIGURE A-2

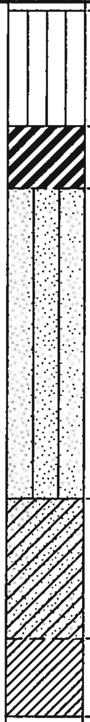
LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA	PROJECT NUMBER 2769	BORING **B-2**

SITE LOCATION Harbor Island, San Diego, CA	START 1/31/2012	FINISH 1/31/2012	SHEET NO. 1 of 1
DRILLING COMPANY Pacific Drilling	DRILLING METHOD Wash Boring	LOGGED BY G. Spaulding	CHECKED BY

DRILLING EQUIPMENT TriPod	BORING DIA. (In) 3	TOTAL DEPTH (ft) 11.5	GROUND ELEV (ft) -11.25	DEPTH/*ELEV.* GROUND WATER (ft) ▼ n/a_

SAMPLING METHOD SPT	NOTES



DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		S	1	PUSH					**MUD LINE** RECENT BAY DEPOSITS **Clayey SILT (ML)**, very soft, dark gray, wet, with shell fragments
									WEATHERED BAY POINT FORMATION Hard clay lense
	-15								**Silty SAND (SM)**, medium dense, gray-brown to olive-gray, wet, micaceous
5									
		S	2	19					
	-20								BAY POINT FORMATION Becomes **Clayey SAND (SC)**
10									
		S	3	22					**Silty CLAY (CL)**, very stiff, red-brown, moist
									Boring terminated at depth of 11.5 feet due to refusal.
	-25								
15									
	-30								

TCG_METRIC_LOG(3) 2769.GPJ GDCLOGMT.GDT 8/17/12

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FIGURE A-3

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA
PROJECT NUMBER 2769
BORING B-3
SITE LOCATION Harbor Island, San Diego, CA
START 1/31/2012
FINISH 1/31/2012
SHEET NO. 1 of 1
DRILLING COMPANY Pacific Drilling
DRILLING METHOD Wash Boring
LOGGED BY G. Spaulding
CHECKED BY
DRILLING EQUIPMENT TriPod
BORING DIA. (in) 3
TOTAL DEPTH (ft) 16.5
GROUND ELEV (ft) -6
DEPTH/*ELEV.* GROUND WATER (ft) ▼ n/a_
SAMPLING METHOD SPT
NOTES

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									MUD LINE RECENT BAY DEPOSITS **Clayey SILT (ML)**, very loose, dark olive-gray to gray, wet, with shell fragments
		S	1	PUSH					
									Interbedded **Silty Fine SAND (SP-SM) to Fine Sandy SILT (ML)**, loose, dark gray, wet, with shell fragments
	-10								
5									
		S	2	7					
									BAY POINT FORMATION **Silty SAND (SM)**, medium dense to dense, gray-brown to brown, with occasional shell fragments
	-15								
10									
		S	3	17					
	-20								
15									
		S	4	46					
									Boring terminated at depth of 16.5 feet due to refusal.
	-25								

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FIGURE A-4

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
HARBOR ISLAND WEST MARINA	2769	**B-4**

SITE LOCATION	START	FINISH	SHEET NO.
Harbor Island, San Diego, CA	1/31/2012	1/31/2012	1 of 1

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Wash Boring	G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (In)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
TriPod	3	11.5	-11.2	⊻ n/a_

SAMPLING METHOD	NOTES
SPT	

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		S	1	PUSH					**MUD LINE** RECENT BAY DEPOSITS **Fine Sandy SILT (ML)**, very loose, dark gray, wet, with shell fragments
5	-15	S	2	14					WEATHERED BAY POINT FORMATION **Silty Fine SAND (SP-SM)**, medium dense, olive-gray to gray-brown, wet, micaceous
10	-20	S	3	29				▨	BAY POINT FORMATION **Sandy CLAY (CL)**, very stiff to hard, olive-gray to olive-brown, moist
									Boring terminated at depth of 11.5 feet due to refusal.
15	-25								
	-30								

TCG_METRIC_LOG(3) 2769.GPJ GDCLOGMT.GDT 8/17/12

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FIGURE A-5

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA
PROJECT NUMBER 2769
BORING B-5
SITE LOCATION Harbor Island, San Diego, CA
START 2/1/2012
FINISH 2/1/2012
SHEET NO. 1 of 2
DRILLING COMPANY Pacific Drilling
DRILLING METHOD Wash Boring
LOGGED BY G. Spaulding
CHECKED BY
DRILLING EQUIPMENT TriPod
BORING DIA. (In) 3
TOTAL DEPTH (ft) 21.5
GROUND ELEV (ft) -9.3
DEPTH/*ELEV.* GROUND WATER (ft) ▼ n/a_
SAMPLING METHOD SPT
NOTES

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									MUD LINE RECENT BAY DEPOSITS **Silty CLAY (CL) to Fine Sandy SILT (ML)**, very soft, gray, wet, with shell fragments
	-10								
		S	1	PUSH					
									Fine SAND (SP), very loose to loose, gray, wet, micaceous
5									
	-15								
		S	2	3			GS		
10									
	-20								- Clay lense from 9.75 to 10.25 feet
		S	3	4					
									BAY POINT FORMATION Becomes coarse **SAND (SP)**, brown
									Silty SAND (SM), dense, interbedded, mottled olive-gray / gray-brown / yellow-brown, wet
15									
	-25								
		S	4	40					
									Silty to Fine Sandy CLAY (CL), very stiff to hard, red-brown, moist

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FIGURE A-6 a

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA
PROJECT NUMBER 2769
BORING B-5
SITE LOCATION Harbor Island, San Diego, CA
START 2/1/2012
FINISH 2/1/2012
SHEET NO. 2 of 2
DRILLING COMPANY Pacific Drilling
DRILLING METHOD Wash Boring
LOGGED BY G. Spaulding
CHECKED BY
DRILLING EQUIPMENT TriPod
BORING DIA. (In) 3
TOTAL DEPTH (ft) 21.5
GROUND ELEV (ft) -9.3
DEPTH/*ELEV.* GROUND WATER (ft) ⊻ n/a_
SAMPLING METHOD SPT
NOTES

DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
	-30	S	5	35				▨	
								▨	**Coarse Clayey SAND (SC)**, dense, red-brown, moist
									Boring terminated at depth of 21.5 feet due to refusal.
25	-35								
30	-40								
35	-45								

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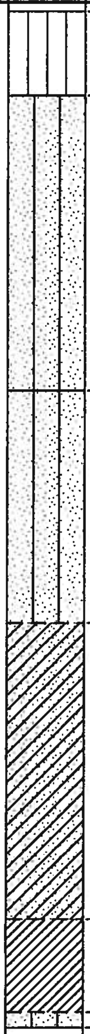
FIGURE A-6 b

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA	**PROJECT NUMBER** 2769	**BORING** **B-6**	
SITE LOCATION Harbor Island, San Diego, CA	**START** 2/2/2012	**FINISH** 2/2/2012	**SHEET NO.** 1 of 1
DRILLING COMPANY Pacific Drilling	**DRILLING METHOD** Wash Boring	**LOGGED BY** G. Spaulding	**CHECKED BY**
DRILLING EQUIPMENT TriPod	**BORING DIA. (In)** 3	**TOTAL DEPTH (ft)** 16.5	**GROUND ELEV (ft)** -10.6
DEPTH/*ELEV.* GROUND WATER (ft) ▼ n/a_	**SAMPLING METHOD** SPT	**NOTES**	



DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	DESCRIPTION AND CLASSIFICATION
		S	1	PUSH				**MUD LINE** RECENT BAY DEPOSITS **Fine Sandy SILT (ML)**, very loose, dark gray, wet
5	-15							WEATHERED BAY POINT FORMATION **Silty Fine SAND (SM)**, loose to medium dense, gray to olive-gray, wet, with occasional shell fragments
		S	2	17				BAY POINT FORMATION **Silty SAND (SM)**, medium dense, mottled olive-brown, wet
10	-20	S	3	25				Becomes **Clayey SAND (SC)**, medium dense, interbedded olive-gray to olive-brown, moist
15	-25	S	4	30				**Silty to Fine Sandy CLAY (CL)**, very stiff, olive to olive-gray, moist
								Silty Fine SAND (SM), very dense, gray, moist, micaceous *Boring terminated at depth of 16.5 feet due to refusal.*
	-30							

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FIGURE A-7

LOG OF TEST BORING

PROJECT NAME	PROJECT NUMBER	BORING
HARBOR ISLAND WEST MARINA	2769	**B-7**

SITE LOCATION	START	FINISH	SHEET NO.
Harbor Island, San Diego, CA	2/2/2012	2/2/2012	1 of 2

DRILLING COMPANY	DRILLING METHOD	LOGGED BY	CHECKED BY
Pacific Drilling	Wash Boring	G. Spaulding	

DRILLING EQUIPMENT	BORING DIA. (In)	TOTAL DEPTH (ft)	GROUND ELEV (ft)	DEPTH/*ELEV.* GROUND WATER (ft)
TriPod	3	25.5	-7.20	⊻ n/a_

SAMPLING METHOD	NOTES
SPT	

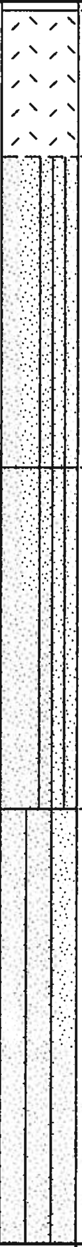
DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
									MUD LINE RECENT BAY DEPOSITS **Clayey Silt / Silty CLAY (ML/CL)**, very soft, gray, wet
		S	1	PUSH					
	-10								**Silty Fine SAND (SP-SM)**, loose, gray, wet, micaceous, with occasional shell fragments
5		S	2	6			GS		
	-15								WEATHERED BAY POINT FORMATION **Silty Fine SAND (SP-SM)**, medium dense, gray to olive-gray, wet, micaceous
10		S	3	23					
	-20								BAY POINT FORMATION **Silty SAND (SM)**, medium dense, mottled olive-gray, wet
15		S	4	35					
	-25								
		S	5	37					

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FIGURE A-8 a

LOG OF TEST BORING

PROJECT NAME HARBOR ISLAND WEST MARINA

PROJECT NUMBER 2769

BORING B-7

SITE LOCATION Harbor Island, San Diego, CA

START 2/2/2012

FINISH 2/2/2012

SHEET NO. 2 of 2

DRILLING COMPANY Pacific Drilling

DRILLING METHOD Wash Boring

LOGGED BY G. Spaulding

CHECKED BY

DRILLING EQUIPMENT TriPod

BORING DIA. (in) 3

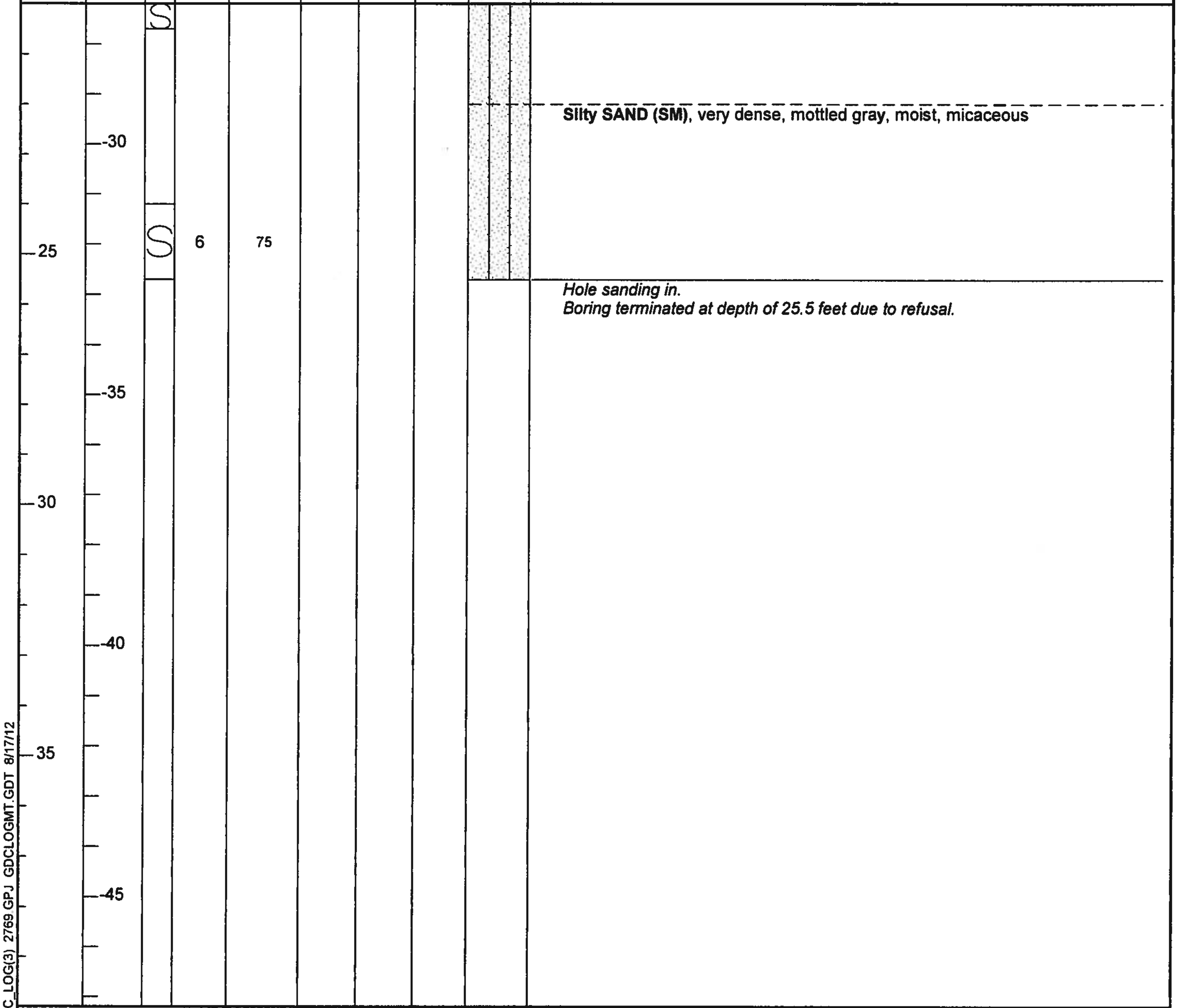
TOTAL DEPTH (ft) 25.5

GROUND ELEV (ft) -7.20

DEPTH/*ELEV.* GROUND WATER (ft) ▼ n/a_

SAMPLING METHOD SPT

NOTES



DEPTH (ft)	ELEVATION (ft)	SAMPLE TYPE	SAMPLE NO.	PENETRATION RESISTANCE (BLOWS/ft)	DRY DENSITY (pcf)	MOISTURE (%)	OTHER TESTS	GRAPHIC LOG	DESCRIPTION AND CLASSIFICATION
		S							
									Silty SAND (SM), very dense, mottled gray, moist, micaceous
25		S	6	75					
									Hole sanding in. *Boring terminated at depth of 25.5 feet due to refusal.*

TerraCosta Consulting Group, Inc.
4455 Murphy Canyon Road, Suite 100
San Diego, California 92123

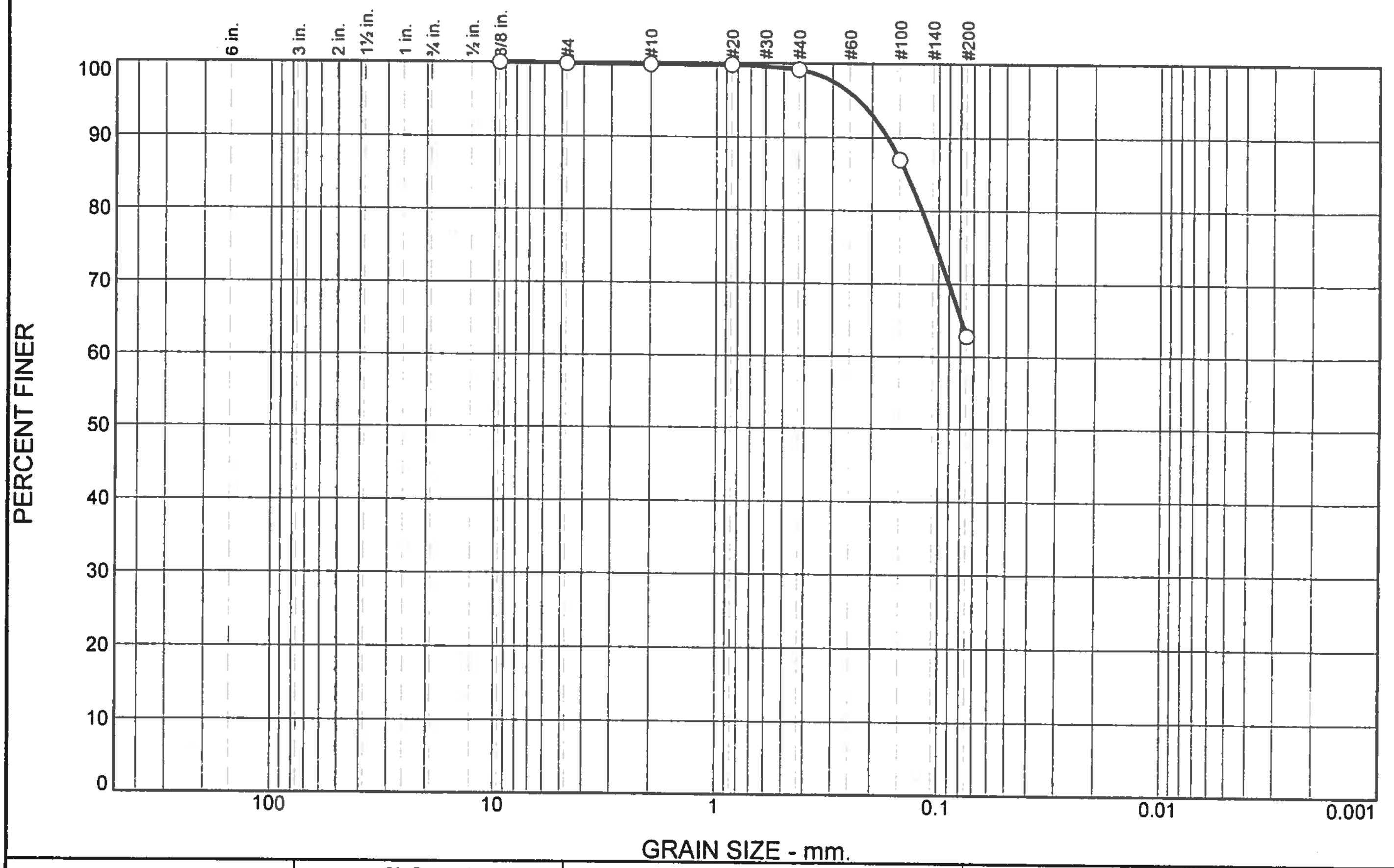
THIS SUMMARY APPLIES ONLY AT THE LOCATION OF THIS BORING AND AT THE TIME OF DRILLING. SUBSURFACE CONDITIONS MAY DIFFER AT OTHER LOCATIONS AND MAY CHANGE AT THIS LOCATION WITH THE PASSAGE OF TIME. THE DATA PRESENTED IS A SIMPLIFICATION OF THE ACTUAL CONDITIONS ENCOUNTERED.

FIGURE A-8 b

APPENDIX B

LABORATORY TEST RESULTS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.1	0.6	36.4	62.8	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	99.9		
#10	99.8		
#20	99.8		
#40	99.2		
#100	87.0		
#200	62.8		

* (no specification provided)

Material Description

Sandy Silt, ML (Lab #26673)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.1701 D_{85}= 0.1395 D_{60}=
D_{50}= D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

Sample Number: B1-2 **Depth:** 4.0'

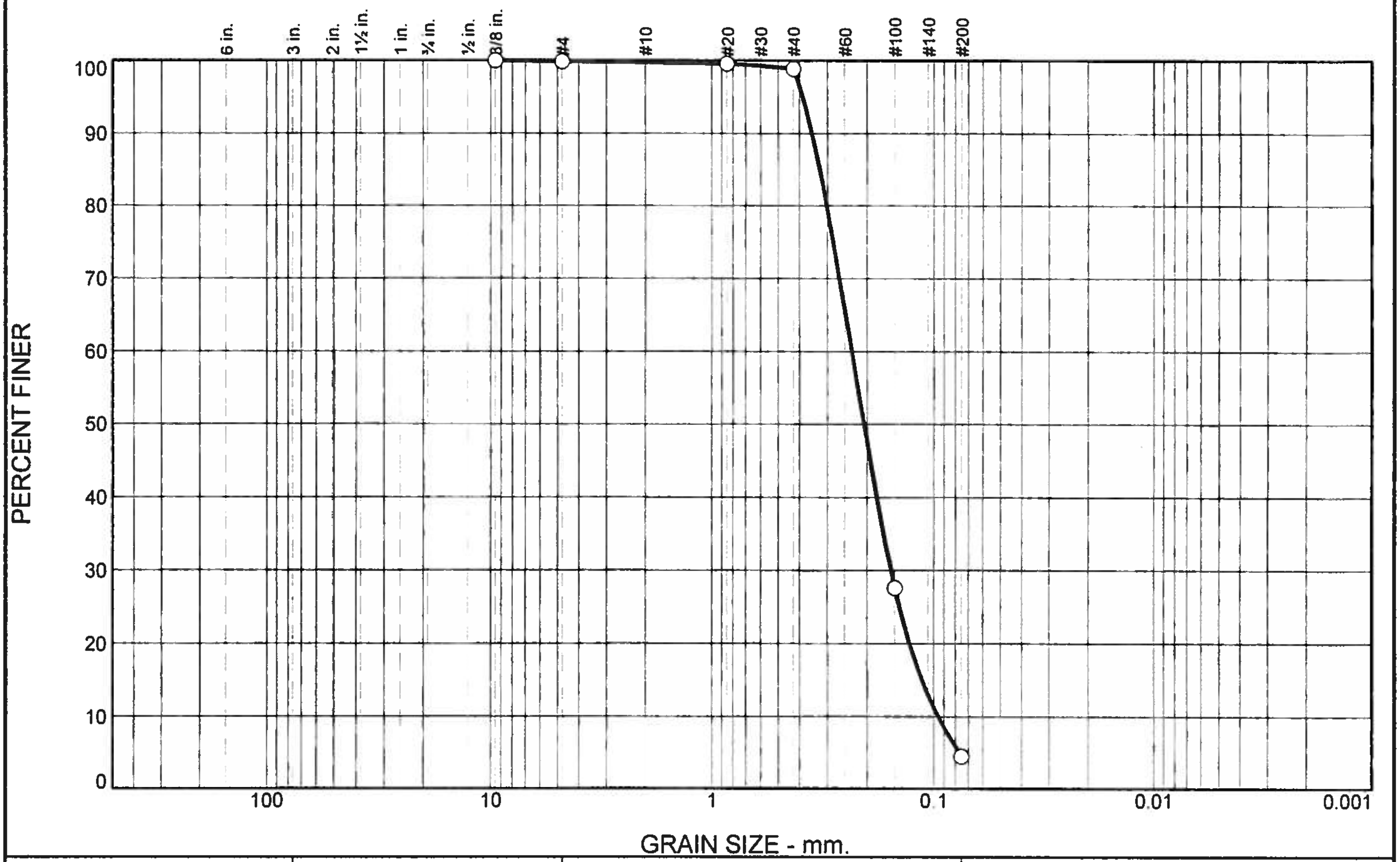
Date: 2/16/12

Client: TerraCosta Consutling Group, Inc.
Project: #2769, Harbor Island West

Project No: 5014-09-0006.29 **Figure** #26673

Tested By: E. Guttierrez **Checked By:** L. Collins

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.1	0.1	0.9	94.4	4.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
0.375"	100.0		
#4	99.9		
#20	99.6		
#40	98.9		
#100	27.6		
#200	4.5		

* (no specification provided)

Material Description

Poorly Graded Sand, SP (Lab #26674)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3514 D_{85}= 0.3243 D_{60}= 0.2331
D_{50}= 0.2059 D_{30}= 0.1561 D_{15}= 0.1134
D_{10}= 0.0958 C_u= 2.43 C_c= 1.09

Classification

USCS= SP AASHTO=

Remarks

Sample Number: B5-2 **Depth:** 6.0'

Date: 2/16/12

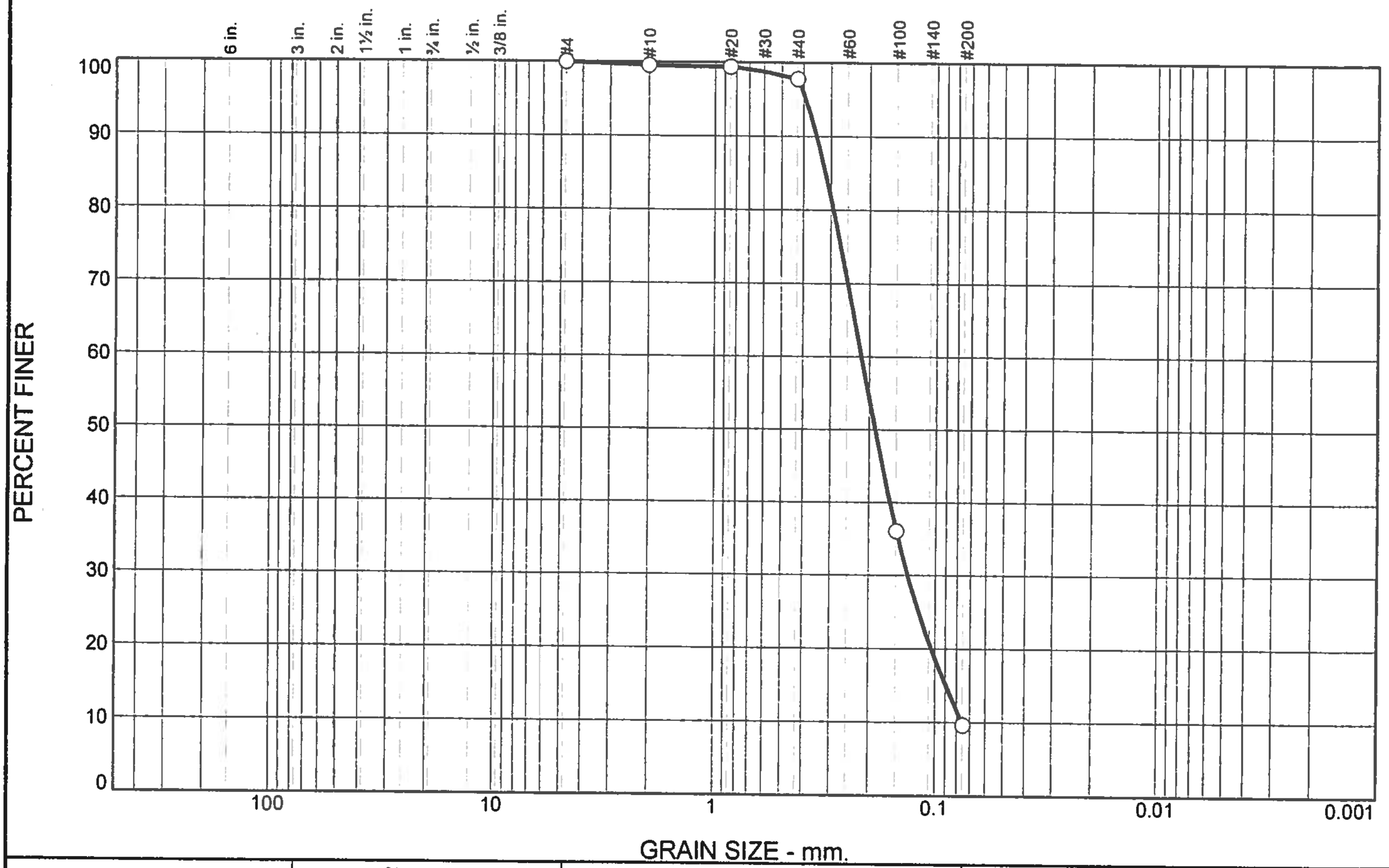
amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769, Harbor Island West

Project No: 5014-09-0006.29 **Figure** #26674

Tested By: R. Valles **Checked By:** L. Collins

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.4	1.8	88.2	9.6	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
#4	100.0		
#10	99.6		
#20	99.4		
#40	97.8		
#100	36.1		
#200	9.6		

* (no specification provided)

Material Description

Poorly Graded Sand w/Silt, SP-SM (Lab #26675)

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 0.3490 D_{85}= 0.3177 D_{60}= 0.2170
D_{50}= 0.1877 D_{30}= 0.1332 D_{15}= 0.0897
D_{10}= 0.0760 C_u= 2.86 C_c= 1.07

Classification

USCS= SP-SM AASHTO=

Remarks

Sample Number: B7-2 **Depth:** 4.0'

Date: 2/16/12

amec

Client: TerraCosta Consulting Group, Inc.
Project: #2769, Harbor Island West

Project No: 5014-09-0006.29 **Figure** #26675

Tested By: R. Valles **Checked By:** L. Collins

Appendix F
Noise Modeling and Calculations

FIELD NOISE MEASUREMENT DATA

PROJECT: Harbor Island West Marina PROJ. #: 498.14

SITE IDENTIFICATION: Lincoln Military Housing Park ST-1 OBSERVER(S): Jonathan Higginson
ADDRESS:
START DATE / TIME: 12/10/14 END DATE / TIME: 12/10/14

METEROLOGICAL CONDITIONS:
TEMP: 66 °F HUMIDITY: 70 %R.H. WIND: **CALM [✓ LIGHT] MODERATE VARIABLE**
WINDSPEED: 5 MPH DIR: **N NE E SE S [✓ SW] W NW STEADY GUSTY**
SKY: **SUNNY CLEAR OVRCST [✓ PRTLY CLOUDY] FOG RAIN OTHER:**

ACOUSTIC MEASUREMENTS:
INSTRUMENT: LD-LxT1 TYPE: [✓ 1] **2** SERIAL #: 0004005
CALIBRATOR: LD-CAL200 SERIAL #: 6645
CALIBRATION CHECK: PRE-TEST 114.0 dBA SPL POST-TEST 113.95 dBA SPL WINDSCREEN ✓

SETTINGS: **[✓ A-WEIGHTED] [✓ SLOW] FAST FRONTAL RANDOM [✓ ANSI] OTHER:**

REC #	**START**	**END**	**L_{eq}**	**L_{max}**	**L_{min}**	**$L_{\cancel{90}}$** 1.67	**$L_{\cancel{50}}$** 8.33	**L_{10}**	**OTHER:** L_{25}	**(TYPE?)** L_{50}	L_{90}
004	1:38PM	1:54PM	59.2	71.0	45.7	67.7	62.8	62.3	59.7	56.3	51.4

COMMENTS:

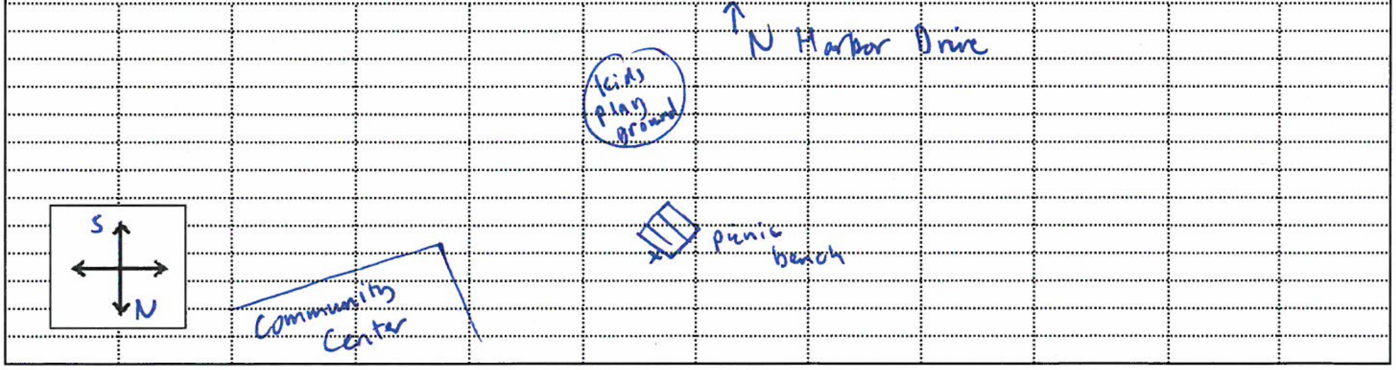
SOURCE INFO AND TRAFFIC COUNTS:
PRIMARY NOISE SOURCE: **TRAFFIC [✓ AIRCRAFT] RAIL INDUSTRIAL AMBIENT OTHER:** Helicopters
ROADWAY TYPE:
TRAFFIC COUNT DURATION: ___-MIN

	SPEED				#2 COUNT		SPEED	
	NB / EB	**SB / WB**	**NB / EB**	**SB / WB**	**NB / EB**	**SB / WB**	**NB / EB**	**SB / WB**
AUTOS:								
MED. TRUCKS:								
HVY TRUCKS:								
BUSES:								
MOTORCYCLES:								

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER SOURCES: **DIST. AIRCRAFT / RUSTLING LEAVES / DIST. BARKING DOGS / BIRDS / DIST. INDUSTRIAL DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:**
Traffic on N Harbor Drive. Occasional activity at kids playground.

DESCRIPTION / SKETCH:
TERRAIN: **HARD SOFT [✓ MIXED] FLAT OTHER:** Lawn, concrete, trees, shrubs
PHOTOS:
OTHER COMMENTS / SKETCH:



File: LxT_Data.004 "The Village at NTC"

FIELD NOISE MEASUREMENT DATA

PROJECT: Harbor Island West Marina PROJ. #: 498.14

SITE IDENTIFICATION: Spanish Landing Park ST-2 OBSERVER(S): Jonathan Higginson

ADDRESS:

START DATE / TIME: 12/10/14 12:24 AM END DATE / TIME: 12/10/14

METEROLOGICAL CONDITIONS:

TEMP: 66 °F HUMIDITY: 736 %R.H. WIND: **CALM LIGHT MODERATE [✓ VARIABLE]**

WINDSPEED: 5 MPH DIR: **N NE E SE [✓ S SW] W NW** **STEADY GUSTY**

SKY: **SUNNY CLEAR OVRCST [✓ PRTLY CLOUDY] FOG RAIN** **OTHER:**

ACOUSTIC MEASUREMENTS:

INSTRUMENT: LD-LxT1 TYPE: [✓ 1] 2 SERIAL #: 0004005

CALIBRATOR: LD-CAL200 SERIAL #: 6645

CALIBRATION CHECK: PRE-TEST 114.0 dBA SPL POST-TEST 113.93 dBA SPL WINDSCREEN —

SETTINGS: **[✓ A-WEIGHTED] [✓ SLOW] FAST FRONTAL RANDOM ANSI OTHER:**

REC #	START	END	L_{eq}	L_{max}	L_{min}	$L_{\cancel{90}}$ 1.67	$L_{\cancel{50}}$ 8.33	L_{10}	OTHER: L_{25}	(TYPE?) L_{50}	L_{90}
003	12:24	12:43pm	63.4	75.9	53.4	71.9	68.0	67.3	63.4	59.6	55.4

COMMENTS:

SOURCE INFO AND TRAFFIC COUNTS:

PRIMARY NOISE SOURCE: **[✓ TRAFFIC] AIRCRAFT RAIL INDUSTRIAL AMBIENT OTHER:**

ROADWAY TYPE:

TRAFFIC COUNT DURATION: ____-MIN

	SPEED		SPEED		#2 COUNT		SPEED	
	NB / EB	**SB / WB**	**NB / EB**	**SB / WB**	**NB / EB**	**SB / WB**	**NB / EB**	**SB / WB**
AUTOS:								
MED. TRUCKS:								
HVY TRUCKS:								
BUSES:								
MOTORCYCLES:								

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER SOURCES: **[✓ DIST. AIRCRAFT] / RUSTLING LEAVES / DIST. BARKING DOGS / BIRDS / DIST. INDUSTRIAL / DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:**

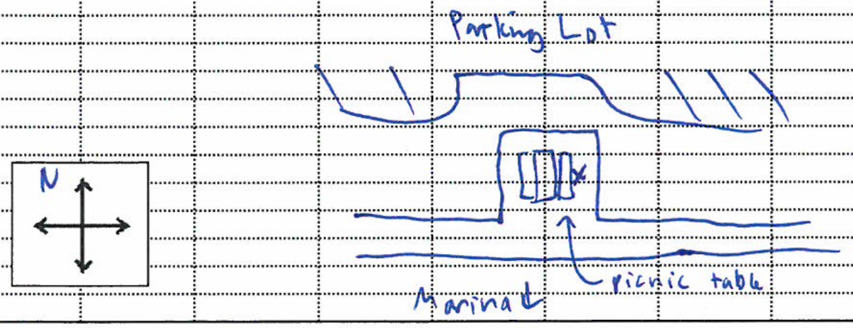
Park activities, marina activities

DESCRIPTION / SKETCH:

TERRAIN: **HARD SOFT [✓ MIXED] FLAT OTHER:** Concrete/asphalt, lawn, water

PHOTOS:

OTHER COMMENTS / SKETCH:



File = LxT_Data.003

FIELD NOISE MEASUREMENT DATA

PROJECT: Harbor Island West Marina PROJ. # 498.14

SITE IDENTIFICATION: Hilton Hotel ST-3 OBSERVER(S): Jonathan Higginson

ADDRESS:

START DATE / TIME: 12/10/14 11:35AM END DATE / TIME: 12/10/14 11:52AM

METEROLOGICAL CONDITIONS:

TEMP: 66 °F HUMIDITY: 70 %R.H. WIND: [✓ CALM] LIGHT MODERATE VARIABLE

WINDSPEED: [illegible] MPH DIR: N NE E SE S SW W NW STEADY GUSTY

SKY: SUNNY CLEAR OVRCST [✓ PRTLY CLOUDY] FOG RAIN OTHER:

ACOUSTIC MEASUREMENTS:

INSTRUMENT: LD-LXT1 TYPE: [✓ 1] 2 SERIAL #: 0004005

CALIBRATOR: LD-CAL200 SERIAL #: 6645

CALIBRATION CHECK: PRE-TEST 114.0 dBA SPL POST-TEST 114.09 dBA SPL WINDSCREEN ✓

SETTINGS: [✓ A-WEIGHTED] [✓ SLOW] FAST FRONTAL RANDOM [✓ ANSI] OTHER:

REC #	START	END	L_{eq}	L_{max}	L_{min}	~~L_{90}~~ 1.67	~~L_{50}~~ 8.33	~~L_{10}~~ 10	OTHER: L_{25}	(TYPE?) L_{50}	L_{90}
002	11:35	11:52	56.7	69.4	48.2	67.1	61.2	57.2	54.0	51.7	49.9

COMMENTS:

SOURCE INFO AND TRAFFIC COUNTS:

PRIMARY NOISE SOURCE: TRAFFIC [✓ AIRCRAFT] RAIL INDUSTRIAL AMBIENT OTHER: Helicopter

ROADWAY TYPE:

TRAFFIC COUNT DURATION: ____-MIN

	NB / EB	SB / WB	SPEED NB / EB	SPEED SB / WB	#2 COUNT NB / EB	#2 COUNT SB / WB	SPEED NB / EB	SPEED SB / WB
AUTOS:								
MED. TRUCKS:								
HVY TRUCKS:								
BUSES:								
MOTORCYCLES:								

SPEED ESTIMATED BY: RADAR / DRIVING / OBSERVER

OTHER SOURCES: [✓ DIST. AIRCRAFT] / RUSTLING LEAVES / DIST. BARKING DOGS / [✓ BIRDS] / DIST. INDUSTRIAL / DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:

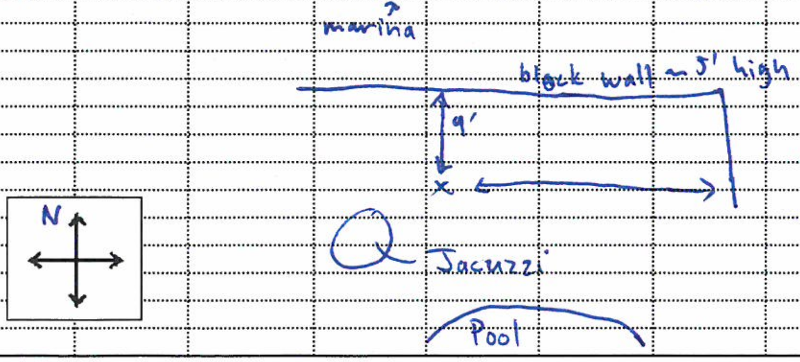
Occasional marina / boat activities. Hotel staff talking near restaurant / hotel

DESCRIPTION / SKETCH:

TERRAIN: HARD SOFT [✓ MIXED] FLAT OTHER: Concrete, water

PHOTOS:

OTHER COMMENTS / SKETCH:



File = LxT_Data.002

FIELD NOISE MEASUREMENT DATA

PROJECT: Harbor Island West Marina PROJ. # 498.14

SITE IDENTIFICATION: Harbor Island Park ST-4 OBSERVER(S): Jonathan Higginson
ADDRESS:
START DATE / TIME: 12/10/14 11:01 AM END DATE / TIME: 12/10/14 11:21 AM

METEROLOGICAL CONDITIONS:
TEMP: 64 °F HUMIDITY: 75 %R.H. WIND: [✓ **CALM**] **LIGHT MODERATE VARIABLE**
WINDSPEED: ____ MPH DIR: **N NE E SE S SW W NW** **STEADY GUSTY**
SKY: **SUNNY CLEAR OVRCST** [✓ **PRTLY CLOUDY**] **FOG RAIN** **OTHER:**

ACOUSTIC MEASUREMENTS:
INSTRUMENT: LD-LXT1 TYPE: [✓ 1] 2 SERIAL #: 0004005
CALIBRATOR: LD-CAL200 SERIAL #: 6645
CALIBRATION CHECK: PRE-TEST 114.0 dBA SPL POST-TEST 113.9 dBA SPL WINDSCREEN L

SETTINGS: [✓ **A-WEIGHTED**] [✓ **SLOW**] **FAST FRONTAL RANDOM** [✓ **ANSI**] **OTHER:**

REC #	**START**	**END**	**L_{eq}**	**L_{max}**	**L_{min}**	**$L_{\cancel{90}}$** 1.67	**$L_{\cancel{50}}$** 8.33	**L_{10}**	**OTHER:** L_{25}	**(TYPE?)** L_{50}	L_{90}
001	11:01	11:21	60.9	72.8	53.2	68.3	63.1	62.6	61.0	59.5	56.1

COMMENTS:

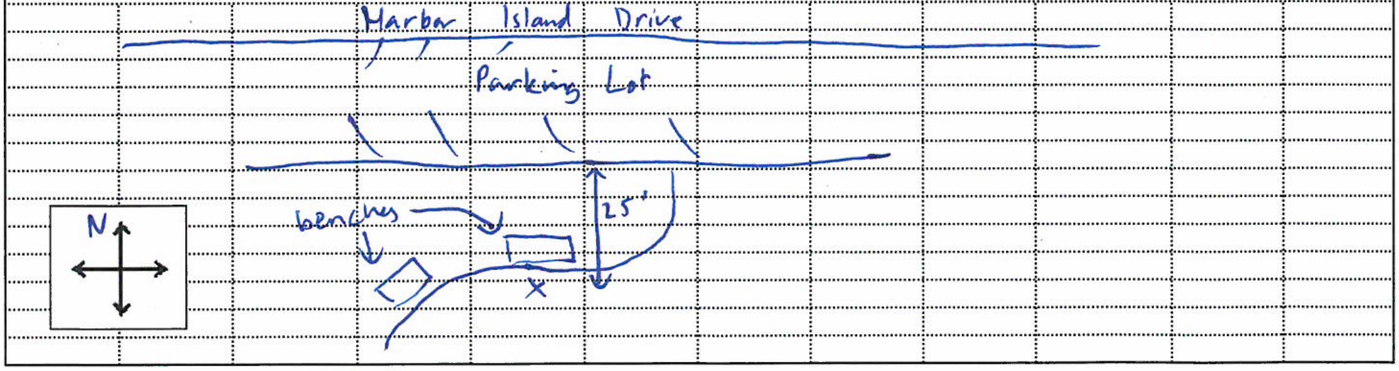
SOURCE INFO AND TRAFFIC COUNTS:
PRIMARY NOISE SOURCE: **TRAFFIC** [✓ **AIRCRAFT**] **RAIL INDUSTRIAL AMBIENT** **OTHER:** Helicopters
ROADWAY TYPE:
TRAFFIC COUNT DURATION: ____-MIN

	SPEED				#2 COUNT		SPEED		
	NB / EB	**SB / WB**	**NB / EB**	**SB / WB**	**NB / EB**	**SB / WB**	**NB / EB**	**SB / WB**
AUTOS:								
MED. TRUCKS:								
HVY TRUCKS:								
BUSES:								
MOTORCYCLES:								

SPEED ESTIMATED BY: **RADAR / DRIVING / OBSERVER**

OTHER SOURCES: **DIST. AIRCRAFT / RUSTLING LEAVES / DIST. BARKING DOGS / BIRDS / DIST. INDUSTRIAL / DIST. CHILDREN PLAYING / DIST. TRAFFIC / DIST. LANDSCAPING ACTIVITIES / OTHER:**
Sporadic vehicle traffic on Harbor Island Drive

DESCRIPTION / SKETCH:
TERRAIN: **HARD SOFT** [✓ **MIXED**] **FLAT OTHER:** Lawn, concrete/asphalt, water
PHOTOS:
OTHER COMMENTS / SKETCH:



File = LxT_Data.001

Photograph 1. ST-1, Camera Facing Northeast

Photograph 2. ST-2, Camera Facing Southeast

Photograph 3. ST-1, Camera Facing Southwest

Photograph 4. ST-1, Camera Facing Northwest

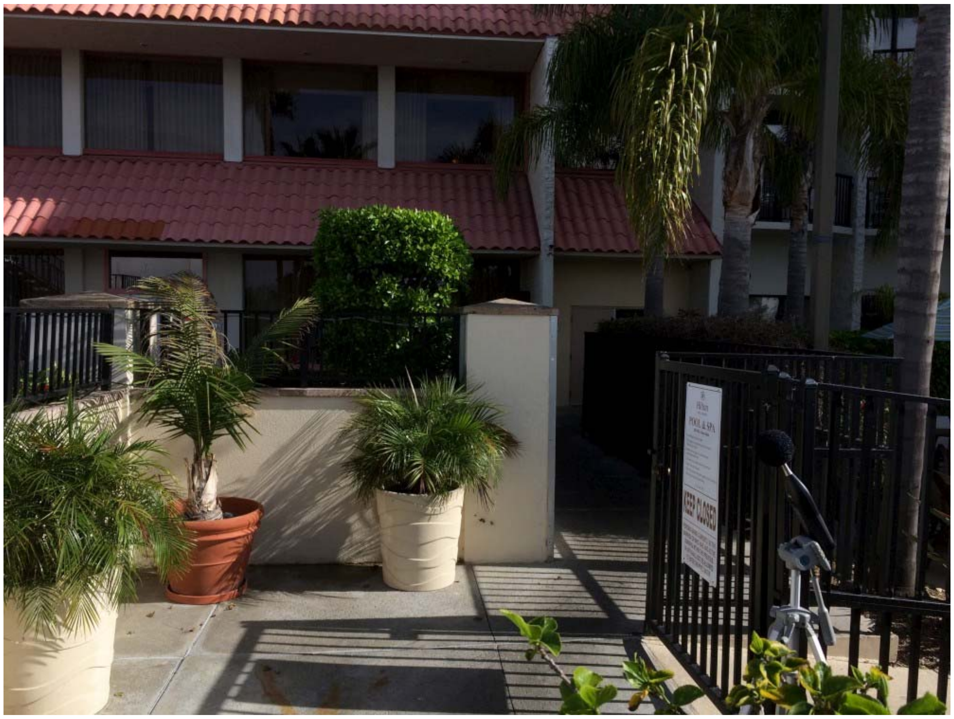
Photograph 5. ST-2, Camera Facing North

Photograph 6. ST-2, Camera Facing East

Photograph 7. ST-2, Camera Facing South

Photograph 8. ST-2, Camera Facing West

Photograph 9. ST-3, Camera Facing North



Photograph 10. ST-3, Camera Facing East

Photograph 11. ST-3, Camera Facing South

Photograph 12. ST-3, Camera Facing West

Photograph 13. ST-4, Camera Facing North

Photograph 14. ST-4, Camera Facing East

Photograph 15. ST-4, Camera Facing South

Photograph 16. ST-4, Camera Facing West

This spreadsheet calculates traffic noise levels based on TNM Version 2.5 Lookup Tables.

**** Type in yellow cells only.**

Traffic Data:

● **Enter ADT Traffic**

○ **Enter Loudest-hour Traffic**

Units:

○ **Metric**

● **English**

Calculate

Noise Increase Calculation

Construction Traffic:	48.6 dB CNEL
Baseline Traffic:	61.7 dB CNEL
Combined Traffic:	61.9 dB CNEL
Increase:	0.2 dB

Link	Roadway	Segment Location	Hard or Soft Ground (H or S)	BARRIER			Total Daily Traffic Volumes (ADT)	Traffic Mix		Vehicle Speed	Sound Levels at Receiver Locations			
				Present 1=yes	Height min. 7 ft. max. 32 ft.	Distance 35 ft. or 100 ft.		Number #	Description	mph max. 80	Distance feet, min. 33 max. 1000	dB Ldn	dB CNEL	dBA Leq1h (loudest hour)
1	**Peak Construction Traffic**	**N/A**	H				121	13	Construction Traffic	35	50	**47.6**	**48.6**	**47.3**
2	**Existing Harbor Island Drive**	**Western Terminus to Harbor Island Dr**	H				5,222	10	County of Orange, Arterials	35	50	**61.1**	**61.7**	**60.2**
3														
4														
5														
6														
7														
8														
9														
10														
11														
12														
13														
14														

Table 1. Construction Noise Analysis, Phase I, at "The Village" Military Housing

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Hours Per Day	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA
Item No.	Description								
39	Pneumatic Tools	85.2	0.5	1	8	1650	hard	0	50.1
70	Workboat (estimated)	73	0.1	1	8	1650	hard	0	30.9
12	Crane	80.6	0.16	2	8	1650	hard	0	43.5
35	Pile-driver (Impact)	101.3	0.2	1	1.6	1650	hard	0	55.2
29	Loader (Front End Loader)	79.1	0.4	1	8	2200	hard	0	40.5
18	Excavator	80.7	0.4	1	8	2200	hard	0	42.1
2	Backhoe	77.6	0.4	1	8	2200	hard	0	39.0
34	Paver	77.2	0.5	1	8	2200	hard	0	39.6
44	Roller	80	0.2	1	8	2200	hard	0	38.4
23	Grader	85	0.4	1	8	2200	hard	0	46.4
9	Compactor	83.2	0.2	1	8	2200	hard	0	41.6
71	Bobcat (estimated)	77.6	0.4	1	8	2200	hard	0	39.0
72	Striper (estimated)	77.2	0.5	1	8	2200	hard	0	39.6
2	Backhoe	77.6	0.4	1	8	2200	hard	0	39.0
10	Compressor, Air	77.7	0.4	1	8	2200	hard	0	39.1
47	Saw, Chain	83.7	0.2	2	8	2200	hard	0	45.1
39	Pneumatic Tools	85.2	0.5	2	8	2200	hard	0	50.6
40	Pumps	80.9	0.5	1	6.4	1650	hard	0	44.8
	Combined Equipment								***58.9***
	Average Hourly Construction Traffic								***47.0***
	Estimated Total Construction Noise								***59.2***

1. Obtained or estimated from:
FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
"Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
"Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971

2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Table 2. Construction Noise Analysis, Phase I, at Spanish Landing Park

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Hours Per Day	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA
Item No.	Description								
39	Pneumatic Tools	85.2	0.5	1	8	600	hard	0	58.8
70	Workboat (estimated)	73	0.1	1	8	600	hard	0	39.7
12	Crane	80.6	0.16	2	8	600	hard	0	52.3
35	Pile-driver (Impact)	101.3	0.2	1	1.6	600	hard	0	64.0
29	Loader (Front End Loader)	79.1	0.4	1	8	1270	hard	0	45.3
18	Excavator	80.7	0.4	1	8	1270	hard	0	46.9
2	Backhoe	77.6	0.4	1	8	1270	hard	0	43.8
34	Paver	77.2	0.5	1	8	1270	hard	0	44.3
44	Roller	80	0.2	1	8	1270	hard	0	43.2
23	Grader	85	0.4	1	8	1270	hard	0	51.2
9	Compactor	83.2	0.2	1	8	1270	hard	0	46.4
71	Bobcat (estimated)	77.6	0.4	1	8	1270	hard	0	43.8
72	Striper (estimated)	77.2	0.5	1	8	1270	hard	0	44.3
2	Backhoe	77.6	0.4	1	8	1270	hard	0	43.8
10	Compressor, Air	77.7	0.4	1	8	1270	hard	0	43.9
47	Saw, Chain	83.7	0.2	2	8	1270	hard	0	49.9
39	Pneumatic Tools	85.2	0.5	2	8	1270	hard	0	55.3
40	Pumps	80.9	0.5	1	6.4	600	hard	0	53.6
	Combined Equipment								***66.6***
	Average Hourly Construction Traffic								***47.0***
	Estimated Total Construction Noise								***66.6***

1. Obtained or estimated from:
FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
"Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
"Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Table 3. Construction Noise Analysis, Phase I, at Hilton Hotel

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Hours Per Day	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA
Item No.	Description								
39	Pneumatic Tools	85.2	0.5	1	8	60	hard	0	78.8
70	Workboat (estimated)	73	0.1	1	8	60	hard	0	59.7
12	Crane	80.6	0.16	2	8	60	hard	0	72.3
35	Pile-driver (Impact)	101.3	0.2	1	1.6	60	hard	0	84.0
29	Loader (Front End Loader)	79.1	0.4	1	8	805	hard	0	49.2
18	Excavator	80.7	0.4	1	8	805	hard	0	50.8
2	Backhoe	77.6	0.4	1	8	805	hard	0	47.7
34	Paver	77.2	0.5	1	8	805	hard	0	48.3
44	Roller	80	0.2	1	8	805	hard	0	47.1
23	Grader	85	0.4	1	8	805	hard	0	55.1
9	Compactor	83.2	0.2	1	8	805	hard	0	50.3
71	Bobcat (estimated)	77.6	0.4	1	8	805	hard	0	47.7
72	Striper (estimated)	77.2	0.5	1	8	805	hard	0	48.3
2	Backhoe	77.6	0.4	1	8	805	hard	0	47.7
10	Compressor, Air	77.7	0.4	1	8	805	hard	0	47.8
47	Saw, Chain	83.7	0.2	2	8	805	hard	0	53.8
39	Pneumatic Tools	85.2	0.5	2	8	805	hard	0	59.3
40	Pumps	80.9	0.5	1	6.4	60	hard	0	73.6
	Combined Equipment								***85.7***
	Average Hourly Construction Traffic								***47.0***
	Estimated Total Construction Noise								***85.7***

1. Obtained or estimated from:
FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
"Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
"Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971

2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Table 4. Construction Noise Analysis, Phase I, at Harbor Island Park

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Hours Per Day	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA
Item No.	Description								
39	Pneumatic Tools	85.2	0.5	1	8	400	hard	0	62.4
70	Workboat (estimated)	73	0.1	1	8	400	hard	0	43.2
12	Crane	80.6	0.16	2	8	400	hard	0	55.8
35	Pile-driver (Impact)	101.3	0.2	1	1.6	400	hard	0	67.5
29	Loader (Front End Loader)	79.1	0.4	1	8	1180	hard	0	45.9
18	Excavator	80.7	0.4	1	8	1180	hard	0	47.5
2	Backhoe	77.6	0.4	1	8	1180	hard	0	44.4
34	Paver	77.2	0.5	1	8	1180	hard	0	45.0
44	Roller	80	0.2	1	8	1180	hard	0	43.8
23	Grader	85	0.4	1	8	1180	hard	0	51.8
9	Compactor	83.2	0.2	1	8	1180	hard	0	47.0
71	Bobcat (estimated)	77.6	0.4	1	8	1180	hard	0	44.4
72	Striper (estimated)	77.2	0.5	1	8	1180	hard	0	45.0
2	Backhoe	77.6	0.4	1	8	1180	hard	0	44.4
10	Compressor, Air	77.7	0.4	1	8	1180	hard	0	44.5
47	Saw, Chain	83.7	0.2	2	8	1180	hard	0	50.5
39	Pneumatic Tools	85.2	0.5	2	8	1180	hard	0	56.0
40	Pumps	80.9	0.5	1	6.4	400	hard	0	57.1
	Combined Equipment								***69.7***
	Average Hourly Construction Traffic								***47.0***
	Estimated Total Construction Noise								***69.7***

1. Obtained or estimated from:
FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
"Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
"Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Table 5. Construction Noise Analysis, Phase 2, at "The Village" Military Housing

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Hours Per Day	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA
Item No.	Description								
2	Backhoe	77.6	0.4	1	8	2655	hard	0	37.4
73	Wood Chipper,	88	0.2	1	8	2655	hard	0	44.7
29	Loader (Front End Loader)	79.1	0.4	2	8	2655	hard	0	41.9
18	Excavator	80.7	0.4	1	8	2655	hard	0	40.5
2	Backhoe	77.6	0.4	1	8	2655	hard	0	37.4
18	Excavator	80.7	0.4	2	8	2655	hard	0	43.5
29	Loader (Front End Loader)	79.1	0.4	2	8	2655	hard	0	41.9
23	Grader	85	0.4	1	8	2655	hard	0	44.8
61	Truck, Dump	76.5	0.4	1	8	2655	hard	0	36.3
	Combined Equipment								***51.4***
	Average Hourly Construction Traffic								***47.0***
	Estimated Total Construction Noise								***52.8***

1. Obtained or estimated from:
   FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
   "Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
   "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Table 6. Construction Noise Analysis, Phase 2, at Spanish Landing Park

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Hours Per Day	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA
Item No.	Description								
2	Backhoe	77.6	0.4	1	8	1240	hard	0	44.0
73	Wood Chipper,	88	0.2	1	8	1240	hard	0	51.4
29	Loader (Front End Loader)	79.1	0.4	2	8	1240	hard	0	48.5
18	Excavator	80.7	0.4	1	8	1240	hard	0	47.1
2	Backhoe	77.6	0.4	1	8	1240	hard	0	44.0
18	Excavator	80.7	0.4	2	8	1240	hard	0	50.1
29	Loader (Front End Loader)	79.1	0.4	2	8	1240	hard	0	48.5
23	Grader	85	0.4	1	8	1240	hard	0	51.4
61	Truck, Dump	76.5	0.4	1	8	1240	hard	0	42.9
	Combined Equipment								***58.0***
	Average Hourly Construction Traffic								***47.0***
	Estimated Total Construction Noise								***58.4***

1. Obtained or estimated from:
   FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
   "Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
   "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Table 7. Construction Noise Analysis, Phase 2, at Hilton Hotel

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Hours Per Day	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA
Item No.	Description								
2	Backhoe	77.6	0.4	1	8	125	hard	0	63.9
73	Wood Chipper,	88	0.2	1	8	125	hard	0	71.3
29	Loader (Front End Loader)	79.1	0.4	2	8	125	hard	0	68.4
18	Excavator	80.7	0.4	1	8	125	hard	0	67.0
2	Backhoe	77.6	0.4	1	8	125	hard	0	63.9
18	Excavator	80.7	0.4	2	8	125	hard	0	70.0
29	Loader (Front End Loader)	79.1	0.4	2	8	125	hard	0	68.4
23	Grader	85	0.4	1	8	125	hard	0	71.3
61	Truck, Dump	76.5	0.4	1	8	125	hard	0	62.8
	Combined Equipment								***78.0***
	Average Hourly Construction Traffic								***47.0***
	Estimated Total Construction Noise								***78.0***

1. Obtained or estimated from:
   FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
   "Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
   "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Table 8. Construction Noise Analysis, Phase 2, at Harbor Island Park

Equipment		Typical Level @ 50', dBA[1]	Usage Factor[1,2]	Number of Units	Hours Per Day	Distance to Receiver, ft.	Hard or Soft Site?	Barrier Attenuation, dB	Leq(h), dBA
Item No.	Description								
2	Backhoe	77.6	0.4	1	8	660	hard	0	49.4
73	Wood Chipper,	88	0.2	1	8	660	hard	0	56.8
29	Loader (Front End Loader)	79.1	0.4	2	8	660	hard	0	54.0
18	Excavator	80.7	0.4	1	8	660	hard	0	52.5
2	Backhoe	77.6	0.4	1	8	660	hard	0	49.4
18	Excavator	80.7	0.4	2	8	660	hard	0	55.6
29	Loader (Front End Loader)	79.1	0.4	2	8	660	hard	0	54.0
23	Grader	85	0.4	1	8	660	hard	0	56.8
61	Truck, Dump	76.5	0.4	1	8	660	hard	0	48.3
	Combined Equipment								***63.5***
	Average Hourly Construction Traffic								***47.0***
	Estimated Total Construction Noise								***63.6***

1. Obtained or estimated from:
   FHWA Roadway Construction Noise Model (RCNM), Version 1.1, December 8, 2008; and/or
   "Transit Noise and Vibration Impact Assessment", FTA, (FTA-VA-90-1003-06), May 2006; and/or
   "Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances;" BBN/EPA, December 31, 1971
2. Usage Factor = percentage of time equipment is operating in noisiest mode while in use

Table 9. Construction Noise Analysis, Noise Increases

	Receptor 1: "The Village" Military Housing	Receptor 2: Spanish Landing Park West	Receptor 3: Hilton Hotel	Receptor 3: Harbor Island Park
Measured existing noise level (L_{eq}), dBA	59.2	63.4	56.7	60.9
Project construction noise levels (L_{eq}), dBA				
Phase 1	59.2	66.6	85.7	69.7
Phase 2	52.8	58.4	78.0	63.6
Combined noise levels (L_{eq}), dBA				
Phase 1	62.2	68.3	85.7	70.2
Phase 2	60.1	64.6	78.0	65.5
Increase due to project, dB				
Phase 1	3.0	4.9	29.0	9.3
Phase 2	0.9	1.2	21.3	4.6

Construction Vibration Analysis, PPV

Vibration attenuation constant (n):	1.1
Vibration Source Data	
Equipment Item	**Reference PPV at 25 feet, in/s** [a]
Impact Pile Driver	0.650
Large bulldozer[b]	0.089
Small bulldozer[c]	0.003

Perceptibility Criteria, PPV, in/sec (continuous/frequent intermittent sources)	
Barely perceptible	0.01
Distinctly perceptible	0.04
Strongly perceptible	0.1
Severe	0.4

[a] Obtained from "Transportation and Construction Vibration Guidance Manual", Caltrans 2013

[b] Considered representative of any full size/large excavator, dozer, backhoe, etc.

[c] Considered representative of any small excavator, dozer, backhoe, skid steer, etc.

Receiver #	**Distance from construction source (Feet)**		**Vibration PPV Level (in/sec) at Receptor Location**		**PPV Threshold for Potential Building Damage (in/sec)**	**Exceeds Threshold?**	**Human Response**
	Waterside Sources	**Landside Sources**	**Waterside Sources**	**Landside Sources**			
The Village on the Naval Training Center (Lincoln Military Housing)	1,650	2,000	0.006	0.001	0.5	No	Below barely perceptible
Spanish Landing Park West	600	1,000	0.020	0.002	N/A	No	Barely perceptible
Hilton Hotel	50	25	0.303	0.089	0.5	No	Strongly perceptible
Harbor Island Park	400	400	0.031	0.004	N/A	No	Barely perceptible
Tom Ham’s Lighthouse Restaurant	300	270	0.042	0.006	0.5	No	Distinctly perceptible

Appendix G
Traffic Technical Memorandum

MEMORANDUM

TO: Elyssa Figari, ICF

FROM: Dale Domingo; Chen Ryan Associates

DATE: December 17, 2018

RE: Harbor Island West Marina Redevelopment Project – Technical Memorandum

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The purpose of this Technical Memorandum is to identify and document potential transportation impacts related to the construction activities of the Harbor Island West Marina Redevelopment Project (proposed project), as well as to recommend mitigation measures, as necessary, for any identified transportation related impacts associated with the proposed project.

PROPOSED PROJECT

The proposed Harbor Island West Marina Redevelopment Project encompasses the replacement and redevelopment of several elements comprising the Harbor Island West Marina (HIWM), an existing marina facility that provides services and amenities to the boating community and waterfront access opportunities to the public. The purpose of the proposed Project is to replace the existing aged dock structure, existing landside buildings, and infrastructure to accommodate a wider range of vessel sizes, to create more slip opportunities for entry level boaters, and to ensure the HIWM's long-term operation.

In summary, the Project would include the following:

1. Demolition of 23,000 square feet of existing building space and reconstruction of approximately 15,682 square feet of new building space;
2. Demolition of the existing paved parking lot (120,000 square feet of pavement) and construction of a new paved parking lot (approximately 116,000 square feet);
3. Removal of 15,000 square feet of landscaping with installation of approximately 18,000 square feet of new landscaping;
4. Construction of a new public 12-foot-wide promenade and replacement of an existing 6,000 square foot viewing deck with a new 6,000 square foot public viewing deck;
5. Modernizing utilities and site lighting; and
6. Demolition of 146,000 square feet of existing docks (including 620 boat slips) and construction of 140,000 square feet of new docks (including 603 boat slips).

The project site is located at 2040 Harbor Island Drive, San Diego, CA 92101.

PROJECT STUDY AREA

This Technical Memorandum was performed in accordance with the requirements of the City of San Diego Traffic Impact Study Manual requirements. The City of San Diego Traffic Impact Study Manual requires that the defined study area include all freeway segments, roadway segments, and intersections where the proposed project would add 50 or more peak hour trips in either direction.

Study Roadway Segments

Based on the project trip assignment, the following four (4) key study area roadway segments were analyzed:

North Harbor Drive between:

- Terminal 2/Spanish Landing to Harbor Island Drive
- Harbor Island Drive to Winship Lane

Harbor Island Drive between:

- North Harbor Drive to Harbor Island Drive Southern Terminus
- Western Terminus to Harbor Island Drive

Freeway Segments

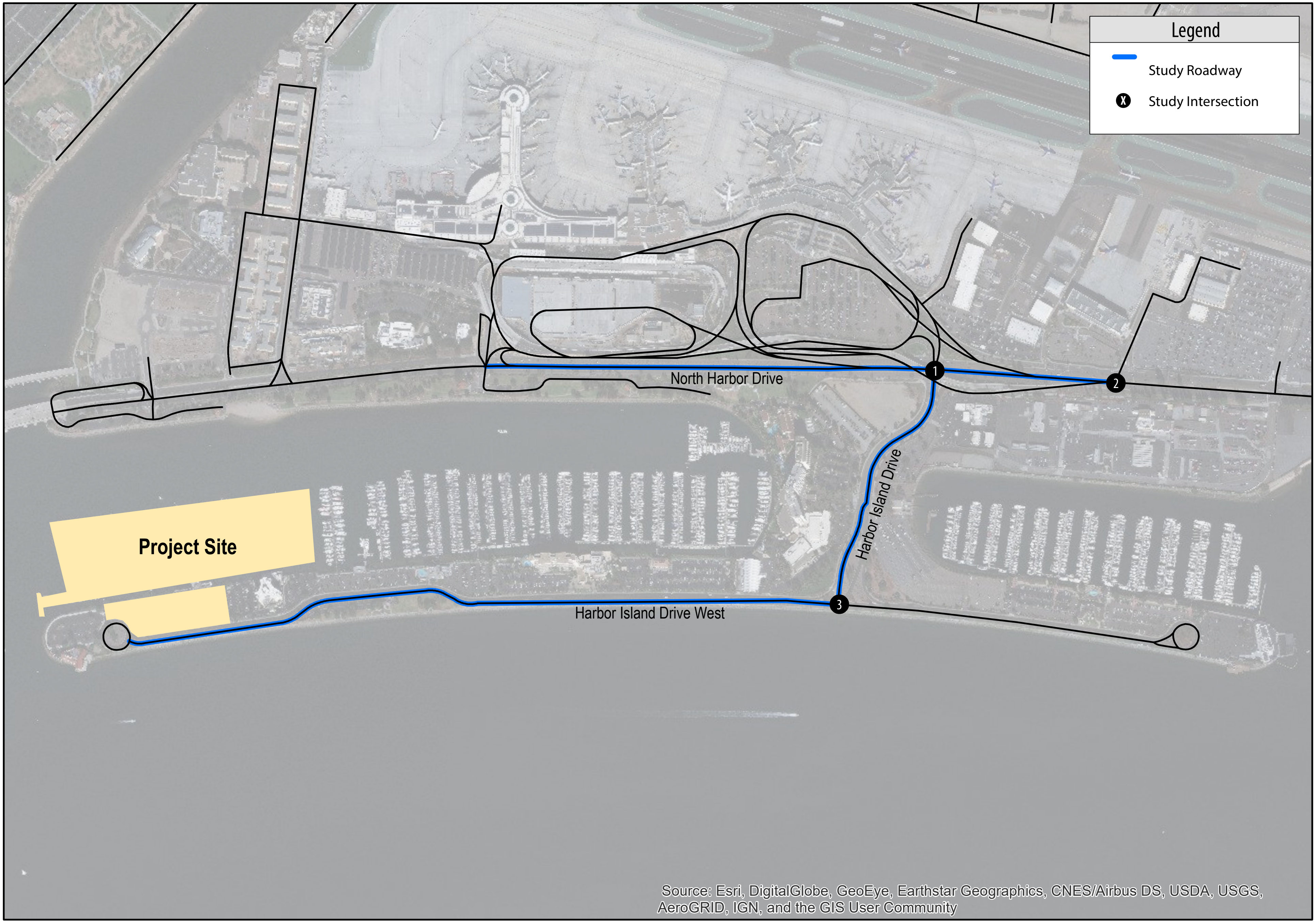
Based on the project trip assignment, no freeway segments will be analyzed for this Technical Memorandum.

Study Intersections

Based on the project trip assignment, the following three (3) key study area intersections were analyzed:

1. Harbor Island Drive & Airport Terminal Road / North Harbor Drive
2. North Harbor Drive / Winship Lane
3. Harbor Island Drive (West) & Harbor Island Drive (East) / Harbor Island Drive

Figure 1 displays the project study area.



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Harbor Island West Marina Redevelopment Project

CHEN RYAN

Figure 1

Project Study Area

ANALYSIS METHODOLOGY

This technical memorandum was performed in accordance with the requirements of the City of San Diego *Traffic Impact Study Manual*, and the Port District's California Environmental Quality Act (CEQA) project review process. Detailed information on roadway segment and intersection analysis methodologies, standards, and thresholds are discussed in the following sections.

Level of Service Definition

Level of Service (LOS) is a quantitative measure describing operational conditions within a traffic stream, and the motorist's and/or passengers' perception of operations. A LOS definition generally describes these conditions in terms of such factors as delay, speed, travel time, freedom to maneuver, interruptions in traffic flow, queuing, comfort, and convenience. **Table 2.1** describes generalized definitions of the various LOS categories (A through F) as applied to roadway operations.

TABLE 2.1
LOS DEFINITIONS

LOS Category	Definition of Operation
A	This LOS represents a completely free-flow condition, where the operation of vehicles is virtually unaffected by the presence of other vehicles and only constrained by the geometric features of the highway and by driver preferences.
B	This LOS represents a relatively free-flow condition, although the presence of other vehicles becomes noticeable. Average travel speeds are the same as in LOS A, but drivers have slightly less freedom to maneuver.
C	At this LOS the influence of traffic density on operations becomes marked. The ability to maneuver within the traffic stream is clearly affected by other vehicles.
D	At this LOS, the ability to maneuver is notably restricted due to traffic congestion, and only minor disruptions can be absorbed without extensive queues forming and the service deteriorating.
E	This LOS represents operations at or near capacity. LOS E is an unstable level, with vehicles operating with minimum spacing for maintaining uniform flow. At LOS E, disruptions cannot be dissipated readily thus causing deterioration down to LOS F.
F	At this LOS, forced or breakdown of traffic flow occurs, although operations appear to be at capacity, queues form behind these breakdowns. Operations within queues are highly unstable, with vehicles experiencing brief periods of movement followed by stoppages.

Source: Highway Capacity Manual 2010

Roadway Segment LOS Standards and Thresholds

Roadway segment LOS standards and thresholds provide the basis for analysis of arterial roadway segment performance. The analysis of roadway segment LOS is based on the functional classification of the roadway, the maximum capacity, roadway geometrics, and existing or forecast Average Daily Traffic (ADT) volumes. Table 2.2 presents the roadway segment capacity and LOS standards utilized to analyze roadways evaluated in this report.

TABLE 2.2
CITY OF SAN DIEGO ROADWAY CLASSIFICATIONS AND LOS STANDARDS

Roadway Classification	LOS A	LOS B	LOS C	LOS D	LOS E
Expressway	30,000	42,000	60,000	70,000	80,000
Primer Arterial	25,000	35,000	50,000	55,000	60,000
Major Arterial (6-lane, divided)	< 20,000	< 28,000	< 40,000	**< 45,000**	< 50,000
Major Arterial (4-lane, divided)	< 15,000	< 21,000	< 30,000	**< 35,000**	< 40,000
Secondary Arterial / Collector (4-lane w/ center lane)	< 10,000	< 14,000	< 20,000	**< 25,000**	< 30,000
Collector (4-lane w/o center lane)	< 5,000	< 10,000	< 13,000	**< 15,000**	< 20,000
Collector (2-lane w/ continuous left-turn lane)	< 5,000	< 10,000	< 13,000	**< 15,000**	< 20,000
Collector (2-lane no fronting property)	< 4,000	< 5,500	< 7,500	**< 9,000**	< 10,000
Collector (2-lane commercial-industrial fronting)	<2,500	< 3,500	< 5,000	**< 6,500**	< 8,000
Collector (2-lane multi-family)	<2,500	< 3,500	< 5000	**< 6,500**	< 8,000
Sub-Collector (2-lane single family)	-	-	2,200	-	**-**

Source: City of San Diego, Traffic Impact Study Manual, July 1998

Note:
Bold numbers indicate the ADT thresholds for acceptable LOS.

These standards are generally used as long-range planning guidelines to determine the functional classification of roadways. The actual capacity of a roadway facility varies according to its physical attributes. Typically, the performance and LOS of a roadway segment is heavily influenced by the ability of its intersections to accommodate peak hour traffic volumes. For the purposes of this traffic analysis, LOS D is considered acceptable for the analyzed roadway segments.

Peak Hour Intersection LOS Standards and Thresholds
This section presents the methodologies used to perform peak hour intersection capacity analysis for signalized intersections. The following assumptions were utilized in conducting all intersection LOS analyses:

- *Pedestrian Calls per Hour:* 10 calls per hour for each pedestrian movement was assumed.
- *Signal Timing:* Based on existing signal timing plans**.**
- *Peak Hour Factor*: Based on existing peak hour count data for existing conditions included in **Appendix A**.

Signalized Intersection Analysis
The analysis of signalized intersections utilized the operational analysis procedures as outlined in the *2010 Highway Capacity Manual (HCM)*. This method defines LOS in terms of delay, or more specifically, average stopped delay per vehicle. Delay is a measure of driver and/or passenger discomfort, frustration, fuel consumption and lost travel time. This technique uses 1,900 vehicles per hour per lane (VPHPL) as the maximum saturation volume of an intersection. This saturation volume is adjusted to account for lane width, on-street parking, pedestrians, traffic composition (i.e., percentage trucks) and shared lane movements (i.e. through and right-turn movements originating from the same lane). The LOS criteria used for this technique are described in **Table 2.3**. The computerized analysis of intersection operations was performed utilizing the *Synchro 10* traffic analysis software.

TABLE 2.3
SIGNALIZED INTERSECTION LOS CRITERIA

Average Stopped Delay Per Vehicle (seconds)	Level of Service (LOS) Characteristics
<10.0	*LOS A* describes operations with very low delay. This occurs when progression is extremely favorable, and most vehicles do not stop at all. Short cycle lengths may also contribute to low delay.
10.1 – 20.0	*LOS B* describes operations with generally good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
20.1 – 35.0	*LOS C* describes operations with higher delays, which may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level, although many still pass through the intersection without stopping.
35.1 – 55.0	*LOS D* describes operations with high delay, resulting from some combination of unfavorable progression, long cycle lengths, or high volumes. The influence of congestion becomes more noticeable, and individual cycle failures are noticeable.
55.1 – 80.0	*LOS E* is considered the limit of acceptable delay. Individual cycle failures are frequent occurrences.
>80.0	*LOS F* describes a condition of excessively high delay, considered unacceptable to most drivers. This condition often occurs when arrival flow rates exceed the LOS D capacity of the intersection. Poor progression and long cycle lengths may also be major contributing causes to such delay.

Source: Highway Capacity Manual 2010

Determination of Significant Impacts

The City of San Diego Traffic Impact Study Manual, defines project impact thresholds by facility type. These thresholds are generally based upon an acceptable increase in the Volume / Capacity (V/C) ratio for roadway and freeway segments, and upon increases in vehicle delays for intersections and ramps.

In the City of San Diego, LOS D is considered acceptable for roadway and intersection operations. A project is considered to have a significant impact if it degrades the operations of a roadway or intersection from an acceptable LOS (D or better) to an unacceptable LOS (E or F), or if it adds additional delay to a facility already operating an unacceptable level. **Table 2.5** summarizes the impact significant thresholds as identified within the City of San Diego's guidelines beyond which mitigation measures are required.

TABLE 2.4
CITY OF SAN DIEGO MEASURE OF SIGNIFICANT PROJECT TRAFFIC IMPACTS

	Allowable Change Due to Impact					
	Freeways		Roadway Segments		Intersections	Ramp Metering
LOS with Project	V/C	Speed (mph)	V/C	Speed (mph)	Delay (sec)	Delay (min.)
E **(or ramp meter delays above 15 min.)**	0.01	1.0	0.02	1.0	2.0	2.0
F **(or ramp meter delays above 15 min.)**	0.005	0.5	0.01	0.5	1.0	1.0

Source: City of San Diego, Significance Determination Thresholds, January 2011

EXISTING CONDITIONS

This section describes key study intersections, existing peak hour intersection traffic volume information and LOS analysis results under Existing conditions.

Existing Roadway Network

Harbor Island Drive is a four-lane east-west undivided roadway. This road provides access to hotels, restaurants, and boat docking sites on the north side, with parallel parking and parking lots available on the south side. Harbor Island Drive has a posted speed limit of 35 miles per hour (mph) with sidewalks provided on both sides of the roadway. Additionally, Harbor Island Drive is designated as a Class III bicycle route.

Within the study area, North Harbor Drive is a six-lane major arterial. It has a posted speed limit of 45 mph and provides direct access to the San Diego International Airport, as well as Harbor Island. Pedestrian sidewalks are provided on both sides of the roadway, as well as a Class II bicycle lane on the south side of the road.

Existing Intersection and Roadway Volumes

Figure 2 shows both the existing ADT volumes for study area roadway segments and the AM/PM peak hour traffic volumes for the key study area intersections. The roadway segment and study area intersection traffic counts were conducted in January and May of 2017. Count worksheets are provided in **Appendix A**.

Existing LOS Analysis

Roadway segment analysis and intersection LOS analysis are discussed separately below.

Roadway Segment Analysis

Table 3.1 displays the LOS analysis results for key study area roadway segments under Existing conditions.

TABLE 3.1
ROADWAY SEGMENT LOS RESULTS
EXISTING CONDITIONS

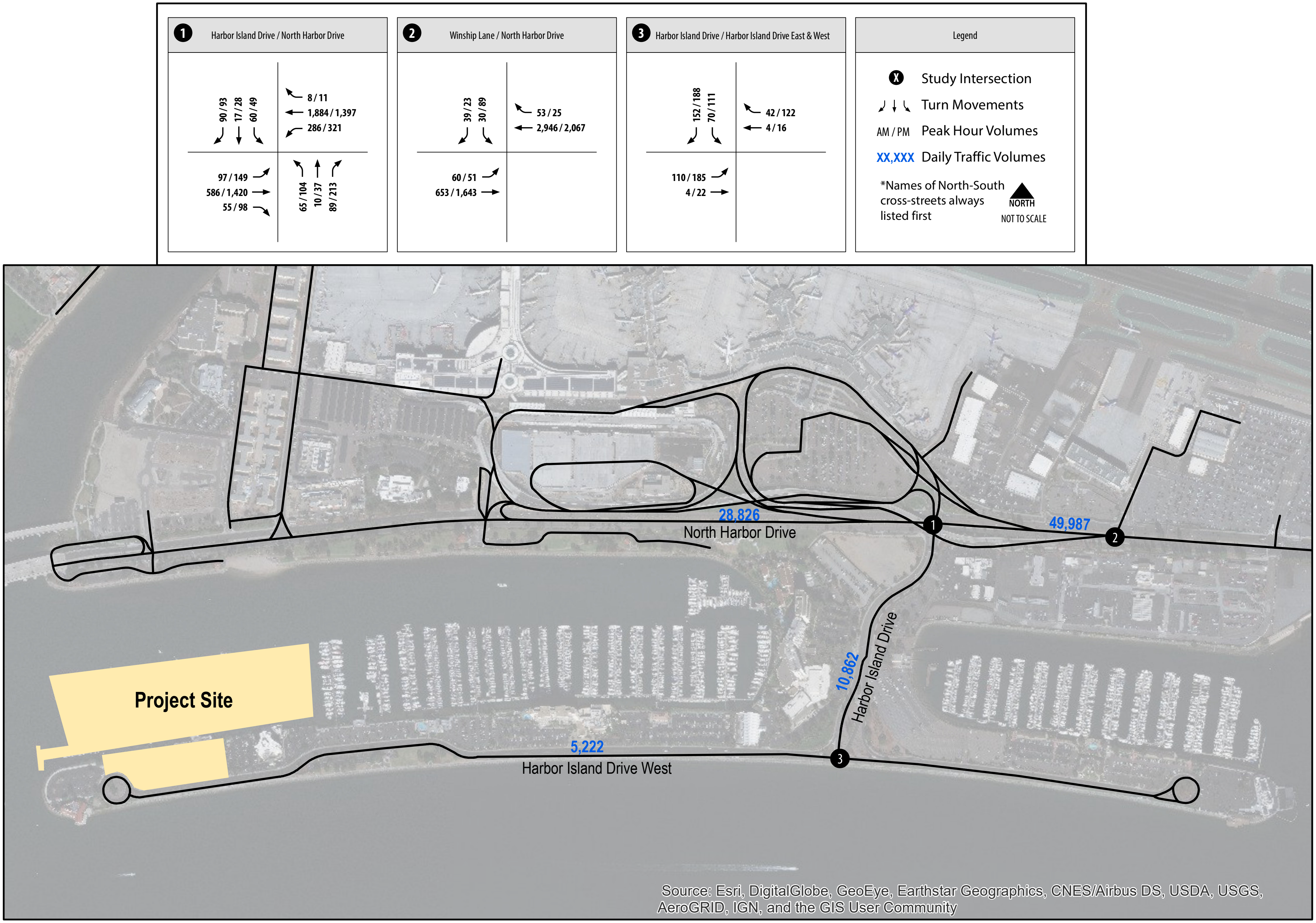
Roadway Segment	Segment	Cross-section	Threshold (LOS E)	ADT	V/C	LOS
N Harbor Dr	Terminal 2/Spanish Landing to Harbor Island Dr	6-Lane Major Arterial	50,000	28,826	0.577	C
	Harbor Island Dr to Winship Ln	6-Lane Major Arterial	50,000	49,987	1.000	**E**
Harbor Island Dr	N Harbor Dr to Harbor Island Drive Southern Terminus	4-Lane Major Arterial	40,000	10,862	0.272	A
	Western Terminus to Harbor Island Dr	4-Lane Collector	15,000	5,222	0.348	B

Source: NDS, Chen Ryan Associates; December 2018

Notes:
V/C = Volume to Capacity Ratio.
Bold letter indicates LOS E or F.

As shown, all key study roadway segments currently operate at LOS D or better with the exception of:

- North Harbor Drive, between Harbor Island Drive and Winship Lane (LOS E)



Harbor Island West Marina Redevelopment Project

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Figure 2
Traffic Volumes - Existing Conditions

Intersection Analysis

Table 3.2 displays intersection LOS and average vehicle delay results for the key study area intersections under Existing conditions. LOS calculation worksheets for Existing conditions are provided in **Appendix B**.

TABLE 3.2
PEAK HOUR INTERSECTION LOS RESULTS
EXISTING CONDITIONS

#	Intersection	AM Peak Hour		PM Peak Hour	
		Avg. Delay (sec.)	LOS	Avg. Delay (sec.)	LOS
1	Harbor Island Drive / Airport Terminal Road & N Harbor Drive	51.5	D	36.6	D
2	N Harbor Drive & Winship Lane	6.4	A	5.5	A
3	Harbor Island Drive (West) / Harbor Island Drive (East) & Harbor Island Drive	4.6	A	5.4	A

Source: NDS, Chen Ryan Associates; December 2018

Notes:
Bold letter indicates LOS E or F.

As shown, all key study area intersections currently operate at LOS D or better.

TRIP GENERATION

Project construction is anticipated to begin in Fall 2019 and will occur over a 24-month period over two phases. During this period, debris from existing developments and materials for redevelopment will be hauled to and from the project site. At the peak of project construction, which is estimated to be in December 2019, it is anticipated that 10 hauling trucks will be required to access the project site on a daily basis along with 37 construction employees. **Figure 3** displays the proposed project site plan.

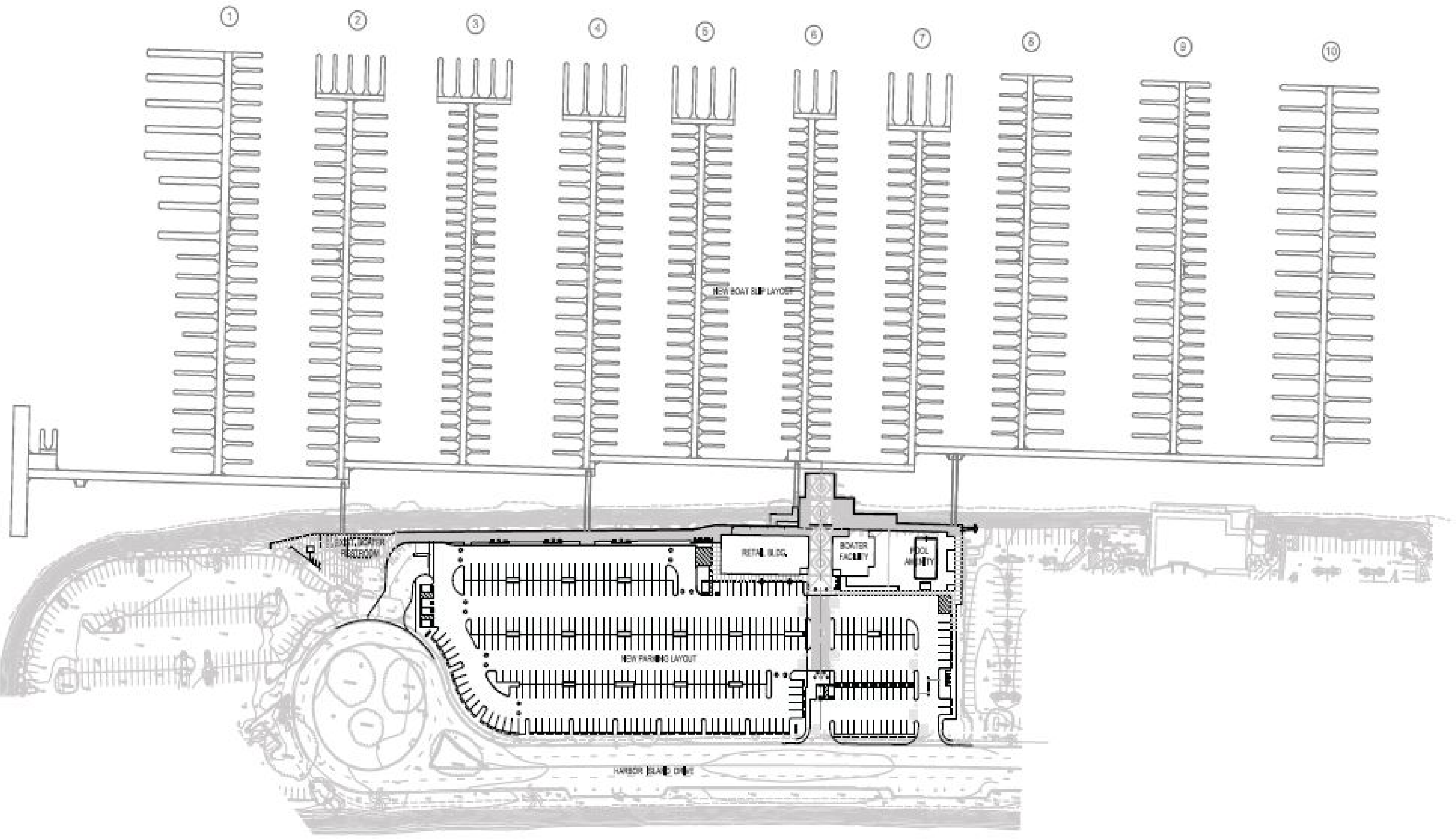
As a worst-case scenario, it was assumed that all construction employees would drive individual vehicles to the project site and would arrive and depart during the AM and PM peak hours, respectively. The daily trip rate per employee is assumed to be three (3) trips per employee to account for a lunch break or off-site errand/meeting. It was also assumed that the hauling trucks would arrive and depart evenly throughout the 8-hour workday. **Table 4.1** displays the assumed vehicle trip generation during the peak of project construction.

TABLE 4.1
PROJECT CONSTRUCTION TRIP GENERATION

Use	Units	Vehicle Conversion Rate	Rate	Daily Vehicle Trips	AM Peak Hour		PM Peak Hour	
					In	Out	In	Out
Construction Employees	37	1	3 / Employee	111	37	0	0	37
Hauling Truck	10	3	2 / Truck	60	3	3	3	3
		Total		**171**	**40**	**3**	**3**	**40**

Source: Chen Ryan Associates; December 2018

As shown, the proposed project construction is anticipated to generate approximately 171 daily trips including 43 trips (40 in / 3 out) during AM Peak Hour and 43 trips (3 in / 40 out) during the PM peak hour.



Harbor Island West Marina
Redevelopment Project

CHEN + RYAN

Figure 3
Project Site Plan

Project Trip Distribution and Assignment

Trip distribution for the Proposed Project was developed based on the project's location in relation to surrounding land uses, distribution of residential population throughout the San Diego Region, and the project's accessibility to freeways. Based upon the assumed project trip distribution, daily and AM/PM peak hour project trips were assigned to the adjacent roadway network per route alternative, as displayed in **Figure 4**.

EXISTING PLUS PROJECT

Existing Plus Project Traffic Volumes

Existing Plus Project traffic volumes were derived by combining the existing traffic volumes (displayed in Figure 3) and the project's trip assignment (displayed in Figures 4-2). Daily roadway and peak hour intersection volumes are displayed in **Figure 5**.

Existing Plus Project Traffic Conditions

Roadway segment analysis and intersection LOS analysis are discussed separately below.

Roadway Segment Analysis

Table 5.1 displays the LOS analysis results for key roadway segments under Existing Plus Project conditions.

TABLE 5.1
ROADWAY SEGMENT LOS RESULTS
EXISTING PLUS PROJECT CONDITIONS

Roadway		Cross-Section	Threshold (LOS E)	Existing	Existing + Project			Δ	S?
				ADT / V/C / LOS	ADT	V/C	LOS		
N Harbor Dr	Terminal 2/Spanish Landing to Harbor Island Dr	6-Lane Major Arterial	50,000	28,826 / 0.577 / C	28,843	0.577	C	0.000	N
	Harbor Island Dr to Winship Ln	6-Lane Major Arterial	50,000	49,987 / 1.000 / **E**	50,141	1.003	F	0.003	N
Harbor Island Dr	N Harbor Dr to Harbor Island Drive Southern Terminus	4-Lane Major Arterial	40,000	10,862 / 0.272 / A	11,033	0.276	A	0.004	N
	Western Terminus to Harbor Island Dr	4-Lane Collector	15,000	5,222 / 0.348 / B	5,393	0.360	B	0.012	N

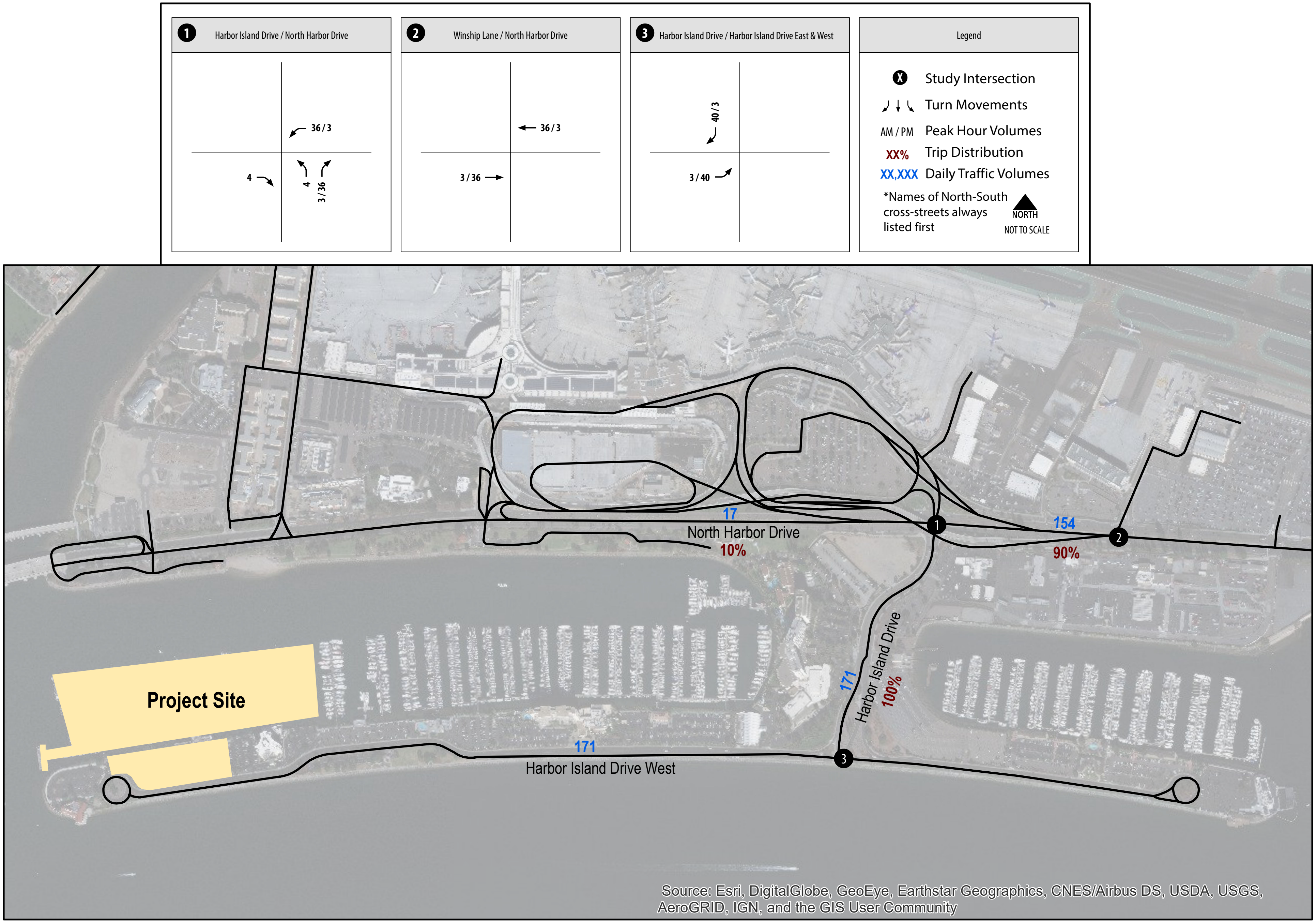
Source: Chen Ryan Associates; December 2018

Notes:
V/C = Volume to Capacity Ratio.
Δ = Change in V/C Ratio.
S? = Indicates if change in V/C ratio is significant.
Bold letter indicates LOS E or F.

As shown in **Table 5.1**, all key study roadway segments would continue to operate at LOS D or better under Existing Plus Project conditions with the exception of:

- North Harbor Drive, between Harbor Island Drive and Winship Lane (LOS F).

Based on the City of San Diego's Significance Criteria, the traffic associated with the proposed project would not cause a significant change in V/C ratio (more than 0.01) under Existing Plus Project conditions. Therefore, a significant project related impact does not exist and mitigation is not required.

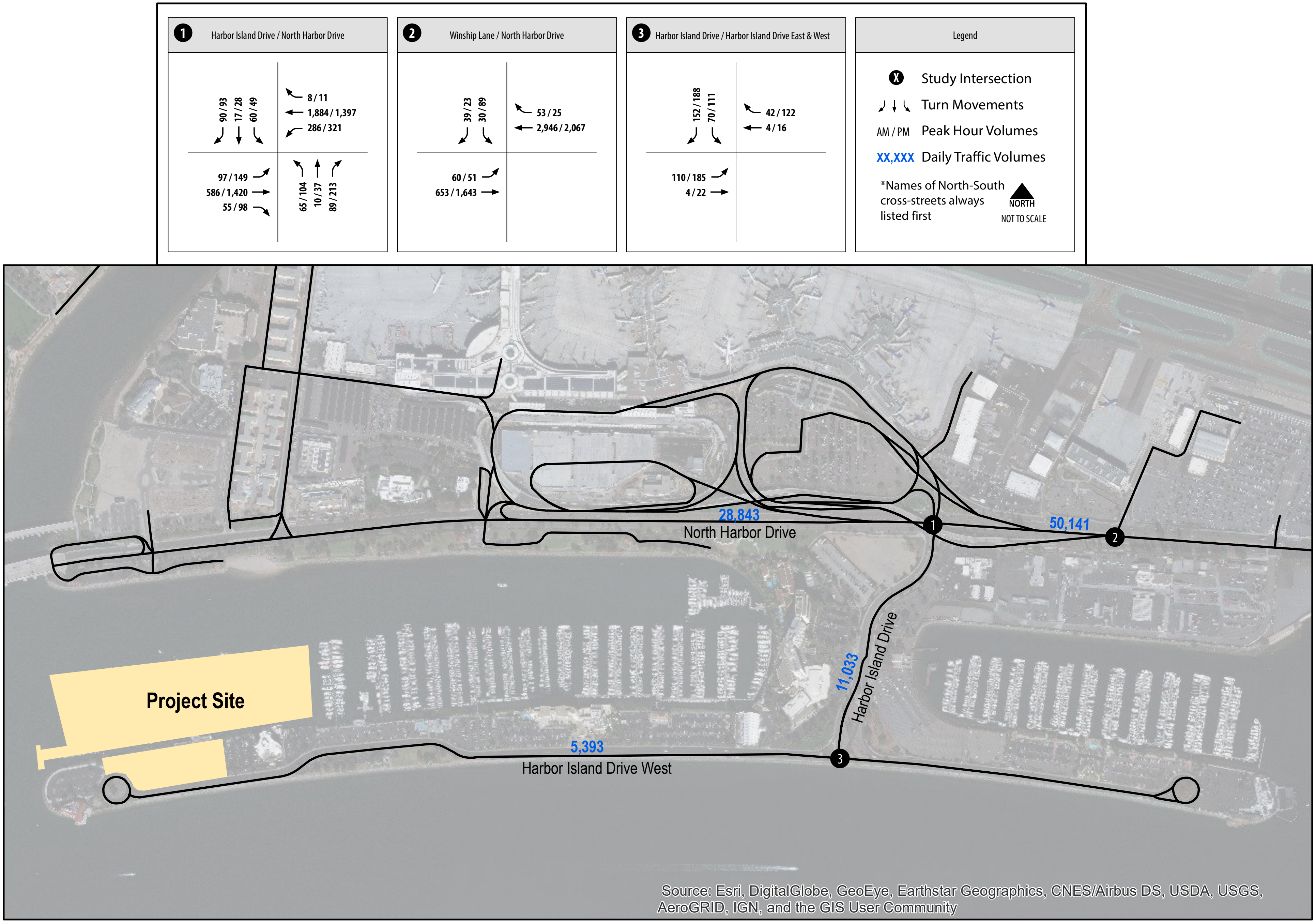


Harbor Island West Marina Redevelopment Project

CHEN RYAN

Figure 4

Construction Trip Distribution and Assignment



Harbor Island West Marina
Redevelopment Project
CHEN RYAN

Figure 5
Traffic Volumes -
Existing Plus Project Conditions

Intersection Analysis

Table 5.2 displays intersection LOS and average vehicle delay results under Existing Plus Project conditions. LOS calculation worksheets for the Existing Plus Project conditions are provided in **Appendix C**.

TABLE 5.2
PEAK HOUR INTERSECTION LOS RESULTS
EXISTING PLUS PROJECT CONDITIONS

#	Intersection	Delay w/o Project (sec.) AM/PM	LOS w/o Project AM/PM	AM Peak Hour Avg. Delay (sec.)	AM Peak Hour LOS	PM Peak Hour Avg. Delay (sec.)	PM Peak Hour LOS	Change in Delay (sec.) AM/PM	Significant Impact?
1	Harbor Island Drive / Airport Terminal Road & N Harbor Drive	51.5 / 36.6	D / D	51.7	D	38.9	D	0.2 / 2.3	N
2	N Harbor Drive & Winship Lane	6.4 / 5.5	A / A	6.4	A	5.4	A	0.0 / -0.1	N
3	Harbor Island Drive (West) / Harbor Island Drive (East) & Harbor Island Drive	4.6 / 5.4	A / A	4.6	A	5.4	A	0.0 / 0.0	N

Source: Chen Ryan Associates; November 2018

Notes:
Bold letter indicates LOS E or F.

As shown in **Table 5.2**, all key study area intersections currently operate at LOS D or better under Existing Plus Project conditions. Therefore, a significant project related impact does not exist and mitigation is not required.

IMPACT SIGNIFICANCE AND MITIGATION

Roadway Segment

Based on the City of San Diego's Significance Criteria, the proposed project would not contribute to a traffic impact for roadway segments within the project study area under Existing Plus Project Construction conditions. Therefore, no mitigation is required.

Intersection

Based on the City of San Diego's Significance Criteria, the proposed project would not contribute to a traffic impact for intersections within the project study area under Existing Plus Project Construction conditions. Therefore, no mitigation is required.

Please feel free to call me if you have any questions regarding the assumptions presented in this memorandum.

Thank you,

Dale Domingo
Chen Ryan Associates, Inc.
(619) 202-0231
ddomingo@chenryanmobility.com

Appendix A
Count Data and Signal Timing Plans

Prepared by NDS/ATD

VOLUME

N Harbor Dr Bet. Terminal 2/Spanish Landing & Harbor Island Dr

Day: Thursday
Date: 5/4/2017

City: San Diego
Project #: CA17_4132_022

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	14,656	14,170	28,826

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
0:00			35		23		58		12:00			223		239		462	
0:15			29		14		43		12:15			195		198		393	
0:30			24		14		38		12:30			219		186		405	
0:45			11	99	11	62	22	161	12:45			250	887	202	825	452	1712
1:00			11		14		25		13:00			259		188		447	
1:15			17		27		44		13:15			206		192		398	
1:30			11		12		23		13:30			233		204		437	
1:45			7	46	10	63	17	109	13:45			220	918	192	776	412	1694
2:00			14		6		20		14:00			226		157		383	
2:15			8		8		16		14:15			229		206		435	
2:30			10		9		19		14:30			220		192		412	
2:45			20	52	8	31	28	83	14:45			296	971	201	756	497	1727
3:00			8		7		15		15:00			288		217		505	
3:15			11		10		21		15:15			275		211		486	
3:30			11		12		23		15:30			336		209		545	
3:45			6	36	13	42	19	78	15:45			357	1256	202	839	559	2095
4:00			12		15		27		16:00			397		180		577	
4:15			19		27		46		16:15			363		206		569	
4:30			29		39		68		16:30			378		192		570	
4:45			60	120	62	143	122	263	16:45			299	1437	237	815	536	2252
5:00			70		74		144		17:00			350		212		562	
5:15			76		117		193		17:15			302		237		539	
5:30			69		112		181		17:30			288		218		506	
5:45			90	305	146	449	236	754	17:45			224	1164	202	869	426	2033
6:00			77		162		239		18:00			255		196		451	
6:15			82		216		298		18:15			222		174		396	
6:30			111		277		388		18:30			194		167		361	
6:45			115	385	283	938	398	1323	18:45			193	864	166	703	359	1567
7:00			112		266		378		19:00			167		152		319	
7:15			147		322		469		19:15			155		185		340	
7:30			164		338		502		19:30			159		124		283	
7:45			152	575	306	1232	458	1807	19:45			192	673	143	604	335	1277
8:00			181		256		437		20:00			159		142		301	
8:15			169		290		459		20:15			184		115		299	
8:30			180		263		443		20:30			164		129		293	
8:45			175	705	251	1060	426	1765	20:45			154	661	126	512	280	1173
9:00			192		216		408		21:00			114		108		222	
9:15			174		204		378		21:15			116		101		217	
9:30			195		199		394		21:30			127		105		232	
9:45			196	757	210	829	406	1586	21:45			102	459	94	408	196	867
10:00			205		176		381		22:00			84		104		188	
10:15			210		180		390		22:15			96		93		189	
10:30			204		155		359		22:30			103		87		190	
10:45			170	789	219	730	389	1519	22:45			101	384	86	370	187	754
11:00			188		208		396		23:00			85		71		156	
11:15			191		218		409		23:15			94		73		167	
11:30			212		220		432		23:30			79		56		135	
11:45			213	804	219	865	432	1669	23:45			51	309	49	249	100	558
TOTALS				4673		6444		**11117**	**TOTALS**				9983		7726		**17709**
SPLIT %				42.0%		58.0%		**38.6%**	**SPLIT %**				56.4%		43.6%		**61.4%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	14,656	14,170	28,826

AM Peak Hour			11:45	7:00	**7:15**	**PM Peak Hour**			15:45	16:45	**15:45**
AM Pk Volume			850	1232	**1866**	**PM Pk Volume**			1495	904	**2275**
Pk Hr Factor			0.953	0.911	**0.929**	**Pk Hr Factor**			0.941	0.954	**0.986**
7 - 9 Volume	0	0	1280	2292	**3572**	**4 - 6 Volume**	0	0	2601	1684	**4285**
7 - 9 Peak Hour			8:00	7:00	**7:15**	**4 - 6 Peak Hour**			16:00	16:45	**16:00**
7 - 9 Pk Volume	0	0	705	1232	**1866**	**4 - 6 Pk Volume**	0	0	1437	904	**2252**
Pk Hr Factor	0.000	0.000	0.974	0.911	**0.929**	**Pk Hr Factor**	0.000	0.000	0.905	0.954	**0.976**

Prepared by NDS/ATD

VOLUME

N Harbor Dr Bet. Harbor Island Dr & Winship Ln

Day: Tuesday
Date: 5/2/2017

City: Port of San Diego
Project #: CA17_4132_023

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	17,117	32,870	49,987

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			81		143		224		12:00			186		479		665	
00:15			63		84		147		12:15			213		468		681	
00:30			43		59		102		12:30			233		483		716	
00:45			40	227	34	320	74	547	12:45			240	872	504	1934	744	2806
01:00			36		22		58		13:00			284		498		782	
01:15			26		27		53		13:15			273		395		668	
01:30			17		16		33		13:30			305		371		676	
01:45			10	89	12	77	22	166	13:45			284	1146	441	1705	725	2851
02:00			18		10		28		14:00			292		328		620	
02:15			20		8		28		14:15			291		336		627	
02:30			11		15		26		14:30			351		403		754	
02:45			14	63	12	45	26	108	14:45			307	1241	359	1426	666	2667
03:00			18		10		28		15:00			364		355		719	
03:15			12		15		27		15:15			339		356		695	
03:30			13		34		47		15:30			420		528		948	
03:45			15	58	64	123	79	181	15:45			467	1590	517	1756	984	3346
04:00			18		75		93		16:00			393		372		765	
04:15			22		93		115		16:15			389		398		787	
04:30			48		189		237		16:30			360		406		766	
04:45			45	133	294	651	339	784	16:45			397	1539	409	1585	806	3124
05:00			61		365		426		17:00			332		462		794	
05:15			70		405		475		17:15			305		461		766	
05:30			91		398		489		17:30			241		453		694	
05:45			72	294	426	1594	498	1888	17:45			250	1128	463	1839	713	2967
06:00			120		409		529		18:00			233		411		644	
06:15			109		401		510		18:15			234		375		609	
06:30			133		467		600		18:30			225		392		617	
06:45			137	499	442	1719	579	2218	18:45			233	925	429	1607	662	2532
07:00			127		452		579		19:00			203		478		681	
07:15			158		482		640		19:15			191		352		543	
07:30			159		504		663		19:30			201		406		607	
07:45			189	633	456	1894	645	2527	19:45			196	791	450	1686	646	2477
08:00			174		473		647		20:00			247		526		773	
08:15			193		464		657		20:15			242		365		607	
08:30			180		588		768		20:30			186		428		614	
08:45			207	754	481	2006	688	2760	20:45			200	875	293	1612	493	2487
09:00			191		539		730		21:00			163		298		461	
09:15			190		516		706		21:15			203		255		458	
09:30			222		563		785		21:30			176		259		435	
09:45			172	775	557	2175	729	2950	21:45			153	695	193	1005	346	1700
10:00			211		574		785		22:00			164		284		448	
10:15			209		545		754		22:15			122		297		419	
10:30			204		568		772		22:30			197		270		467	
10:45			228	852	572	2259	800	3111	22:45			182	665	238	1089	420	1754
11:00			218		476		694		23:00			113		203		316	
11:15			209		502		711		23:15			114		233		347	
11:30			233		497		730		23:30			82		156		238	
11:45			229	889	552	2027	781	2916	23:45			75	384	144	736	219	1120
TOTALS				5266		14890		**20156**	**TOTALS**				11851		17980		**29831**
SPLIT %				26.1%		73.9%		**40.3%**	**SPLIT %**				39.7%		60.3%		**59.7%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	17,117	32,870	49,987

AM Peak Hour			11:00	10:00	**10:00**	**PM Peak Hour**			15:30	12:15	**15:30**
AM Pk Volume			889	2259	**3111**	**PM Pk Volume**			1669	1953	**3484**
Pk Hr Factor			0.954	0.984	**0.972**	**Pk Hr Factor**			0.893	0.969	**0.885**
7 - 9 Volume	0	0	1387	3900	**5287**	**4 - 6 Volume**	0	0	2667	3424	**6091**
7 - 9 Peak Hour			08:00	08:00	**08:00**	**4 - 6 Peak Hour**			16:00	17:00	**16:15**
7 - 9 Pk Volume	0	0	754	2006	**2760**	**4 - 6 Pk Volume**	0	0	1539	1839	**3153**
Pk Hr Factor	0.000	0.000	0.911	0.853	**0.898**	**Pk Hr Factor**	0.000	0.000	0.969	0.993	**0.978**

Prepared by NDS/ATD

VOLUME

Harbor Island Dr Bet. N Harbor Dr & Southern Terminus Of Harbor Island Dr

Day: Tuesday
Date: 1/10/2017

City: San Diego
Project #: CA17_4017_008

DAILY TOTALS	NB	SB	EB	WB	Total
	5,467	5,395	0	0	10,862

AM Period	NB		SB		EB	WB	TOTAL		PM Period	NB		SB		EB	WB	TOTAL	
00:00	23		13				36		12:00	79		87				166	
00:15	17		18				35		12:15	87		61				148	
00:30	26		12				38		12:30	64		82				146	
00:45	15	81	7	50			22	131	12:45	76	306	85	315			161	621
01:00	8		13				21		13:00	130		80				210	
01:15	11		7				18		13:15	115		90				205	
01:30	5		0				5		13:30	121		90				211	
01:45	6	30	7	27			13	57	13:45	102	468	79	339			181	807
02:00	3		3				6		14:00	96		88				184	
02:15	7		6				13		14:15	85		95				180	
02:30	4		3				7		14:30	90		91				181	
02:45	3	17	3	15			6	32	14:45	103	374	79	353			182	727
03:00	5		7				12		15:00	113		94				207	
03:15	5		3				8		15:15	114		82				196	
03:30	5		7				12		15:30	86		107				193	
03:45	4	19	9	26			13	45	15:45	89	402	107	390			196	792
04:00	5		13				18		16:00	92		79				171	
04:15	3		14				17		16:15	74		99				173	
04:30	2		23				25		16:30	83		96				179	
04:45	13	23	18	68			31	91	16:45	108	357	76	350			184	707
05:00	7		12				19		17:00	117		77				194	
05:15	18		28				46		17:15	103		77				180	
05:30	21		27				48		17:30	84		82				166	
05:45	13	59	35	102			48	161	17:45	83	387	83	319			166	706
06:00	29		32				61		18:00	79		89				168	
06:15	13		22				35		18:15	92		89				181	
06:30	38		53				91		18:30	61		72				133	
06:45	36	116	61	168			97	284	18:45	77	309	67	317			144	626
07:00	48		61				109		19:00	68		73				141	
07:15	60		61				121		19:15	56		58				114	
07:30	46		65				111		19:30	65		64				129	
07:45	36	190	64	251			100	441	19:45	61	250	77	272			138	522
08:00	51		77				128		20:00	74		55				129	
08:15	47		67				114		20:15	76		58				134	
08:30	33		62				95		20:30	148		56				204	
08:45	48	179	92	298			140	477	20:45	97	395	57	226			154	621
09:00	52		73				125		21:00	65		50				115	
09:15	60		64				124		21:15	74		56				130	
09:30	58		99				157		21:30	80		43				123	
09:45	62	232	80	316			142	548	21:45	48	267	56	205			104	472
10:00	60		84				144		22:00	60		24				84	
10:15	81		84				165		22:15	56		55				111	
10:30	69		66				135		22:30	73		37				110	
10:45	67	277	89	323			156	600	22:45	48	237	52	168			100	405
11:00	50		84				134		23:00	67		32				99	
11:15	63		101				164		23:15	41		26				67	
11:30	116		114				230		23:30	44		19				63	
11:45	88	317	104	403			192	720	23:45	23	175	17	94			40	269
TOTALS		1540		2047				**3587**	**TOTALS**		3927		3348				**7275**
SPLIT %		42.9%		57.1%				**33.0%**	**SPLIT %**		54.0%		46.0%				**67.0%**

DAILY TOTALS	NB	SB	EB	WB	Total
	5,467	5,395	0	0	10,862

AM Peak Hour	11:30	11:15			**11:15**	**PM Peak Hour**	13:00	15:30			**13:00**
AM Pk Volume	370	406			**752**	**PM Pk Volume**	468	392			**807**
Pk Hr Factor	0.797	0.890			**0.817**	**Pk Hr Factor**	0.900	0.916			**0.956**
7 - 9 Volume	369	549	0	0	**918**	**4 - 6 Volume**	744	669	0	0	**1413**
7 - 9 Peak Hour	07:15	08:00			**08:00**	**4 - 6 Peak Hour**	16:45	16:00			**16:30**
7 - 9 Pk Volume	193	298	0	0	**477**	**4 - 6 Pk Volume**	412	350	0	0	**737**
Pk Hr Factor	0.804	0.810	0.000	0.000	**0.852**	**Pk Hr Factor**	0.880	0.884	0.000	0.000	**0.950**

Prepared by NDS/ATD

VOLUME

Harbor Island Dr Bet. Western Terminus Of Harbor Island Dr & Southern Terminus Of Harbor Island Dr

Day: Tuesday

Date: 1/10/2017

City: San Diego

Project #: CA17_4017_009

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	2,617	2,605	5,222

AM Period	NB	SB	EB		WB		TOTAL		PM Period	NB	SB	EB		WB		TOTAL	
00:00			12		8		20		12:00			42		40		82	
00:15			8		6		14		12:15			40		27		67	
00:30			6		3		9		12:30			34		39		73	
00:45			1	27	3	20	4	47	12:45			50	166	39	145	89	311
01:00			4		4		8		13:00			70		37		107	
01:15			4		2		6		13:15			70		51		121	
01:30			2		0		2		13:30			57		43		100	
01:45			0	10	2	8	2	18	13:45			56	253	44	175	100	428
02:00			1		1		2		14:00			48		46		94	
02:15			1		2		3		14:15			40		45		85	
02:30			1		3		4		14:30			46		45		91	
02:45			2	5	2	8	4	13	14:45			47	181	40	176	87	357
03:00			5		4		9		15:00			61		46		107	
03:15			2		0		2		15:15			56		38		94	
03:30			3		4		7		15:30			43		50		93	
03:45			2	12	1	9	3	21	15:45			47	207	40	174	87	381
04:00			3		5		8		16:00			42		39		81	
04:15			0		6		6		16:15			41		53		94	
04:30			1		3		4		16:30			39		42		81	
04:45			8	12	14	28	22	40	16:45			56	178	36	170	92	348
05:00			6		7		13		17:00			54		39		93	
05:15			6		15		21		17:15			43		38		81	
05:30			8		13		21		17:30			39		44		83	
05:45			8	28	13	48	21	76	17:45			35	171	52	173	87	344
06:00			13		13		26		18:00			35		53		88	
06:15			4		9		13		18:15			44		52		96	
06:30			18		18		36		18:30			31		30		61	
06:45			18	53	20	60	38	113	18:45			30	140	36	171	66	311
07:00			26		18		44		19:00			23		30		53	
07:15			34		21		55		19:15			29		29		58	
07:30			21		27		48		19:30			34		34		68	
07:45			23	104	26	92	49	196	19:45			23	109	38	131	61	240
08:00			26		37		63		20:00			29		23		52	
08:15			27		27		54		20:15			25		20		45	
08:30			14		28		42		20:30			106		27		133	
08:45			30	97	40	132	70	229	20:45			50	210	32	102	82	312
09:00			27		41		68		21:00			35		25		60	
09:15			29		24		53		21:15			26		32		58	
09:30			26		47		73		21:30			33		20		53	
09:45			35	117	43	155	78	272	21:45			21	115	27	104	48	219
10:00			25		36		61		22:00			21		12		33	
10:15			38		54		92		22:15			13		22		35	
10:30			34		43		77		22:30			28		23		51	
10:45			43	140	52	185	95	325	22:45			14	76	15	72	29	148
11:00			29		48		77		23:00			27		11		38	
11:15			24		60		84		23:15			18		5		23	
11:30			42		69		111		23:30			11		8		19	
11:45			44	139	57	234	101	373	23:45			11	67	9	33	20	100
TOTALS				744		979		**1723**	**TOTALS**				1873		1626		**3499**
SPLIT %				43.2%		56.8%		**33.0%**	**SPLIT %**				53.5%		46.5%		**67.0%**

DAILY TOTALS	NB	SB	EB	WB	Total
	0	0	2,617	2,605	5,222

AM Peak Hour			11:30	11:00	**11:15**	**PM Peak Hour**			13:00	17:30	**13:00**
AM Pk Volume			168	234	**378**	**PM Pk Volume**			253	201	**428**
Pk Hr Factor			0.955	0.848	**0.851**	**Pk Hr Factor**			0.904	0.948	**0.884**
7 - 9 Volume	0	0	201	224	**425**	**4 - 6 Volume**	0	0	349	343	**692**
7 - 9 Peak Hour			07:00	08:00	**08:00**	**4 - 6 Peak Hour**			16:30	17:00	**16:15**
7 - 9 Pk Volume	0	0	104	132	**229**	**4 - 6 Pk Volume**	0	0	192	173	**360**
Pk Hr Factor	0.000	0.000	0.765	0.825	**0.818**	**Pk Hr Factor**	0.000	0.000	0.857	0.832	**0.957**

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4016-008

Day: Tuesday

City: San Diego

Date: 1/10/2017

AM

NS/EW Streets:	Harbour Island Dr			Harbour Island Dr			N Harbor Dr			N Harbor Dr			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	1	1	1.5	1	0.5	1	3	1	2	4	0	
7:00 AM	7	2	32	27	4	20	24	67	7	51	359	1	601
7:15 AM	23	2	28	19	1	21	19	115	10	50	377	3	668
7:30 AM	22	3	26	12	1	22	16	107	14	51	378	0	652
7:45 AM	10	6	20	11	2	24	22	145	15	49	405	1	710
8:00 AM	21	1	26	16	7	23	23	139	14	56	355	1	682
8:15 AM	24	2	19	19	5	24	27	158	12	53	355	2	700
8:30 AM	10	1	24	14	3	19	25	144	14	43	361	1	659
8:45 AM	18	3	25	14	2	18	28	148	20	74	329	0	679
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	135	20	200	132	25	171	184	1023	106	427	2919	9	5351
APPROACH %'s :	38.03%	5.63%	56.34%	40.24%	7.62%	52.13%	14.01%	77.91%	8.07%	12.73%	87.00%	0.27%	
PEAK HR START TIME :	745 AM												TOTAL
PEAK HR VOL :	65	10	89	60	17	90	97	586	55	201	1476	5	2751
PEAK HR FACTOR :	0.854			0.870			0.937			0.924			0.969

UTURNS			
NB	SB	EB	WB
0	0	7	0
0	0	5	0
0	0	6	0
0	0	7	0
0	0	8	0
0	0	14	0
0	0	8	0
0	0	14	0
NB	SB	EB	WB
0	0	69	0

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4016-008

Day: Tuesday

City: San Diego

Date: 1/10/2017

PM

NS/EW Streets:	Harbour Island Dr			Harbour Island Dr			N Harbor Dr			N Harbor Dr			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	2	1	1	1.5	1	0.5	1	3	1	2	4	0	
4:00 PM	27	12	53	12	7	23	41	394	30	44	264	0	907
4:15 PM	20	7	41	11	7	21	44	418	33	60	247	2	911
4:30 PM	25	9	50	10	9	24	39	377	20	68	260	3	894
4:45 PM	32	9	69	16	5	25	32	296	22	57	228	3	794
5:00 PM	28	8	81	17	6	35	33	299	20	43	266	1	837
5:15 PM	31	5	60	12	5	22	35	291	23	52	325	1	862
5:30 PM	18	6	54	13	11	30	30	272	28	44	270	2	778
5:45 PM	18	7	59	12	4	24	32	207	33	53	209	1	659
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	199	63	467	103	54	204	286	2554	209	421	2069	13	6642
APPROACH %'s :	27.30%	8.64%	64.06%	28.53%	14.96%	56.51%	9.38%	83.77%	6.85%	16.82%	82.66%	0.52%	

UTURNS			
NB	SB	EB	WB
0	0	25	1
0	0	28	0
0	0	13	0
0	0	11	0
0	0	19	0
0	0	19	0
0	1	16	0
0	0	16	0
NB	SB	EB	WB
0	1	147	1

PEAK HR START TIME :	400 PM												TOTAL
PEAK HR VOL :	104	37	213	49	28	93	156	1485	105	229	999	8	3506
PEAK HR FACTOR :		0.805			0.924			0.882			0.934		0.962

CONTROL : Signalized

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Harbour Island Dr and N Harbor Dr , San Diego

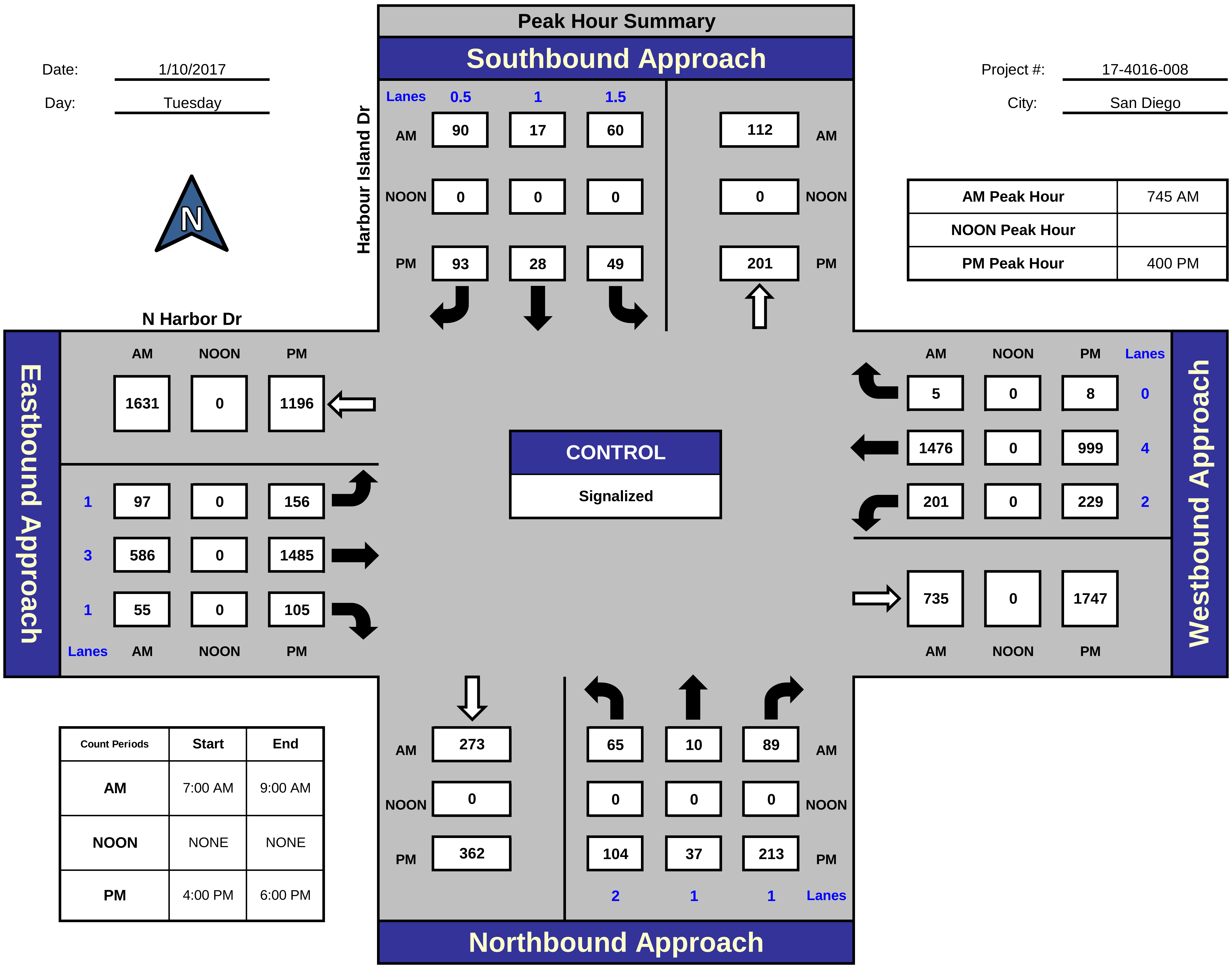
Date: 1/10/2017

Day: Tuesday

Project #: 17-4016-008

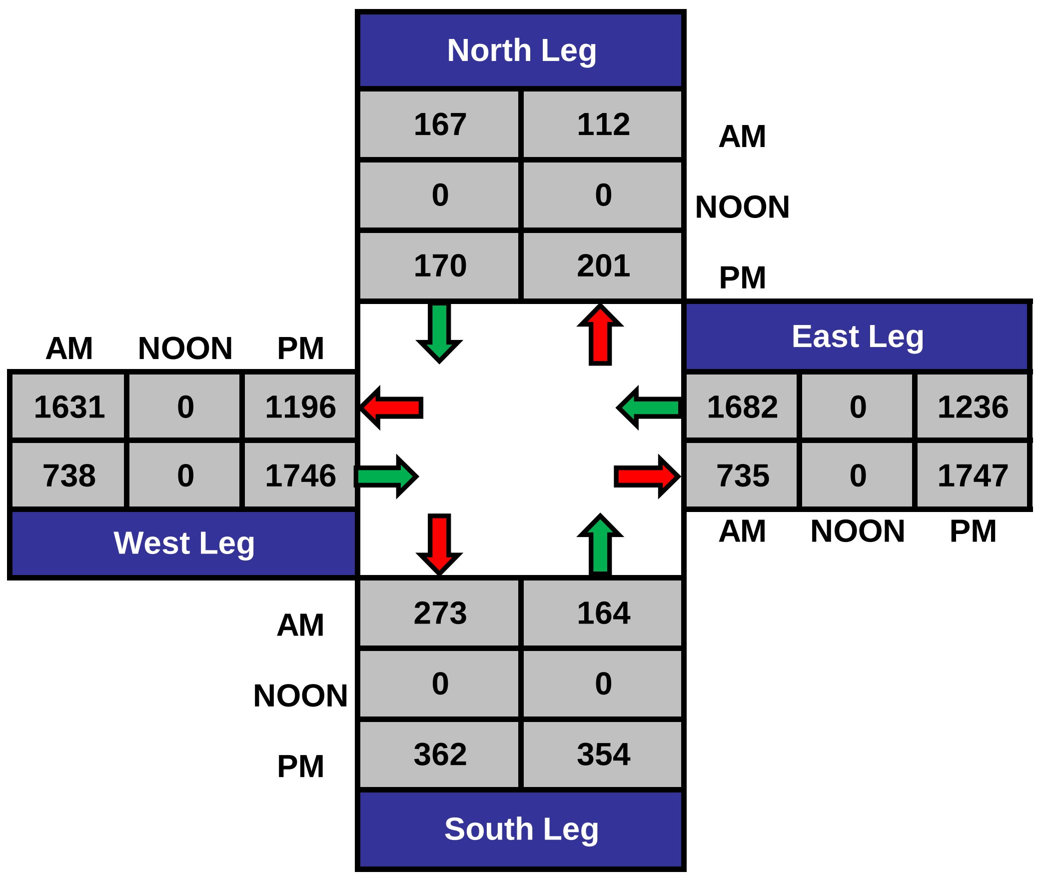
City: San Diego

AM Peak Hour	745 AM
NOON Peak Hour	
PM Peak Hour	400 PM

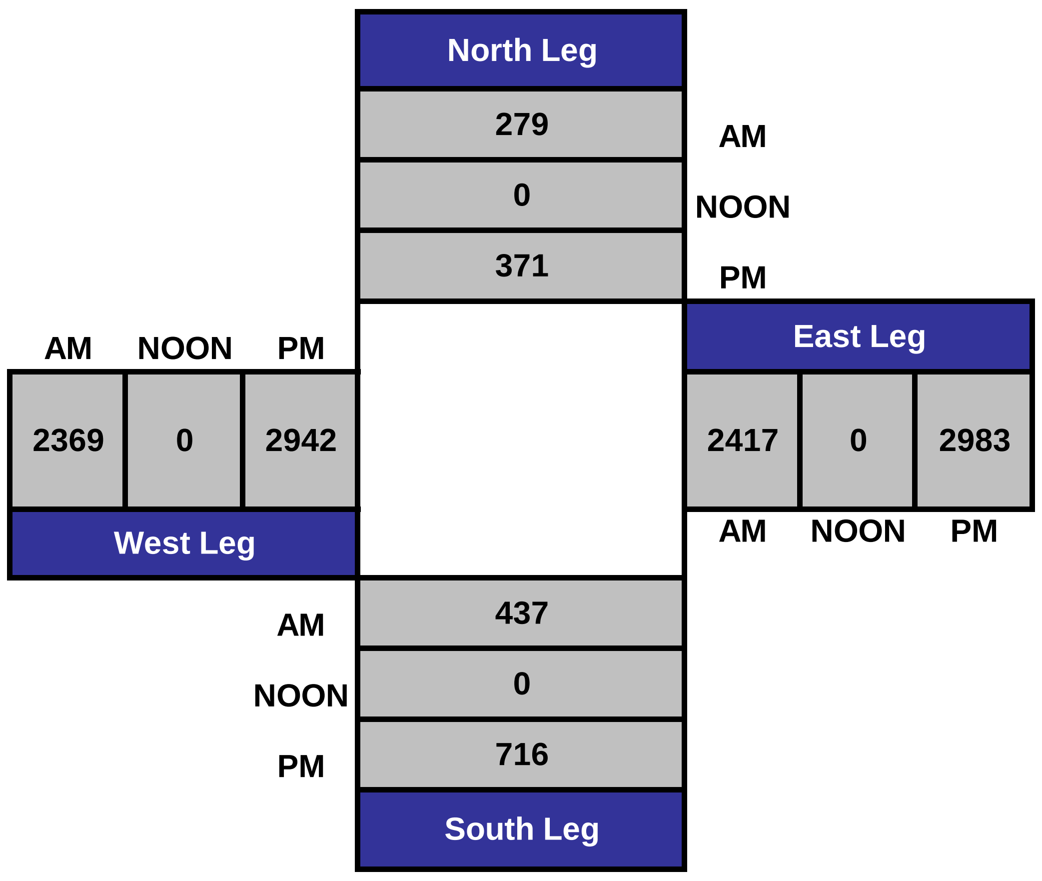


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4016-009

City: San Diego

Day: Tuesday

Date: 1/10/2017

AM

NS/EW Streets:	Commuter Terminal /Winship Ln			Commuter Terminal /Winship Ln			Harbour Island Dr			Harbour Island Dr			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	2	0	1	1	3	0	0	5	1	
7:00 AM	0	0	0	5	0	10	13	104	0	0	604	6	742
7:15 AM	0	0	0	6	0	7	19	131	0	0	560	8	731
7:30 AM	0	0	0	5	0	10	15	146	0	0	626	16	818
7:45 AM	0	0	0	7	0	10	18	145	0	0	619	10	809
8:00 AM	0	0	0	6	0	10	13	181	0	0	609	11	830
8:15 AM	0	0	0	12	0	9	14	181	0	0	533	6	755
8:30 AM	0	0	0	7	0	2	14	145	0	0	586	7	761
8:45 AM	0	0	0	3	0	9	18	188	0	0	568	9	795

	UTURNS			
	NB	SB	EB	WB
7:00 AM	0	0	3	0
7:15 AM	0	0	6	0
7:30 AM	0	0	4	0
7:45 AM	0	0	3	0
8:00 AM	0	0	4	0
8:15 AM	0	0	4	0
8:30 AM	0	0	7	0
8:45 AM	0	0	3	0

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	51	0	67	124	1221	0	0	4705	73	6241
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	43.22%	0.00%	56.78%	9.22%	90.78%	0.00%	0.00%	98.47%	1.53%	

NB	SB	EB	WB
0	0	34	0

PEAK HR START TIME :	730 AM												TOTAL
PEAK HR VOL :	0	0	0	30	0	39	60	653	0	0	2387	43	3212
PEAK HR FACTOR :	0.000			0.821			0.914			0.946			0.967

CONTROL : Signalized

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4016-009

Day: Tuesday

City: San Diego

Date: 1/10/2017

PM

NS/EW Streets:	Commuter Terminal /Winship Ln			Commuter Terminal /Winship Ln			Harbour Island Dr			Harbour Island Dr			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	2	0	1	1	3	0	0	5	1	
4:00 PM	0	0	0	21	0	7	12	438	0	0	396	4	878
4:15 PM	0	0	0	14	0	7	13	451	0	0	447	6	938
4:30 PM	0	0	0	23	0	5	8	447	0	0	432	3	918
4:45 PM	0	0	0	16	0	6	12	379	0	0	459	8	880
5:00 PM	0	0	0	36	0	5	18	366	0	0	452	4	881
5:15 PM	0	0	0	15	0	13	6	356	0	0	493	7	890
5:30 PM	0	0	0	15	0	9	9	333	0	0	411	7	784
5:45 PM	0	0	0	9	0	4	12	281	0	0	375	2	683
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	149	0	56	90	3051	0	0	3465	41	6852
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	72.68%	0.00%	27.32%	2.87%	97.13%	0.00%	0.00%	98.83%	1.17%	

UTURNS			
NB	SB	EB	WB
0	0	7	0
0	0	10	0
0	0	4	0
0	0	6	0
0	0	12	0
0	0	3	0
0	0	2	0
0	0	6	0
NB	SB	EB	WB
0	0	50	0

PEAK HR START TIME :	415 PM												TOTAL
PEAK HR VOL :	0	0	0	89	0	23	51	1643	0	0	1790	21	3617
PEAK HR FACTOR :		0.000			0.683			0.913			0.969		0.964

CONTROL : Signalized

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Commuter Terminal /Winship Ln and Harbour Island Dr , San Diego

Date: 1/10/2017

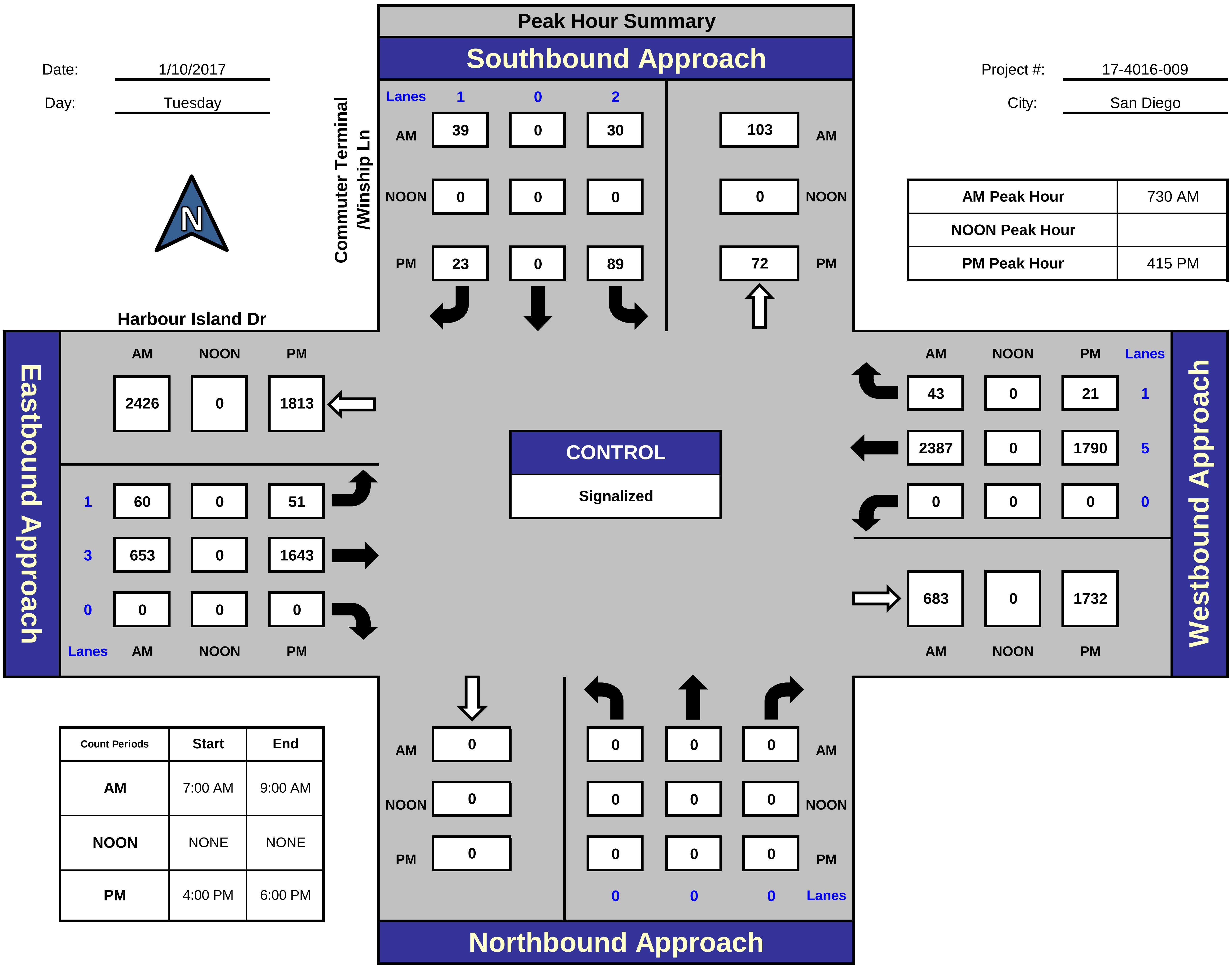
Day: Tuesday

Project #: 17-4016-009

City: San Diego

AM Peak Hour	730 AM
NOON Peak Hour	
PM Peak Hour	415 PM

Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM



Peak Hour Summary

CONTROL

Signalized

Southbound Approach (Commuter Terminal /Winship Ln)

Lanes	1	0	2	
AM	39	0	30	103
NOON	0	0	0	0
PM	23	0	89	72

Eastbound Approach (Harbour Island Dr)

Lanes	AM	NOON	PM
	2426	0	1813
1	60	0	51
3	653	0	1643
0	0	0	0

Westbound Approach

AM	NOON	PM	Lanes
43	0	21	1
2387	0	1790	5
0	0	0	0
683	0	1732	

Northbound Approach

AM	0	0	0	0	AM
NOON	0	0	0	0	NOON
PM	0	0	0	0	PM
		0	0	0	Lanes

Total Ins & Outs

North Leg

69	103	AM
0	0	NOON
112	72	PM

West Leg

AM	NOON	PM
2426	0	1813
713	0	1694

East Leg

AM	NOON	PM
2430	0	1811
683	0	1732

South Leg

AM	0	0
NOON	0	0
PM	0	0

Total Volume Per Leg

North Leg

172	AM
0	NOON
184	PM

West Leg

AM	NOON	PM
3139	0	3507

East Leg

AM	NOON	PM
3113	0	3543

South Leg

AM	0
NOON	0
PM	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4016-014

Day: Tuesday

City: San Diego

Date: 1/10/2017

AM

NS/EW Streets:	Harbour Island Dr			Harbour Island Dr			Harbour Island Dr			Harbour Island Dr			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND			
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
LANES:	0	0	0	1	1	1	1.5	0.5	0	0	1	1	
7:00 AM	0	0	0	33	0	19	21	5	0	0	0	16	94
7:15 AM	0	0	0	30	0	19	33	3	0	0	2	10	97
7:30 AM	0	0	0	25	0	32	25	2	0	0	0	12	96
7:45 AM	0	0	0	24	0	33	24	1	0	0	0	5	87
8:00 AM	0	0	0	19	0	40	24	4	0	0	2	13	102
8:15 AM	0	0	0	11	0	29	31	0	0	0	0	11	82
8:30 AM	0	0	0	19	0	35	19	0	0	0	1	10	84
8:45 AM	0	0	0	21	0	48	36	0	0	0	1	8	114

	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL
TOTAL VOLUMES :	0	0	0	182	0	255	213	15	0	0	6	85	756
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	41.65%	0.00%	58.35%	93.42%	6.58%	0.00%	0.00%	6.59%	93.41%	

PEAK HR START TIME :	800 AM												TOTAL
PEAK HR VOL :	0	0	0	70	0	152	110	4	0	0	4	42	382
PEAK HR FACTOR :		0.000			0.804			0.792			0.767		0.838

CONTROL : Signalized

UTURNS			
NB	SB	EB	WB
0	0	0	0
0	0	1	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

NB	SB	EB	WB
0	0	1	0

Intersection Turning Movement

Prepared by:

National Data & Surveying Services

Project ID: 17-4016-014

Day: Tuesday

City: San Diego

Date: 1/10/2017

PM

NS/EW Streets:	Harbour Island Dr			Harbour Island Dr			Harbour Island Dr			Harbour Island Dr				UTURNS			
	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND							
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB
LANES:	0	0	0	1	1	1	1.5	0.5	0	0	1	1					
4:00 PM	0	0	0	31	0	43	45	4	0	0	1	23	147	0	0	0	0
4:15 PM	0	0	0	31	0	57	40	6	0	0	1	23	158	0	0	0	0
4:30 PM	0	0	0	33	0	40	40	4	0	0	5	28	150	0	0	0	0
4:45 PM	0	0	0	29	0	38	61	5	0	0	4	23	160	0	0	0	0
5:00 PM	0	0	0	26	0	44	63	2	0	0	1	36	172	0	0	0	0
5:15 PM	0	0	0	30	0	42	46	7	0	0	3	29	157	0	1	0	0
5:30 PM	0	0	0	26	0	45	39	5	0	0	6	28	149	0	0	0	0
5:45 PM	0	0	0	29	0	57	37	8	0	0	6	29	166	0	0	0	0
	NL	NT	NR	SL	ST	SR	EL	ET	ER	WL	WT	WR	TOTAL	NB	SB	EB	WB
TOTAL VOLUMES :	0	0	0	235	0	366	371	41	0	0	27	219	1259	0	1	0	0
APPROACH %'s :	#DIV/0!	#DIV/0!	#DIV/0!	39.10%	0.00%	60.90%	90.05%	9.95%	0.00%	0.00%	10.98%	89.02%					

PEAK HR START TIME :	500 PM												TOTAL
PEAK HR VOL :	0	0	0	111	0	188	185	22	0	0	16	122	644
PEAK HR FACTOR :	0.000			0.869			0.796			0.932			0.936

CONTROL : Signalized

ITM Peak Hour Summary

Prepared by:

National Data & Surveying Services

Harbour Island Dr and Harbour Island Dr , San Diego

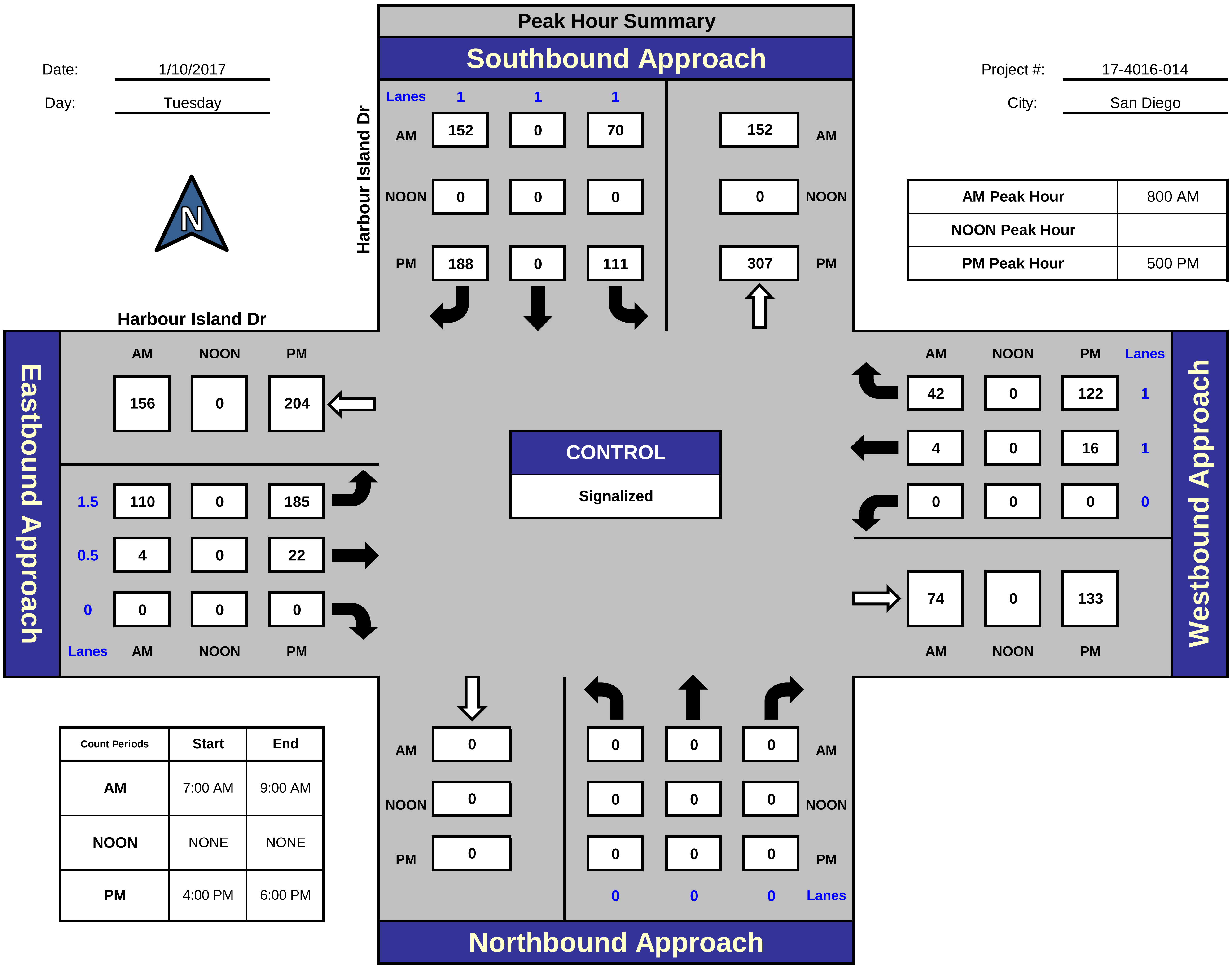
Date: 1/10/2017

Day: Tuesday

Project #: 17-4016-014

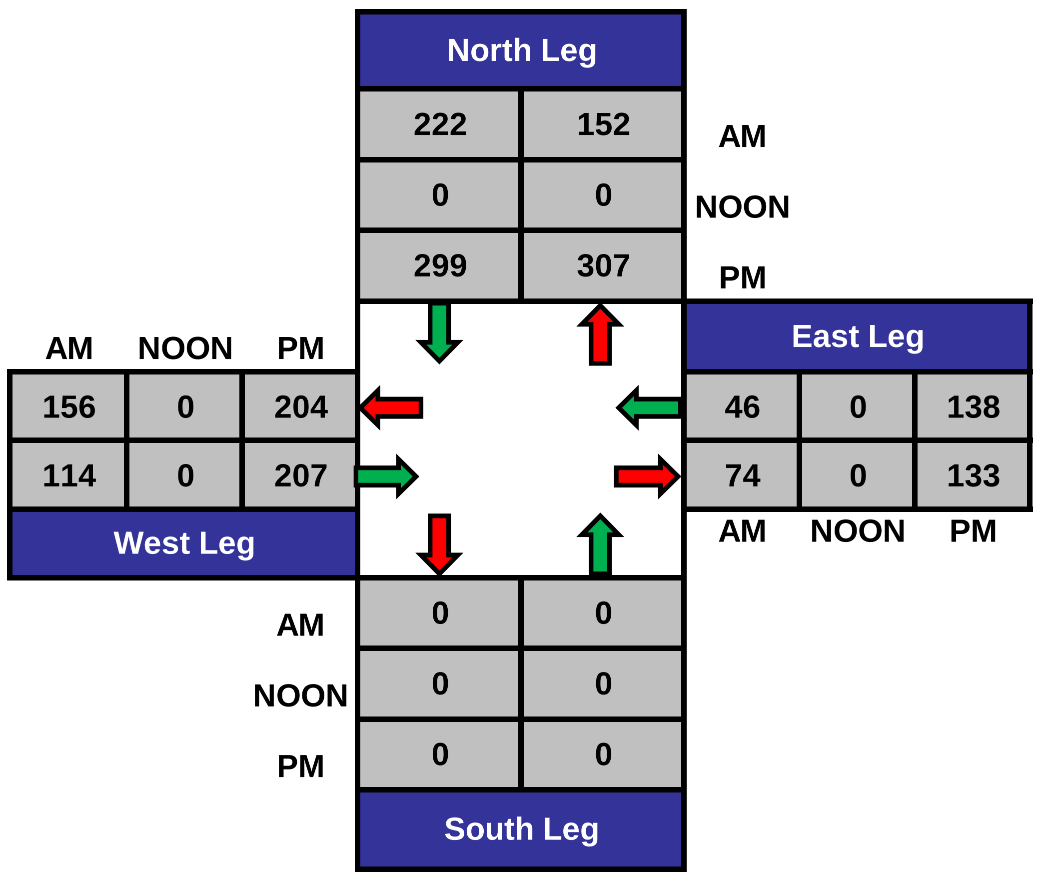
City: San Diego

AM Peak Hour	800 AM
NOON Peak Hour	
PM Peak Hour	500 PM

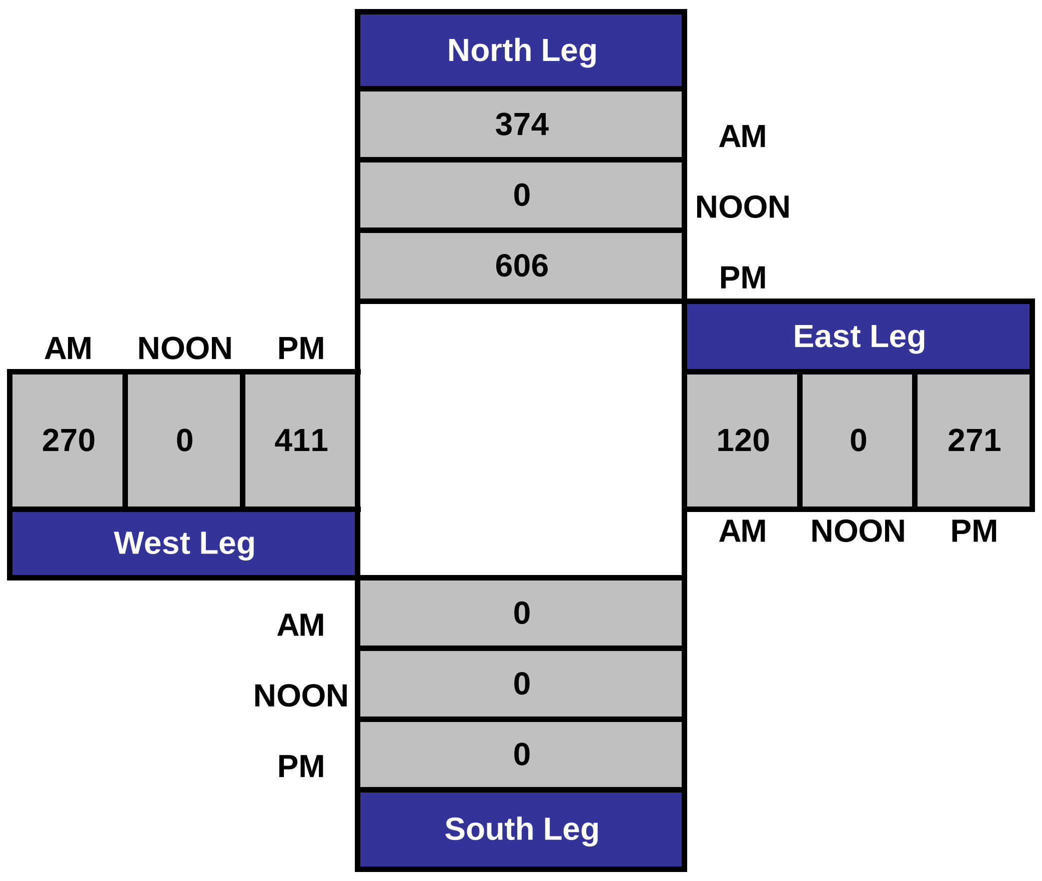


Count Periods	Start	End
AM	7:00 AM	9:00 AM
NOON	NONE	NONE
PM	4:00 PM	6:00 PM

Total Ins & Outs



Total Volume Per Leg



Appendix B

Peak Hour Intersection LOS work Sheets Worksheets –Existing Conditions

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑	↱	↰↰	↑↑↑↱		↰↰	↑	↱	↰	↰↑↱	
Traffic Volume (veh/h)	97	586	55	286	1884	8	65	10	89	60	17	90
Future Volume (veh/h)	97	586	55	286	1884	8	65	10	89	60	17	90
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1863	1863	1793	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	103	623	47	311	2048	9	76	12	0	61	32	93
Adj No. of Lanes	1	3	1	2	4	0	2	1	1	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.92	0.92	0.92	0.85	0.85	0.85	0.87	0.87	0.87
Percent Heavy Veh, %	2	6	2	2	6	6	2	2	2	2	2	2
Cap, veh/h	612	2867	1016	379	2186	10	193	104	89	141	148	126
Arrive On Green	0.35	0.59	0.59	0.04	0.11	0.11	0.06	0.06	0.00	0.08	0.08	0.08
Sat Flow, veh/h	1774	4893	1583	3442	6385	28	3442	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	103	623	47	311	1484	573	76	12	0	61	32	93
Grp Sat Flow(s),veh/h/ln	1774	1631	1583	1721	1542	1788	1721	1863	1583	1774	1863	1583
Q Serve(g_s), s	4.8	7.1	1.3	10.6	37.5	37.5	2.5	0.7	0.0	3.9	1.9	6.8
Cycle Q Clear(g_c), s	4.8	7.1	1.3	10.6	37.5	37.5	2.5	0.7	0.0	3.9	1.9	6.8
Prop In Lane	1.00		1.00	1.00		0.02	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	612	2867	1016	379	1584	612	193	104	89	141	148	126
V/C Ratio(X)	0.17	0.22	0.05	0.82	0.94	0.94	0.39	0.12	0.00	0.43	0.22	0.74
Avail Cap(c_a), veh/h	612	2867	1016	645	1584	612	650	352	299	302	317	270
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.82	0.82	0.82	0.99	0.99	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	11.6	7.8	55.7	51.1	51.1	53.8	52.9	0.0	51.8	50.9	53.1
Incr Delay (d2), s/veh	0.0	0.2	0.1	1.4	10.2	20.7	1.3	0.5	0.0	2.1	0.7	8.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	3.2	0.7	5.1	17.6	22.2	1.2	0.4	0.0	2.0	1.0	3.3
LnGrp Delay(d),s/veh	26.9	11.8	7.9	57.1	61.3	71.8	55.1	53.4	0.0	53.9	51.6	61.4
LnGrp LOS	C	B	A	E	E	E	E	D		D	D	E
Approach Vol, veh/h		773			2368			88			186	
Approach Delay, s/veh		13.6			63.3			54.8			57.2	
Approach LOS		B			E			D			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	17.4	74.8		11.5	46.4	45.8		14.3				
Change Period (Y+Rc), s	4.4	5.7		4.9	5.7	* 5.4		4.9				
Max Green Setting (Gmax), s	22.1	33.6		22.3	15.6	* 40		20.1				
Max Q Clear Time (g_c+I1), s	12.6	9.1		4.5	6.8	39.5		8.8				
Green Ext Time (p_c), s	0.4	7.7		0.2	0.1	0.8		0.6				
Intersection Summary												
HCM 2010 Ctrl Delay			51.5									
HCM 2010 LOS			D									
Notes												

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑↑↑↑	↱	↰↰	↱
Traffic Volume (veh/h)	60	653	2946	53	30	39
Future Volume (veh/h)	60	653	2946	53	30	39
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1792	1863	1863	1863
Adj Flow Rate, veh/h	66	718	3101	0	37	39
Adj No. of Lanes	1	3	5	1	2	1
Peak Hour Factor	0.91	0.91	0.95	0.95	0.82	0.82
Percent Heavy Veh, %	2	6	6	2	2	2
Cap, veh/h	86	4279	5726	1249	135	62
Arrive On Green	0.05	0.87	0.79	0.00	0.04	0.04
Sat Flow, veh/h	1774	5055	7600	1583	3442	1583
Grp Volume(v), veh/h	66	718	3101	0	37	39
Grp Sat Flow(s),veh/h/ln	1774	1631	1452	1583	1721	1583
Q Serve(g_s), s	4.3	2.5	18.6	0.0	1.2	2.9
Cycle Q Clear(g_c), s	4.3	2.5	18.6	0.0	1.2	2.9
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	86	4279	5726	1249	135	62
V/C Ratio(X)	0.77	0.17	0.54	0.00	0.27	0.63
Avail Cap(c_a), veh/h	332	4279	5726	1249	720	331
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.97	0.97	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	55.5	1.1	4.6	0.0	55.1	55.8
Incr Delay (d2), s/veh	13.1	0.1	0.4	0.0	1.1	10.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	1.2	7.4	0.0	0.6	2.7
LnGrp Delay(d),s/veh	68.6	1.2	5.0	0.0	56.2	65.9
LnGrp LOS	E	A	A		E	E
Approach Vol, veh/h		784	3101		76	
Approach Delay, s/veh		6.9	5.0		61.1	
Approach LOS		A	A		E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		108.5		9.5	10.1	98.4		
Change Period (Y+Rc), s		5.3		4.9	4.4	5.3		
Max Green Setting (Gmax), s		83.1		24.7	22.1	56.6		
Max Q Clear Time (g_c+I1), s		4.5		4.9	6.3	20.6		
Green Ext Time (p_c), s		14.4		0.2	0.1	35.8		

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↑	↱	↰↰	↱
Traffic Volume (veh/h)	110	4	4	42	70	152
Future Volume (veh/h)	110	4	4	42	70	152
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	139	5	5	0	88	0
Adj No. of Lanes	1	1	1	1	2	1
Peak Hour Factor	0.79	0.79	0.77	0.77	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	0	0	21	18	303	139
Arrive On Green	0.00	0.00	0.01	0.00	0.09	0.00
Sat Flow, veh/h		0	908	1583	3442	1583
Grp Volume(v), veh/h		0.0	5	0	88	0
Grp Sat Flow(s),veh/h/ln			1863	1583	1721	1583
Q Serve(g_s), s			0.0	0.0	0.2	0.0
Cycle Q Clear(g_c), s			0.0	0.0	0.2	0.0
Prop In Lane				1.00	1.00	1.00
Lane Grp Cap(c), veh/h			21	18	303	139
V/C Ratio(X)			0.24	0.00	0.29	0.00
Avail Cap(c_a), veh/h			6332	5383	15600	7177
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh			4.4	0.0	3.8	0.0
Incr Delay (d2), s/veh			5.6	0.0	0.5	0.0
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			0.0	0.0	0.1	0.0
LnGrp Delay(d),s/veh			10.0	0.0	4.3	0.0
LnGrp LOS			A		A	
Approach Vol, veh/h			5		88	
Approach Delay, s/veh			10.0		4.3	
Approach LOS			A		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		
Phs Duration (G+Y+Rc), s				4.8		4.0		
Change Period (Y+Rc), s				4.0		4.0		
Max Green Setting (Gmax), s				40.0		30.0		
Max Q Clear Time (g_c+I1), s				2.2		2.0		
Green Ext Time (p_c), s				0.3		0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	4.6
HCM 2010 LOS	A

1: Harbor Island Drive/Airport Terminal Road & N Harbor Drive

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑	↱	↰↰	↑↑↑↱		↰↰	↑	↱	↰	↰↑↱	
Traffic Volume (veh/h)	149	1420	98	321	1397	11	104	37	213	49	28	93
Future Volume (veh/h)	149	1420	98	321	1397	11	104	37	213	49	28	93
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.91
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1863	1863	1793	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	169	1614	89	345	1502	11	128	46	0	53	30	91
Adj No. of Lanes	1	3	1	2	4	0	2	1	1	1	2	0
Peak Hour Factor	0.88	0.88	0.88	0.93	0.93	0.93	0.81	0.81	0.81	0.92	0.92	0.92
Percent Heavy Veh, %	2	6	2	2	6	6	2	2	2	2	2	2
Cap, veh/h	748	2825	1006	399	1676	12	201	109	93	146	154	119
Arrive On Green	0.42	0.58	0.58	0.15	0.35	0.35	0.06	0.06	0.00	0.08	0.08	0.08
Sat Flow, veh/h	1774	4893	1582	3442	6364	47	3442	1863	1583	1774	1863	1447
Grp Volume(v), veh/h	169	1614	89	345	1092	421	128	46	0	53	30	91
Grp Sat Flow(s),veh/h/ln	1774	1631	1582	1721	1542	1784	1721	1863	1583	1774	1863	1447
Q Serve(g_s), s	7.3	25.0	2.6	11.7	26.8	26.8	4.4	2.9	0.0	3.4	1.8	7.4
Cycle Q Clear(g_c), s	7.3	25.0	2.6	11.7	26.8	26.8	4.4	2.9	0.0	3.4	1.8	7.4
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	748	2825	1006	399	1218	470	201	109	93	146	154	119
V/C Ratio(X)	0.23	0.57	0.09	0.86	0.90	0.90	0.64	0.42	0.00	0.36	0.20	0.76
Avail Cap(c_a), veh/h	748	2825	1006	462	1218	470	1064	576	490	282	296	230
HCM Platoon Ratio	1.00	1.00	1.00	1.33	1.33	1.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.92	0.92	0.92	0.96	0.96	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.2	16.0	8.4	49.8	37.4	37.4	55.2	54.5	0.0	52.1	51.3	53.9
Incr Delay (d2), s/veh	0.1	0.8	0.2	11.9	9.8	21.1	3.2	2.5	0.0	1.5	0.6	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	11.4	1.4	6.2	12.4	15.9	2.2	1.5	0.0	1.7	1.0	3.3
LnGrp Delay(d),s/veh	22.2	16.8	8.6	61.7	47.2	58.5	58.4	57.0	0.0	53.6	52.0	63.5
LnGrp LOS	C	B	A	E	D	E	E	E		D	D	E
Approach Vol, veh/h		1872			1858			174			174	
Approach Delay, s/veh		16.9			52.5			58.1			58.5	
Approach LOS		B			D			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	18.3	75.0		11.9	56.3	37.0		14.8
Change Period (Y+Rc), s	4.4	5.7		4.9	5.7	* 5.4		4.9
Max Green Setting (Gmax), s	16.1	27.8		37.1	12.6	* 32		19.1
Max Q Clear Time (g_c+I1), s	13.7	27.0		6.4	9.3	28.8		9.4
Green Ext Time (p_c), s	0.2	0.8		0.7	0.1	2.6		0.5

Intersection Summary	
HCM 2010 Ctrl Delay	36.6
HCM 2010 LOS	D

Notes

2: N Harbor Drive & Winship Lane

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑↑↑↑	↱	↰↰	↱
Traffic Volume (veh/h)	51	1643	2067	25	89	23
Future Volume (veh/h)	51	1643	2067	25	89	23
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1792	1863	1863	1863
Adj Flow Rate, veh/h	56	1805	2131	0	131	28
Adj No. of Lanes	1	3	5	1	2	1
Peak Hour Factor	0.91	0.91	0.97	0.97	0.68	0.68
Percent Heavy Veh, %	2	6	6	2	2	2
Cap, veh/h	73	4195	5660	1235	198	91
Arrive On Green	0.05	1.00	0.78	0.00	0.06	0.06
Sat Flow, veh/h	1774	5055	7600	1583	3442	1583
Grp Volume(v), veh/h	56	1805	2131	0	131	28
Grp Sat Flow(s),veh/h/ln	1774	1631	1452	1583	1721	1583
Q Serve(g_s), s	3.7	0.0	11.0	0.0	4.5	2.0
Cycle Q Clear(g_c), s	3.7	0.0	11.0	0.0	4.5	2.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	73	4195	5660	1235	198	91
V/C Ratio(X)	0.77	0.43	0.38	0.00	0.66	0.31
Avail Cap(c_a), veh/h	312	4195	5660	1235	823	379
HCM Platoon Ratio	1.33	1.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.73	0.73	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	56.2	0.0	4.1	0.0	55.4	54.2
Incr Delay (d2), s/veh	11.8	0.2	0.2	0.0	3.7	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.1	4.4	0.0	2.2	1.9
LnGrp Delay(d),s/veh	68.0	0.2	4.3	0.0	59.1	56.1
LnGrp LOS	E	A	A		E	E
Approach Vol, veh/h		1861	2131		159	
Approach Delay, s/veh		2.3	4.3		58.6	
Approach LOS		A	A		E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		108.2		11.8	9.3	98.9		
Change Period (Y+Rc), s		5.3		4.9	4.4	5.3		
Max Green Setting (Gmax), s		81.1		28.7	21.1	55.6		
Max Q Clear Time (g_c+I1), s		2.0		6.5	5.7	13.0		
Green Ext Time (p_c), s		57.3		0.5	0.1	39.1		

Intersection Summary			
HCM 2010 Ctrl Delay			5.5
HCM 2010 LOS			A

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↑	↱	↰↰	↱
Traffic Volume (veh/h)	185	22	16	122	111	188
Future Volume (veh/h)	185	22	16	122	111	188
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	231	28	17	0	128	0
Adj No. of Lanes	1	1	1	1	2	1
Peak Hour Factor	0.80	0.80	0.93	0.93	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	0	0	34	29	417	192
Arrive On Green	0.00	0.00	0.02	0.00	0.12	0.00
Sat Flow, veh/h		0	1863	1583	3442	1583
Grp Volume(v), veh/h		0.0	17	0	128	0
Grp Sat Flow(s),veh/h/ln			1863	1583	1721	1583
Q Serve(g_s), s			0.1	0.0	0.3	0.0
Cycle Q Clear(g_c), s			0.1	0.0	0.3	0.0
Prop In Lane				1.00	1.00	1.00
Lane Grp Cap(c), veh/h			34	29	417	192
V/C Ratio(X)			0.49	0.00	0.31	0.00
Avail Cap(c_a), veh/h			6010	5109	14806	6812
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh			4.5	0.0	3.7	0.0
Incr Delay (d2), s/veh			10.5	0.0	0.4	0.0
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			0.1	0.0	0.2	0.0
LnGrp Delay(d),s/veh			15.1	0.0	4.1	0.0
LnGrp LOS			B		A	
Approach Vol, veh/h			17		128	
Approach Delay, s/veh			15.1		4.1	
Approach LOS			B		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		
Phs Duration (G+Y+Rc), s				5.1		4.2		
Change Period (Y+Rc), s				4.0		4.0		
Max Green Setting (Gmax), s				40.0		30.0		
Max Q Clear Time (g_c+I1), s				2.3		2.1		
Green Ext Time (p_c), s				0.4		0.0		

Intersection Summary			
HCM 2010 Ctrl Delay			5.4
HCM 2010 LOS			A

Appendix C

Peak Hour Intersection LOS work Sheets Worksheets – Existing Plus Project Conditions

Harbor Island West Marina Redevelopment Project — Existing Plus Project Conditions

1: Harbor Island Drive/Airport Terminal Road & N Harbor Drive — AM Peak Hour

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑	↱	↰↰	↑↑↑↱		↰↰	↑	↱	↰	↰↑↱	
Traffic Volume (veh/h)	97	586	59	322	1884	8	65	10	92	60	17	90
Future Volume (veh/h)	97	586	59	322	1884	8	65	10	92	60	17	90
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1863	1863	1793	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	103	623	51	350	2048	9	76	12	0	61	32	93
Adj No. of Lanes	1	3	1	2	4	0	2	1	1	1	2	0
Peak Hour Factor	0.94	0.94	0.94	0.92	0.92	0.92	0.85	0.85	0.85	0.87	0.87	0.87
Percent Heavy Veh, %	2	6	2	2	6	6	2	2	2	2	2	2
Cap, veh/h	612	2810	998	419	2186	10	193	104	89	141	148	126
Arrive On Green	0.35	0.57	0.57	0.04	0.11	0.11	0.06	0.06	0.00	0.08	0.08	0.08
Sat Flow, veh/h	1774	4893	1583	3442	6385	28	3442	1863	1583	1774	1863	1583
Grp Volume(v), veh/h	103	623	51	350	1484	573	76	12	0	61	32	93
Grp Sat Flow(s),veh/h/ln	1774	1631	1583	1721	1542	1788	1721	1863	1583	1774	1863	1583
Q Serve(g_s), s	4.8	7.3	1.5	11.9	37.5	37.5	2.5	0.7	0.0	3.9	1.9	6.8
Cycle Q Clear(g_c), s	4.8	7.3	1.5	11.9	37.5	37.5	2.5	0.7	0.0	3.9	1.9	6.8
Prop In Lane	1.00		1.00	1.00		0.02	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	612	2810	998	419	1584	612	193	104	89	141	148	126
V/C Ratio(X)	0.17	0.22	0.05	0.84	0.94	0.94	0.39	0.12	0.00	0.43	0.22	0.74
Avail Cap(c_a), veh/h	612	2810	998	645	1584	612	650	352	299	302	317	270
HCM Platoon Ratio	1.00	1.00	1.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.81	0.81	0.81	0.99	0.99	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	26.9	12.3	8.3	55.5	51.1	51.1	53.8	52.9	0.0	51.8	50.9	53.1
Incr Delay (d2), s/veh	0.0	0.2	0.1	2.7	10.1	20.6	1.3	0.5	0.0	2.1	0.7	8.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	3.3	0.7	5.8	17.6	22.1	1.2	0.4	0.0	2.0	1.0	3.3
LnGrp Delay(d),s/veh	26.9	12.4	8.4	58.2	61.2	71.7	55.1	53.4	0.0	53.9	51.6	61.4
LnGrp LOS	C	B	A	E	E	E	E	D		D	D	E
Approach Vol, veh/h		777			2407			88			186	
Approach Delay, s/veh		14.1			63.3			54.8			57.2	
Approach LOS		B			E			D			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	18.8	73.5		11.5	46.4	45.8		14.3
Change Period (Y+Rc), s	4.4	5.7		4.9	5.7	* 5.4		4.9
Max Green Setting (Gmax), s	22.1	33.6		22.3	15.6	* 40		20.1
Max Q Clear Time (g_c+I1), s	13.9	9.3		4.5	6.8	39.5		8.8
Green Ext Time (p_c), s	0.4	7.7		0.2	0.1	0.8		0.6

Intersection Summary	
HCM 2010 Ctrl Delay	51.7
HCM 2010 LOS	D

Notes

2: N Harbor Drive & Winship Lane

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑↑↑↑	↱	↰↰	↱
Traffic Volume (veh/h)	60	656	2982	53	30	39
Future Volume (veh/h)	60	656	2982	53	30	39
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1792	1863	1863	1863
Adj Flow Rate, veh/h	66	721	3139	0	37	39
Adj No. of Lanes	1	3	5	1	2	1
Peak Hour Factor	0.91	0.91	0.95	0.95	0.82	0.82
Percent Heavy Veh, %	2	6	6	2	2	2
Cap, veh/h	86	4279	5726	1249	135	62
Arrive On Green	0.05	0.87	0.79	0.00	0.04	0.04
Sat Flow, veh/h	1774	5055	7600	1583	3442	1583
Grp Volume(v), veh/h	66	721	3139	0	37	39
Grp Sat Flow(s),veh/h/ln	1774	1631	1452	1583	1721	1583
Q Serve(g_s), s	4.3	2.6	19.0	0.0	1.2	2.9
Cycle Q Clear(g_c), s	4.3	2.6	19.0	0.0	1.2	2.9
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	86	4279	5726	1249	135	62
V/C Ratio(X)	0.77	0.17	0.55	0.00	0.27	0.63
Avail Cap(c_a), veh/h	332	4279	5726	1249	720	331
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.97	0.97	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	55.5	1.1	4.6	0.0	55.1	55.8
Incr Delay (d2), s/veh	13.1	0.1	0.4	0.0	1.1	10.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.4	1.2	7.6	0.0	0.6	2.7
LnGrp Delay(d),s/veh	68.6	1.2	5.0	0.0	56.2	65.9
LnGrp LOS	E	A	A		E	E
Approach Vol, veh/h		787	3139		76	
Approach Delay, s/veh		6.8	5.0		61.1	
Approach LOS		A	A		E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		108.5		9.5	10.1	98.4		
Change Period (Y+Rc), s		5.3		4.9	4.4	5.3		
Max Green Setting (Gmax), s		83.1		24.7	22.1	56.6		
Max Q Clear Time (g_c+I1), s		4.6		4.9	6.3	21.0		
Green Ext Time (p_c), s		14.5		0.2	0.1	35.5		

Intersection Summary	
HCM 2010 Ctrl Delay	6.4
HCM 2010 LOS	A

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↑	↱	↰↰	↱
Traffic Volume (veh/h)	113	4	4	42	70	192
Future Volume (veh/h)	113	4	4	42	70	192
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	143	5	5	0	88	0
Adj No. of Lanes	1	1	1	1	2	1
Peak Hour Factor	0.79	0.79	0.77	0.77	0.80	0.80
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	0	0	21	18	303	139
Arrive On Green	0.00	0.00	0.01	0.00	0.09	0.00
Sat Flow, veh/h		0	908	1583	3442	1583
Grp Volume(v), veh/h		0.0	5	0	88	0
Grp Sat Flow(s),veh/h/ln			1863	1583	1721	1583
Q Serve(g_s), s			0.0	0.0	0.2	0.0
Cycle Q Clear(g_c), s			0.0	0.0	0.2	0.0
Prop In Lane				1.00	1.00	1.00
Lane Grp Cap(c), veh/h			21	18	303	139
V/C Ratio(X)			0.24	0.00	0.29	0.00
Avail Cap(c_a), veh/h			6332	5383	15600	7177
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh			4.4	0.0	3.8	0.0
Incr Delay (d2), s/veh			5.6	0.0	0.5	0.0
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			0.0	0.0	0.1	0.0
LnGrp Delay(d),s/veh			10.0	0.0	4.3	0.0
LnGrp LOS			A		A	
Approach Vol, veh/h			5		88	
Approach Delay, s/veh			10.0		4.3	
Approach LOS			A		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		
Phs Duration (G+Y+Rc), s				4.8		4.0		
Change Period (Y+Rc), s				4.0		4.0		
Max Green Setting (Gmax), s				40.0		30.0		
Max Q Clear Time (g_c+I1), s				2.2		2.0		
Green Ext Time (p_c), s				0.3		0.0		

Intersection Summary			
HCM 2010 Ctrl Delay			4.6
HCM 2010 LOS			A

1: Harbor Island Drive/Airport Terminal Road & N Harbor Drive

PM Peak Hour

	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑↑↑	↱	↰↰	↑↑↑↱		↰↰	↑	↱	↰	↰↱	
Traffic Volume (veh/h)	149	1420	98	324	1397	11	108	37	249	49	28	93
Future Volume (veh/h)	149	1420	98	324	1397	11	108	37	249	49	28	93
Number	5	2	12	1	6	16	7	4	14	3	8	18
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.99	1.00		1.00	1.00		0.91
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1863	1863	1793	1900	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	169	1614	89	348	1502	11	133	46	0	53	30	91
Adj No. of Lanes	1	3	1	2	4	0	2	1	1	1	2	0
Peak Hour Factor	0.88	0.88	0.88	0.93	0.93	0.93	0.81	0.81	0.81	0.92	0.92	0.92
Percent Heavy Veh, %	2	6	2	2	6	6	2	2	2	2	2	2
Cap, veh/h	745	2810	1004	404	1676	12	207	112	95	146	154	119
Arrive On Green	0.42	0.57	0.57	0.12	0.26	0.26	0.06	0.06	0.00	0.08	0.08	0.08
Sat Flow, veh/h	1774	4893	1582	3442	6364	47	3442	1863	1583	1774	1863	1447
Grp Volume(v), veh/h	169	1614	89	348	1092	421	133	46	0	53	30	91
Grp Sat Flow(s),veh/h/ln	1774	1631	1582	1721	1542	1784	1721	1863	1583	1774	1863	1447
Q Serve(g_s), s	7.3	25.1	2.6	11.9	27.3	27.3	4.5	2.9	0.0	3.4	1.8	7.4
Cycle Q Clear(g_c), s	7.3	25.1	2.6	11.9	27.3	27.3	4.5	2.9	0.0	3.4	1.8	7.4
Prop In Lane	1.00		1.00	1.00		0.03	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	745	2810	1004	404	1218	470	207	112	95	146	154	119
V/C Ratio(X)	0.23	0.57	0.09	0.86	0.90	0.90	0.64	0.41	0.00	0.36	0.20	0.76
Avail Cap(c_a), veh/h	745	2810	1004	462	1218	470	1064	576	490	282	296	230
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.92	0.92	0.92	0.94	0.94	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.3	16.2	8.5	52.0	42.6	42.6	55.1	54.4	0.0	52.1	51.3	53.9
Incr Delay (d2), s/veh	0.1	0.9	0.2	11.8	9.8	21.1	3.1	2.3	0.0	1.5	0.6	9.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	11.4	1.4	6.3	12.7	16.2	2.3	1.5	0.0	1.7	1.0	3.3
LnGrp Delay(d),s/veh	22.4	17.1	8.7	63.8	52.4	63.7	58.3	56.6	0.0	53.6	52.0	63.5
LnGrp LOS	C	B	A	E	D	E	E	E		D	D	E
Approach Vol, veh/h		1872			1861			179			174	
Approach Delay, s/veh		17.2			57.1			57.9			58.5	
Approach LOS		B			E			E			E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4	5	6		8
Phs Duration (G+Y+Rc), s	18.5	74.6		12.1	56.1	37.0		14.8
Change Period (Y+Rc), s	4.4	5.7		4.9	5.7	* 5.4		4.9
Max Green Setting (Gmax), s	16.1	27.8		37.1	12.6	* 32		19.1
Max Q Clear Time (g_c+I1), s	13.9	27.1		6.5	9.3	29.3		9.4
Green Ext Time (p_c), s	0.2	0.6		0.7	0.1	2.1		0.5

Intersection Summary			
HCM 2010 Ctrl Delay			38.9
HCM 2010 LOS			D

Notes

2: N Harbor Drive & Winship Lane

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑↑↑	↑↑↑↑↑	↱	↰↰	↱
Traffic Volume (veh/h)	51	1679	2070	25	89	23
Future Volume (veh/h)	51	1679	2070	25	89	23
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1792	1792	1863	1863	1863
Adj Flow Rate, veh/h	56	1845	2134	0	131	28
Adj No. of Lanes	1	3	5	1	2	1
Peak Hour Factor	0.91	0.91	0.97	0.97	0.68	0.68
Percent Heavy Veh, %	2	6	6	2	2	2
Cap, veh/h	73	4195	5660	1235	198	91
Arrive On Green	0.05	1.00	0.78	0.00	0.06	0.06
Sat Flow, veh/h	1774	5055	7600	1583	3442	1583
Grp Volume(v), veh/h	56	1845	2134	0	131	28
Grp Sat Flow(s),veh/h/ln	1774	1631	1452	1583	1721	1583
Q Serve(g_s), s	3.7	0.0	11.0	0.0	4.5	2.0
Cycle Q Clear(g_c), s	3.7	0.0	11.0	0.0	4.5	2.0
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	73	4195	5660	1235	198	91
V/C Ratio(X)	0.77	0.44	0.38	0.00	0.66	0.31
Avail Cap(c_a), veh/h	312	4195	5660	1235	823	379
HCM Platoon Ratio	1.33	1.33	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.72	0.72	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	56.2	0.0	4.1	0.0	55.4	54.2
Incr Delay (d2), s/veh	11.6	0.2	0.2	0.0	3.7	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.1	0.1	4.4	0.0	2.2	1.9
LnGrp Delay(d),s/veh	67.8	0.2	4.3	0.0	59.1	56.1
LnGrp LOS	E	A	A		E	E
Approach Vol, veh/h		1901	2134		159	
Approach Delay, s/veh		2.2	4.3		58.6	
Approach LOS		A	A		E	

Timer	1	2	3	4	5	6	7	8
Assigned Phs		2		4	5	6		
Phs Duration (G+Y+Rc), s		108.2		11.8	9.3	98.9		
Change Period (Y+Rc), s		5.3		4.9	4.4	5.3		
Max Green Setting (Gmax), s		81.1		28.7	21.1	55.6		
Max Q Clear Time (g_c+I1), s		2.0		6.5	5.7	13.0		
Green Ext Time (p_c), s		58.8		0.5	0.1	39.1		

Intersection Summary	
HCM 2010 Ctrl Delay	5.4
HCM 2010 LOS	A

	↗	→	←	↖	↘	↙
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↰	↑	↑	↱	↰↰	↱
Traffic Volume (veh/h)	225	22	16	122	111	191
Future Volume (veh/h)	225	22	16	122	111	191
Number	5	2	6	16	7	14
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863
Adj Flow Rate, veh/h	281	28	17	0	128	0
Adj No. of Lanes	1	1	1	1	2	1
Peak Hour Factor	0.80	0.80	0.93	0.93	0.87	0.87
Percent Heavy Veh, %	2	2	2	2	2	2
Cap, veh/h	0	0	34	29	417	192
Arrive On Green	0.00	0.00	0.02	0.00	0.12	0.00
Sat Flow, veh/h		0	1863	1583	3442	1583
Grp Volume(v), veh/h		0.0	17	0	128	0
Grp Sat Flow(s),veh/h/ln			1863	1583	1721	1583
Q Serve(g_s), s			0.1	0.0	0.3	0.0
Cycle Q Clear(g_c), s			0.1	0.0	0.3	0.0
Prop In Lane				1.00	1.00	1.00
Lane Grp Cap(c), veh/h			34	29	417	192
V/C Ratio(X)			0.49	0.00	0.31	0.00
Avail Cap(c_a), veh/h			6010	5109	14806	6812
HCM Platoon Ratio			1.00	1.00	1.00	1.00
Upstream Filter(I)			1.00	0.00	1.00	0.00
Uniform Delay (d), s/veh			4.5	0.0	3.7	0.0
Incr Delay (d2), s/veh			10.5	0.0	0.4	0.0
Initial Q Delay(d3),s/veh			0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln			0.1	0.0	0.2	0.0
LnGrp Delay(d),s/veh			15.1	0.0	4.1	0.0
LnGrp LOS			B		A	
Approach Vol, veh/h			17		128	
Approach Delay, s/veh			15.1		4.1	
Approach LOS			B		A	

Timer	1	2	3	4	5	6	7	8
Assigned Phs				4		6		
Phs Duration (G+Y+Rc), s				5.1		4.2		
Change Period (Y+Rc), s				4.0		4.0		
Max Green Setting (Gmax), s				40.0		30.0		
Max Q Clear Time (g_c+I1), s				2.3		2.1		
Green Ext Time (p_c), s				0.4		0.0		

Intersection Summary	
HCM 2010 Ctrl Delay	5.4
HCM 2010 LOS	A