

Parks Recreation & Waterfront

Waterfront Specific Plan for the City of Berkeley Public Tidelands Area

Supporting Infrastructure, Revenue, Parking, and Sea Level Rise Studies (as of March 2023)

The following studies were produced as part of *Waterfront Specific Plan* (formerly “Berkeley Marina Area Specific Plan”) process, with the exception of the “Berkeley Marina Sea Level Rise AB 691 Assessment Study”. These studies are not final and continue to be updated by City staff, Hargreaves Jones, and the consultants associated with each study.

The *Waterfront Specific Plan* process began in the spring of 2020, just as the global pandemic emerged, which extended the anticipated duration of the effort and has required several updates and revisions to data and analysis included in these documents. These studies have informed the development of the *Waterfront Specific Plan* to date, and will continue to be referenced and revised as this process continues.

Final versions will be released in coordination with the final *Waterfront Specific Plan* – following an upcoming environmental review process, further community and stakeholder engagement, and ongoing City Council review.

1. **Infrastructure Assessment DRAFT** (May 2021)
Hargreaves Jones, Moffatt & Nichol, Nelson\Nygaard, Bkf Engineering
2. **Existing Amenities and Operations Assessment DRAFT** (March 2021)
Keyser Marston Associates
3. **Implementation Strategy DRAFT** (April 2021)
Keyser Marston Associates
4. **Hotel Food and Beverage Revenue Potential DRAFT** (September 2022)
Keyser Marston Associates
5. **Dredging Needs Technical Memo DRAFT** (April 2021)
Moffatt & Nichol
6. **Slip Mix Study DRAFT** (August 2022)
Moffatt & Nichol
7. **Parking & Mobility Framework DRAFT** (January 2022)
Nelson Nygaard
8. **Berkeley Marina Sea Level Rise AB 691 Assessment Study DRAFT** (August 2019)
NCE

BERKELEY MARINA AREA specific plan

INFRASTRUCTURE ASSESSMENT

may 14, 2021

DRAFT

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Executive Summary

DRAFT

Executive Summary

In recent years, the infrastructure at the Berkeley Marina has begun to experience significant failures such as deteriorating dock systems, the closing of the Berkeley Pier, crumbling roadways and parking lots, and more. Due to insufficient revenues, a capital replacement fund for this critical infrastructure work has never been established. In past years, infrastructure replacement has been funded through a variety of sources including: grants, loans, the Marina Fund when possible, and most recently, one-time allocations from the General Fund and the T1 Bond Measure. Additionally, the Marina Fund currently supports all aspects of the Waterfront including recreational activities at Cesar Chavez Park, Shorebird Nature Center and Park, Adventure Playground and at the South Cove area.

The Berkeley Marina Area's Fiscal Year 2021-2025 Capital Improvement Project (CIP) Plan is divided into two parts:

Part 1 provides an assessment of existing infrastructure categorized into the following areas: Waterside Infrastructure, Landside Infrastructure, Recreational Infrastructure and Facilities.

Part 2 identifies and prioritizes short-term capital improvement projects at the marina to be completed in the next five years.

The 5-year CIP Plan includes more than 20 projects; representing an investment of more than \$61 million.



Part1 Existing Infrastructure Assessment

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1.1 Waterside Infrastructure

Assessment of Existing In-water and Shoreline Infrastructure

Moffatt & Nichol has been contracted by Hargreaves Jones, who has been contracted by the City of Berkeley Department of Parks, Recreation, and Waterfront, to evaluate the existing conditions of the Berkeley Marina boating and waterside infrastructure facilities. This study is being conducted to assist with the development of the Berkeley Marina Area Specific Plan (BMASP).

The scope of work for this report includes the following tasks:

- Assess the condition of the existing waterside infrastructure including identification of locations and facilities in need of improvement and repairs
- Incorporate the findings of the 2019 “DRAFT Berkeley Marina Sea Level Rise AB 691 Assessment Study”
- Identify and prioritize short-term capital improvement projects at the marina which will improve revenue generation, quality of the existing infrastructure, and resiliency to the impacts of sea level rise (SLR)

A summary of the condition assessment results are presented:

Facility	Overall Rating
Yacht Harbor	
A Dock	Good
B and C Docks	Excellent
D and E Docks	Poor
F and G Docks	Good
H and I Docks	Excellent
J Dock	Fair
K Dock	Moderate
L Dock	Fair
M Dock	Fair
N Dock	Moderate
O Dock	Moderate
Sailing Docks and Boat Launch	
East Dock	Excellent
Middle Dock	Excellent
West Dock	Excellent
Boat Launch	Good
Shoreline	
Rip Rap Revetment	Good
Harbor Basin Bulkhead Wall	Moderate
South Sailing Basin Seawall	Poor
Waterside Structures	
Harbormaster's Office	Good
Over-Water Restrooms	Good/Moderate
Wharf and Storage Dock	Good
Berkeley Yacht Club Clubhouse	Good
Berkeley Marine Center Vendor Structure	Good
Skates on the Bay	Good
199 Seawall Drive	Moderate
Concrete Sheet Pile Breakwater	Good
Rubble Mound Breakwater	Good

Table 1-1 Conditions Assessment Summary

Background

The Berkeley Marina is the westernmost portion of the City of Berkeley. The marina is publicly owned and operated by the City. The entire marina land area is man-made, built upon the sandy beach and tidal flatlands of the East Bay shoreline using dredged material and capped landfill.

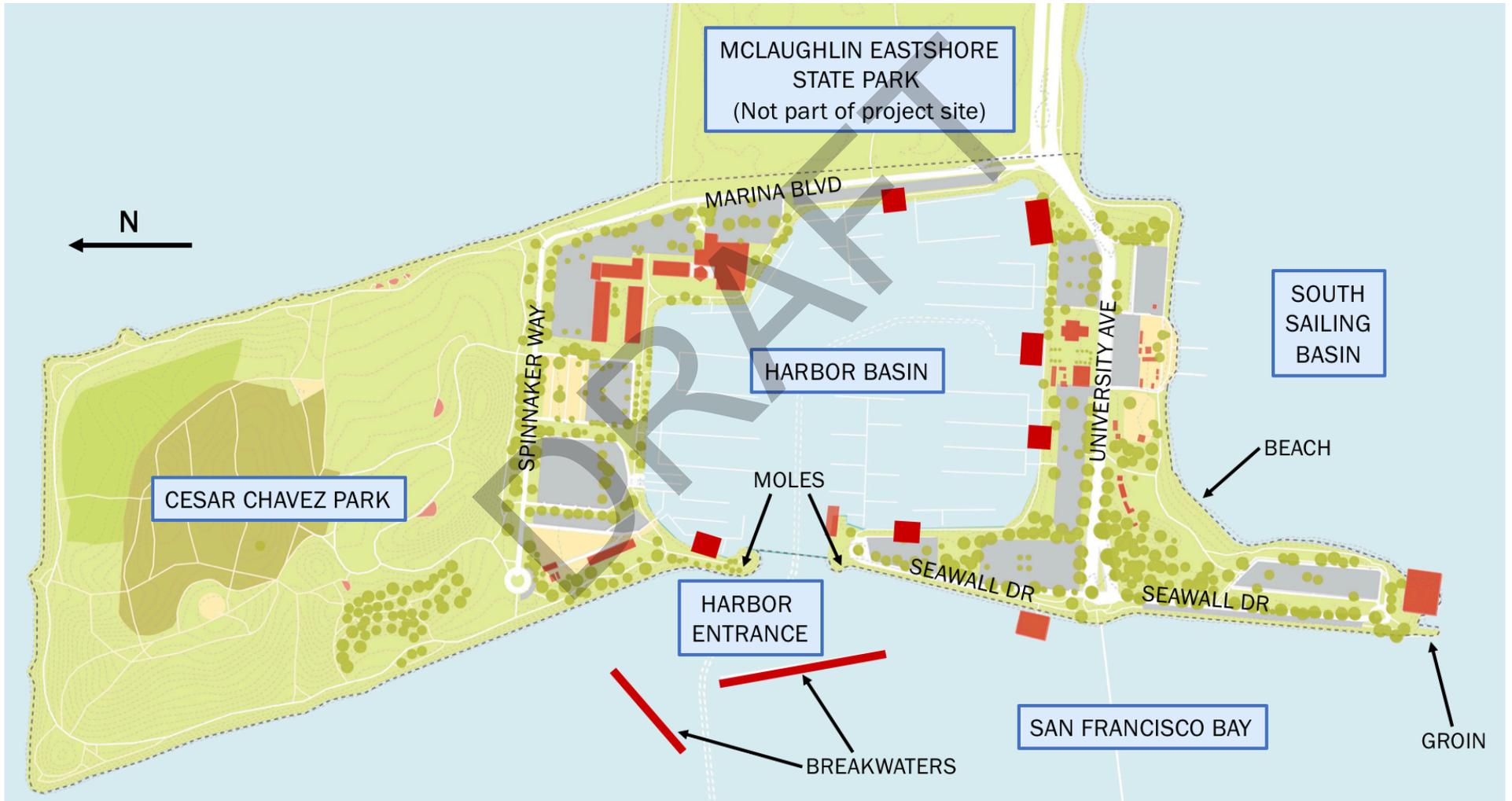
The original site of the Berkeley Marina was home to Berkeley Beach, a 1 mile stretch of dark sand that has been filled and built upon over the last 170 years. In 1853, Captain James Jacobs built the first pier at the site and named it Jacob's Landing. This pier was expanded in 1868, becoming the Heywood and Jacobs Wharf. An additional pier was built in 1873 to serve as a ferry landing and freight transport hub for the Standard Soap Company.

In 1909, the City built the Berkeley Municipal Wharf and later extended the wharf to create the Berkeley Pier in 1926 and 1927. The pier was used for automobile ferry service to Sausalito and San Francisco prior to and during the construction of the Bay Bridge. The Harbor Basin was created in 1936 with funds from the Works Progress Administration. The material dredged to create the Harbor Basin was used to create upland areas of the marina. Beginning in 1957, major expansion of the land area in the northern part of the site took place in the form of landfill disposal. These landfills were capped from 1981 to 1989, and converted to park land in the early 1990's. Much of this land is now Cesar Chavez Park. In July 2015,

the Berkeley Pier permanently closed due to concerns about its safety and structural integrity.

The Yacht Harbor within the Berkeley Marina is the largest marina in the San Francisco Bay, with over 1,000 berthing slips and slip lengths ranging from 20' to 84'. There are two breakwaters adjacent to the 300' wide harbor entrance which dissipate wave energy to calm the waters in the Yacht Harbor. In addition, the site has three small sailing docks for non-motorized watercraft use, a boat launching facility, a dock for cruise ships, and various structures built over the water. A riprap revetment spans and protects nearly the entire length of the Berkeley Marina perimeter. Figure 1-2 highlights the major geographical features which define the Berkeley Marina site.

Figure 1-2 Berkeley Marina Site Geography



Field Investigations

Field investigations were conducted between Friday, January 8, 2021 and Sunday, January 10, 2021 at low tide to gather information regarding the existing conditions of the waterside infrastructure and facilities at the Berkeley Marina. An additional inspection of A Dock took place on February 26, 2021. Field inspections were done by a team of four engineers from Moffatt & Nichol: Brad Porter, PE, Dilip Trivedi, PE, Daniel Jordan, EIT and Allison Canepa, EIT. The guide piles which support the docks at the marina had previously been inspected as part of the Selective Piling Replacement project and were not inspected during the field investigations for this project.

The investigations of the docks involved visually inspecting the deck surface and flotation units, connections, gangways, access piers, hardware, appurtenances, and utilities. The Hornblower Cruises Dock was not inspected because it is privately owned and operated. The shoreline was inspected visually from both the water and from the trails located adjacent to the shoreline. The piles and stringer beams which support the above-water structures at the marina were inspected both visually and tactilely. The breakwaters were inspected visually by kayak. The Berkeley Pier was not inspected as part of the conditions assessment for this project, nor did any underwater inspections take place as part of the conditions assessment.

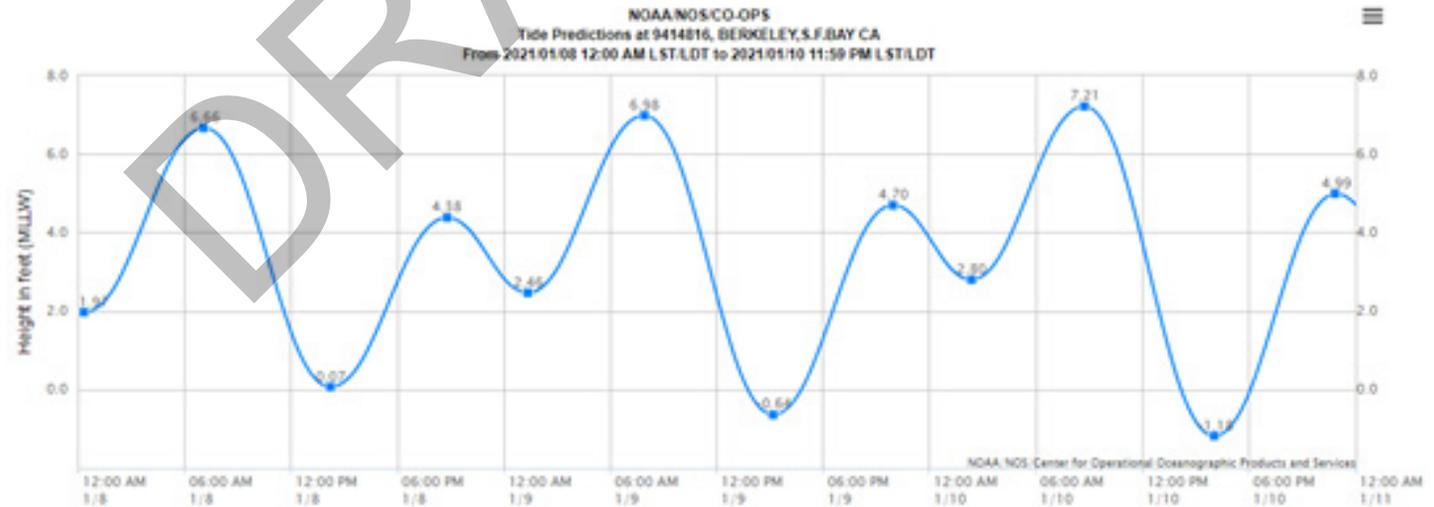


Figure 1-3 Tides from January 8, 2021 to January 10, 2021

1.1.1 Docks

Condition Assessment

The existing waterside infrastructure at the Berkeley Marina was split into four groups to provide clarity and organization to the conditions assessment. The four groups are as follows

- Yacht Harbor
- Sailing Docks and Boat Launch
- Shoreline
- Waterside Structures

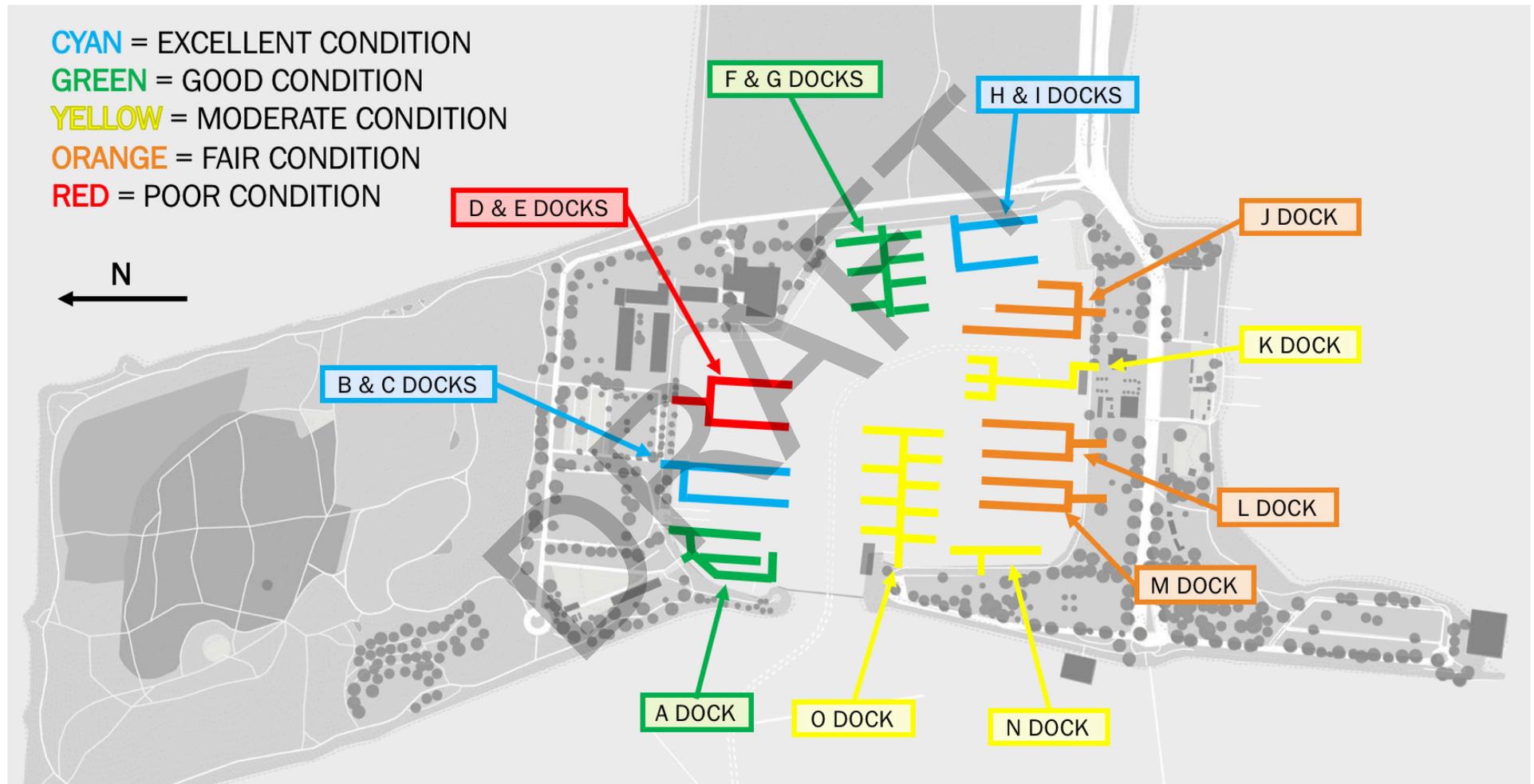
Assessment ratings used to categorize the condition of the various components within these four groups are described in the Table 1-4

There are 16 docks located in the Berkeley Marina Yacht Harbor (including the Hornblower Cruises Dock). These docks are labeled A-O going clockwise about the north side of the harbor. The Figure 1-5 presents the location of each dock in the marina as well as its overall condition rating from the inspection. The majority of the docks are constructed of concrete flotation units manufactured by Bellingham Marine Inc., with exceptions being A Dock and Docks D through G, all of which are comprised of a

Table 1-4 Conditions Assessment Rating System

Rating	Description
Excellent	No major deficiencies; no new minor deficiencies. Like-new.
Good	No major deficiencies; several new minor deficiencies.
Moderate	Few or no major deficiencies; numerous new deficiencies and/or several old minor deficiencies; annual maintenance performed, but additional effort is needed.
Fair	Major deficiencies that if not corrected immediately may lead to or cause deterioration of the facility such that project is incapable of providing the maximum storm protection; little or no evidence of minimum maintenance performed; a greater effort is required to reduce deficiencies.
Poor	Major deficiencies such that the system, or portion thereof, will probably not withstand a major storm event; little or no evidence of maintenance performed.

Figure 1-5 Small Craft Harbor Dock Conditions



timber frame and deck surface.

A Dock

A Dock is located in the northwest corner of the marina harbor. The three main walkways (East Walk, Middle Walk, and West Walk) are connected to each other by a marginal walkway which runs parallel to the shoreline. Slip lengths here range from 25' to 40'. The East Walk at A Dock is directly connected to the westernmost dock of the Boat Launch Facility. A Dock is in good condition.

The Middle and East Walks at A Dock were upgraded within the last five years. These upgrades included new timber framing and decking as well as new electrical power pedestals at the West and Middle Walks. A Dock has a marine fueling station located on its West Walk's last finger. The fueling station is in good condition and is

aerial photo of A Dock



the only fueling facility at the marina. The deck surface of

the docks adjacent to the fuel station consists of plywood boards so that the fuel line can be easily accessed underneath the deck, if need be. Some other fingers at this dock had plywood boards replace the original timber plank deck surface as well. A few of the fingers at A Dock are slightly warped, but most fingers are in excellent condition. One finger at the East Walk had missing deck panels which should be replaced.

The piles at this dock are made of either concrete, steel pipe, or timber. The concrete piles are in excellent condition, the steel piles are corroding but not showing signs of significant damage, and the timber piles vary between good and moderate condition. The last finger at the middle dock has an empty pile guide, with no indication of a stub timber pile below the water line.

Utilities at A Dock include electrical and water service. The West Walk has power pedestals and water service access on the shore side of the main walkway. The Middle Walk has utility access at every third finger and the East Walk has access at every finger. Power pedestals are located on the knee brace north of each finger and water access is located on the knee brace south of the finger at the Middle Walk and both are located on the knee brace south of the finger at the East Walk.

There are four ways to access A Dock: walking the westernmost dock at the boat launching facility, using one of the two gangways adjacent to the vessel lift, or using the gangway which connects the Berkeley Marine Center Vendor Structure to A Dock. All of these access ways are in good condition, but the gangways adjacent to the vessel lift both have very steep slopes. The gangplank which connects the East Walk to the Middle Walk beneath the vessel lift is very unstable and users must exercise caution when traversing it.

Figure 1-6 A Docks



Fuel dispenser



Plywood cover deck at fueling station



Twisted finger at west walk



Exposed finger end revealing construction method for the docks

B and C Docks

B and C Docks were replaced in 2007. The slips range in length from 25' to 36'. The two docks are connected to each other via a marginal walkway which runs parallel to the Harbor Basin's north shore. The main walkways for each dock are perpendicular to the marginal walkway. B and C Docks are in excellent condition.

B and C Docks are comprised of concrete dock modules made by Bellingham Marine, Inc. The dock modules are in excellent condition with no observable defects in the concrete or floatation. Piles at this dock are all precast concrete with no signs of any damage or wear.

aerial photo of B and C Docks



The pile guides at these two docks are steel pile guides with HDPE (high density polyethylene) rub strips hidden beneath polymer cover boards. A hole is cut into the cover board to fit the pile. The design of the guides creates a clean, flattering appearance and is similar to that seen at H and I Docks, which were constructed two years after the B and C Docks. Cleats, corner bumpers, and rub strips were all found to be in excellent condition.

The utilities at B and C Docks include telecom, electric, water, fire water, and sewage pumpout. Telecom boxes are located at the base of each dock's main walkway. Metered electrical power pedestals are located at the knee brace of every slip. Power pedestals are separate from the dock storage boxes. The knee braces also house water spigots so each slip holder has access to water. Fire cabinets located along the main walkways all have fire extinguishers and hoses inside them, as well as fire water access attached to the left side of each cabinet. C Dock houses a Keco Remote Pumpout System with two auxiliary connection points for boaters located at the dock's southern end. The diaphragm pump which sends the sewage landward is located between the two auxiliary connection points.

An aluminum gangway connects the two docks to the shore. The gangway is 90' long, is ADA accessible, and is in excellent condition. The gangway rests on the dock using HDPE skid pads.

Figure 1-7 B and C Docks



View from main walk on C Dock



Pile guide hidden beneath polymer cover board



Typical utility configuration at B and C Docks



Keco sewage pumpout and auxiliary connection in the distance

D and E Docks

D and E Docks were constructed in the 1960's and are the oldest remaining docks at the marina. They were originally slated for replacement in 2000 with B and C Docks, but insufficient funding led to D and E being excluded from that project. Funding for the project has recently been secured by the City in the form of a \$5,000,000 Department of Boating and Waterways (DBW) loan. D and E Docks have a similar configuration to B and C Docks. Slip lengths at these docks range from 32' to 40'. D and E Docks are in poor condition.

D and E Docks are comprised of timber framing and decking. The deck is comprised of staggered 2" x 6" timber planks, which run parallel to the dock's long axis rather than perpendicular (as seen in the other timber docks at the marina). The decking is showing signs of heavy wear and deterioration, often having holes and checks in the timber planks and a rough texture. Individual planks have been replaced at various locations along the dock and these can be identified by their noticeable color difference compared to the original planks. These repairs work well and highlight one of the advantages of having a timber deck in comparison to concrete. The southern end of E Dock is blocked off to the public. Despite the various issues with these two docks, they remain stable during use.

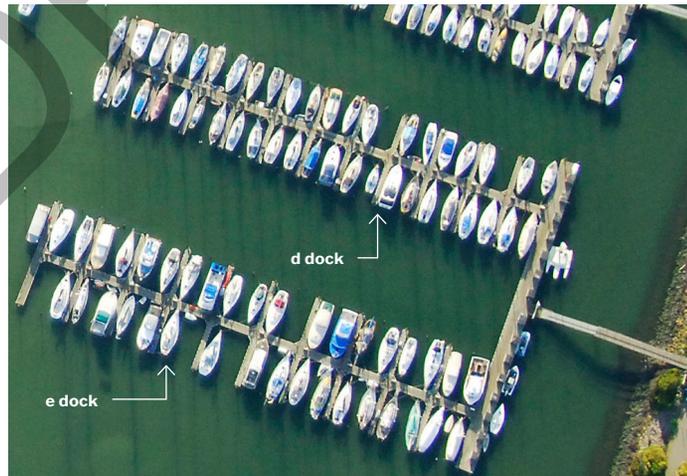
Appurtenances (pile guides, rub strips, corner bumpers, and cleats) at these two docks are in poor condition. Most of the pile guides at these docks are heavily corroded and have lost significant portions of their cross-section. Rub strips and corner bumpers are detached at many locations. Occasionally, cleats were found to be improperly mounted or detached from the deck entirely.

Piles at D and E are in poor condition. Many piles are exhibiting significant section loss in the tidal zone, due to a combination of marine borer infestation and rot. During storm events, piles have recently fallen at these docks due to their weak cross-sectional strength. The piles at D and E Dock will be replaced as part of the proposed dock

replacement project and are not included as part of the ongoing Selective Timber Piling Replacement project.

D and E Docks lack individual storage for slip holders at their respective slips. All the storage at these docks is located at the marginal walkway in the form of lockers. The freeboard of the marginal walkway is 6" near the lockers. This is likely due to the additional weight from the lockers and their contents. This makes accessing storage inconvenient for slip holders, especially those located at the southern ends of the docks. These docks also have outdated utilities for both electrical and water. These utilities are attached to small wooden posts located at the base of each finger dock.

The timber gangway is in good condition and the timber access pier is in excellent condition. The gangway has notches on its west side which act as steps to assist with its steep slope. At the bottom of the gangway, the steel wheel and wheel guide on the gangway's east side are beginning to corrode but show no signs of further damage. On the west side, the steel wheel has been replaced with a rubberized wheel. The original wheel guide still sits beneath the new wheel and is also starting to rust.



aerial photo of D and E Docks

Figure 1-8 D and E Docks



Typical timber deck at D and E Docks. Notice the replaced plank with a redder hue



Stub pile and corroded guide at E Dock



Storage lockers at marginal walkway



Typical power and water utilities at D and E Docks



Gangway wheels. Note the difference in wheel material between the west and east side of the gangway



Closed off fingers and end of main walkway at E Dock

F and G Docks

F and G Docks were replaced in 1999. These two docks are located in the upper portion of the Harbor Basin's east side, just south of the DoubleTree Hotel. The docks branch from a shared head walkway perpendicular to the shore. F Dock is located on the north side of the head walkway and G Dock is on its south side. Slip lengths range from 22' to 84'. F and G Docks are in good condition.

The decking for F and G Docks is made of timber which runs perpendicular to the long axis of the dock. The frames for the docks are made of timber. The majority of the decking is in excellent condition, but there are a few locations at the end of fingers where the wood is starting to show signs of decay. The decaying wood is found at fingers which are exposed to waves generated by vessels traversing the harbor's interior channel. When the waves splash water onto the docks and it is allowed to pond, the water slowly rots the timber deck. While the damage observed from this is minor, this should be monitored to see if the condition of the timber worsens over time. Some fingers at F and G Docks have begun to exhibit twisting and deformation; however, it is minimal, and the fingers remain stable to walk on.

The piles at F and G Docks are all precast concrete and are in excellent condition. The pile guides are made of galvanized steel rings with HDPE rub block attachments to prevent direct contact between the concrete pile and steel ring. Similar to the decaying wood of the decks exposed to wave action, the pile guides at the exposed locations are showing signs of corrosion damage. While no significant section loss was observed at the guides, the corrosion should be monitored for changes to the condition of the rings.

F and G Docks have electrical, telecom, water, fire water, and sewage pumpout utilities. Each slip at F Dock has individual storage boxes and power pedestals with a meter, in addition to a water spigot. G Dock has the power center attached to the storage box, with no meter present. The docks also have telecom boxes located at the base of each main walkway. There is a sewage auxiliary connection located at the southern tip of G Dock's easternmost walkway. Fire cabinets at both

docks have dedicated fire water access valves. Cleats, rub strips, and corner bumpers are in excellent condition and are well attached to the docks.

There are two gangways connecting F and G Docks to the shore. The north gangway is 35' long with a steep slope providing direct access to the docks. The gangway connects to the dock using HDPE skid pads on skid plates. The plate on the south side of the gangway needs to be reattached to the dock. The other gangway is ADA accessible with a switchback ramp on the dock. The ADA gangway has a steel frame with timber deck, which is uncommon. The total length of this gangway is approximately 160'. Both gangways are in excellent condition with no observable defects.



Aerial photo of F and G Docks

Figure 1-9 F and G Docks



Twisted finger at F Dock. Note the middle section of the finger is slightly raised in comparison to the ends



Deteriorated wood and corroded guide at F Dock. This finger is exposed to the interior channel of the harbor



Typical utility configuration at F Dock



Typical utility configuration at G Dock



Gangways at F and G Docks. Note the shorter gangway on the left side of the photo

H and I Docks

H and I Docks were replaced in 2009 and are the newest docks at the Berkeley Marina. The docks are located in the southeast corner of the Harbor Basin and share a marginal walkway perpendicular to the shore. Slip lengths range from 40' to 60'. H Dock is the only dock at the marina which accommodates houseboats and as a result the walkways at H Dock are wide and very stable. H and I Docks are in excellent condition.

The dock modules are precast concrete manufactured by Bellingham Marine, Inc. The concrete is in excellent condition, with no visible defects. Dry utilities run within the precast concrete dock modules along the main walkways and wet utilities run outside the modules under the walers. There are panels at the center of every other module that allow the utility lines to be accessed.

Utilities at H and I Docks include electrical, water, telecom, sewage, and fire water. Each slip has a dedicated power pedestal with meter, storage box, and water spigot. The house boat area has sewage collector lines at each slip. Additionally, there is a Sanisailor sewage pumpout located at the southern end of I Dock's main walkway.

The piles at H and I Docks are precast concrete similar to those found at B and C Docks. These piles were in excellent condition with no observable defects. The guides have a similar design to those found at B and C Docks and are in good condition. There are two pile guides at I Dock which are exhibiting signs of damage. The first damaged guide is improperly attached to the dock and is sagging. The sag has led to damage of the polymer cover board, as direct contact between the polymer cover board and concrete pile has caused the board to crack. The other damaged pile guide seems to have had its rub strips detached from the guide. The guide now uses a deformed buoy to act as a rub strip, which has caused the polymer

cover board to become misaligned and detached from the rest of the guide.

The gangway serving the two docks is 90' long and is in excellent condition. The gangway is made completely of aluminum and is ADA accessible. The bottom of the gangway rolls on the dock using wheels in dedicated wheel guides. The wheels are in excellent condition with no corrosion.

Aerial photo of H and I Docks. Note: The house boats on H Dock

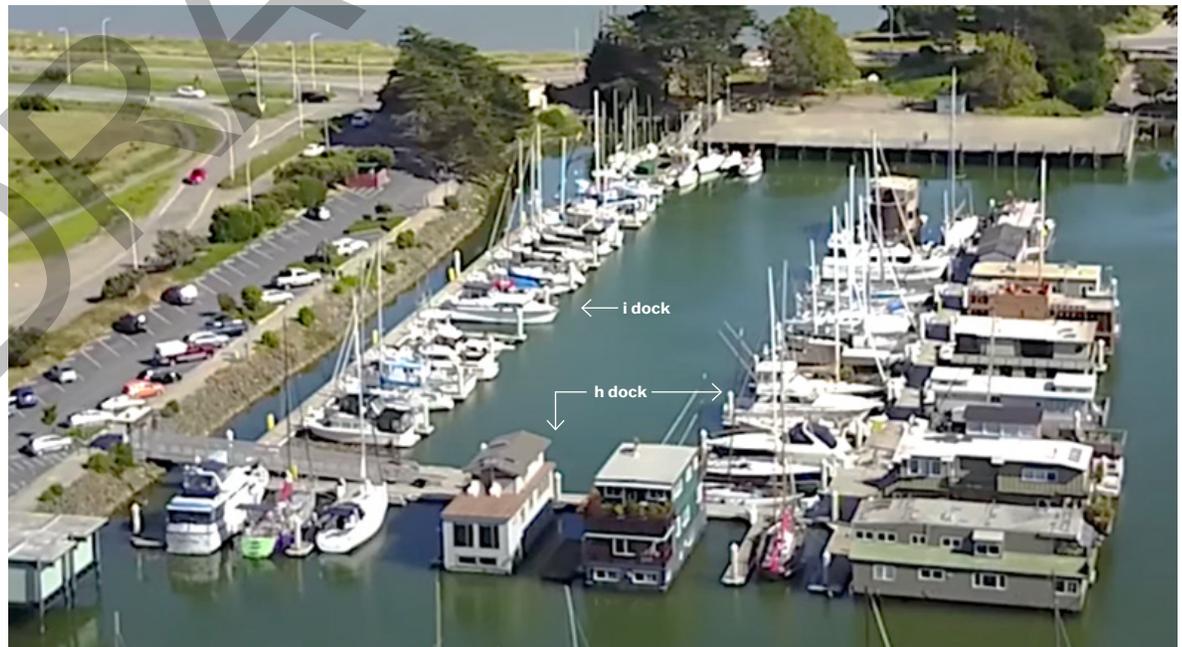


Figure 1-10 H and I Dock



View from the main walkway at H Dock



Sanisailor sewage pumpout at I Dock



Damaged guide at I Dock. It appears the buoy is acting as a temporary replacement for rub strips



Typical fire cabinet with fire water access

J Dock

J Dock is located in the southeastern corner of the Harbor Basin along the southern shoreline. Slips lengths range from 24' to 28'. The dock has three main walkways which stem from a marginal walkway running parallel to the shore. J Dock is in fair condition.

The dock modules are precast concrete floats manufactured by Bellingham Marine, Inc. These floats vary from poor to good condition, depending on whether they have been replaced in the past. Replaced floats can be identified by their noticeable color difference when compared to the older floats. The older floats are showing signs of significant deterioration, often with large cracks and spalls located at the edges of float modules. The damage is particularly bad at finger ends where vessel impacts have likely contributed to the damage. Plywood cover boards and steel cover plates are often used to cover these cracks and spalls. Occasionally, appurtenances (pile guides, rub strips, and corner bumpers) attached to the spalled dock modules become dislodged and either hang from their remaining attachment points to the dock, or fall into the water with the spalled concrete.

Aerial photo of J Dock



Other issues with the concrete dock modules at J Dock include warping of the finger docks, concrete delamination (indicative of corroding steel rebar), and slip hazards. An issue that particularly effects J Dock is the growth of moss likely caused by pooling water. The moss creates a slippery surface on the concrete decks and is a slip hazard.

There are 10 precast concrete piles at J Dock which are all in excellent condition. The rest of the piles are creosote treated timber of various condition. The damaged timber piles at the dock will be replaced as part of the ongoing Selective Piling Replacement project.

Pile guides at J Dock are in fair condition overall, with some guides exhibiting severe corrosion damage. The most common issue with the guides at J Dock is unattached pile roller assemblies at the internal pile guides. These assemblies are often improperly placed to begin with, allowing adequate space for the pile to make contact with and damage the knee brace cover boards.

J Dock has access to electrical and water utilities. Storage boxes accompany each slip with power centers attached to the box. Water spigots are located adjacent to the storage boxes on the knee brace.

The gangway at J dock is a 50' long timber structure with a relatively steep slope, similar to those found at the marina's older docks (Docks D, E, L, M, N, and O). The walking surface of the gangway has small notches on one side which act as steps to assist users with the slope. The lower end of the gangway rolls on the dock with steel wheels in dedicated wheel guides. Both the guides and wheels are discolored from rusting but show no other physical signs of corrosion damage.

Figure 1-11 J Dock



Typical cracking and spalling at finger ends. Note the cracking occurs on the perimeter of the concrete float module



Delamination of the concrete dock module. This damage is typically covered by plywood or steel and is not visible



Concrete float replaced with timber deck on main walkway



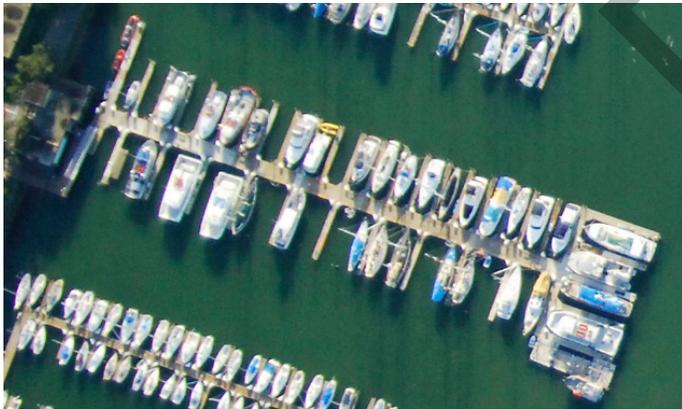
Internal pile guide. Note the unattached pile roller assembly, allowing the pile to make direct contact with the plywood

K Dock

K Dock is located at the center of the Harbor Basin's southern shore, just north of the Harbormaster's Office. The dock can be accessed from the shore via an access pier adjacent to the office, which then connects to a gangway running parallel to the shore. Slip lengths vary between 46' and 65'. K Dock is in moderate condition.

K Dock serves large commercial fishing vessels at the marina and is currently where ferry service at the marina operates from. The dock is better maintained than some of the other older docks found at the marina, as evidenced by finger dock replacements, diamond plate steel covers at trip hazards, and replaced concrete floats. The main walkway at K Dock is wider than other docks at the marina because it is the marina's public dock. As a result, the main walkway is very stable.

The dock modules at K Dock are in moderate condition. Most of the modules are precast concrete floats made by Bellingham Marine, Inc., but some of the most damaged fingers have been replaced with aluminum framed, composite timber deck docks. The older concrete dock modules, especially at the northern end of the dock, are cracking at their edges. There are color differences between adjacent dock modules, suggesting that replacements have been made over time.



Aerial photo of K Dock

The new aluminum framed, composite timber decked finger dock replacements are in excellent condition, but are inherently unstable. Shifting one's weight from one edge of the finger width to the other causes the finger to twist considerably. It appears that the width of the flotation units beneath these docks is not sufficient to provide adequate stability to the fingers. In addition, many of the new finger replacements have already warped about their connection point, despite their young age.

Piles at K Dock are of varying condition. A total of 44 guide piles support the dock: 15 are precast concrete piles in excellent condition and the rest are creosote treated timber piles of varying condition. The moderately damaged or worse timber piles will be replaced as part of the Selective Piling Replacement project.

Piles guides at K Dock have a similar configuration to those found at the other older docks. At external piles (piles located at the end of fingers or at the outer edges of the dock), a steel hoop is attached to the end of fingers. At the internal piles (piles located along main and marginal walkways), pile roller assemblies are mounted to plywood or polymer cover boards. Many of the steel hoops at the external guides are corroding and have lost portions of their cross-section as a result. The pile roller assemblies at the internal guides are occasionally unattached to the dock.

Each slip has access to electrical and water utilities. The electrical power centers are attached the storage boxes adjacent to each slip, and spigots for water access are located adjacent to the storage boxes.

The aluminum gangway at K Dock is attached to the elevated walkways surrounding the Harbormaster's Office. The gangway is approximately 50' long and is in good condition. The gangway rests on the dock using HDPE skid blocks, which are in excellent condition. There is a small bulge in the walking surface of the gangway halfway down its slope.

Figure 1-12 K Dock



Main walkway of K Dock. Note the width of the dock as well as the different color of the float modules. Floats lighter in color are likely replacements



Diamond plate covers at the edges of the floats. Covers hide cracks and tripping hazards



New finger part of the finger dock replacement project. Note how it is already twisted significantly



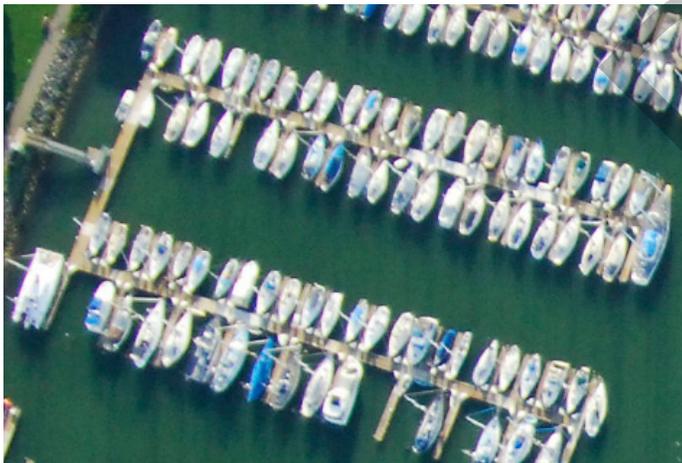
Cracking concrete and finger end

L Dock

L Dock is located along the Harbor Basin's southern shore to the west of K Dock. L Dock is comprised of two main walkways connected to each other via a marginal walkway that runs parallel to the shore. Slips at L Dock range from 28' to 45'. L Dock is in fair condition.

L Dock is mostly comprised of precast concrete dock modules manufactured by Bellingham Marine, Inc. Many of the same issues with the concrete floats at J Dock occur at L Dock. The damage from cracks and spalling is less visible at L Dock because it is often covered with plywood. There are occasional locations where the ends of fingers are spalling, but not as severe as the spalling at J Dock. The east half of L Dock has had some fingers replaced as part of the finger replacement project. These fingers have the same issues found at the K Dock replacements: warping about the connection to the main walkway and instability due to lacking flotation.

Aerial photo of L Dock



The piles at L Dock are in varying condition. There is an equal distribution between minor damaged, moderately damaged, and severely damaged timber piles at this dock. The severely damaged pilings typically have large cavities from marine borer infestation and rot. These pilings have failed recently during heavy storm events and have caused damage to their adjacent docks. The 3 precast concrete piles supporting the dock are in excellent condition.

The pile guides at L Dock are in poor condition. The steel hoops on the external pile guides are heavily corroded and there were many instances of dismantled pile roller assemblies at the internal pile guides. The plywood cover boards to which the roller assemblies should be attached show damage from direct contact with the pile.

Slips at L Dock have access to electrical and water utilities, similar to K and J Docks. Storage boxes located on the knee braces have attached electrical power centers and water spigots are next to the storage boxes.

An access pier and gangway perpendicular to the shore connect the marginal walkway to the shore. The gangway and access pier are in good condition. The gangway is 35' long, with a steep slope and timber deck. There are notches in the walking surface of the gangway to assist users with the slope. The gangway rolls on the dock with wheels on each side of the gangway rolling in wheel guides. The wheels and guides are discolored from rusting but show no signs of physical corrosion damage.

Figure 1-13 L Dock



Damaged internal pile guide. Note the unattached pile roller assemblies and widening hole in the plywood



Typical cracking at edges of concrete float module

M Dock

M Dock is located along the Harbor Basin's southern shore, west of L Dock. It has a similar configuration to L Dock. Slips lengths at M Dock are either 26' or 28'. Overall, M Dock is in fair condition.

The docks at M Dock are comprised of precast concrete dock modules by Bellingham Marine, Inc. M Dock is in similar condition to L Dock. There are multiple locations where the edges of the concrete floats are exhibiting cracking and occasional spalling. This dock has a combination of plywood covers and diamond plate over the damaged portions of the concrete. There was one instance of a hollow sounding float on the finger between slips 139 and 141. The hollow sound and cracks on the finger are indicative of concrete delamination within the interior of the dock module. Some of the concrete fingers have experienced significant warping and are no longer safe to walk upon.

The finger dock replacement project has replaced some of the concrete fingers at M Dock with aluminum frame, timber deck docks. The two fingers at the north end of the east main walkway have been replaced and are stable more stable than other replacements. These fingers are wider due to their location at the end of the main walkway and have wider flotation units beneath them as a result. These wider flotation units fit their respective docks better and provide improved stability as a result.

Piles and guides at M dock are in poor condition overall. The timber piles tend to either be in good condition or poor condition, with only two piles at the dock exhibiting moderate damage. The 3 precast concrete piles supporting the dock are in excellent condition. Some of the steel hoops at the external guides have experienced significant corrosion damage. Internal pile guides occasionally have missing or dismantled roller assemblies

and damaged plywood cover boards as a result of direct contact with the pile.

Slips at M Dock have access to electrical and water utilities. Storage boxes located on knee braces have electrical power centers attached and water spigots adjacent to them.

The gangway and access pier are in good condition. The gangway is 35' long and is built similar to the gangway at J Dock. The gangway rolls on the dock using steel wheels in wheel guides. The steel wheels and guides are discolored from rusting and the texture of the steel is beginning to show signs of corrosion. The wheel guides rest on two concrete float modules with different finished surface elevations, causing the wheel guides to bend.



Aerial photo of M Dock

Figure 1-14 M Dock



Delaminated finger between slips 139 and 141. The cracking on the walking surface is typical of delamination.



Gangway with notches. This gangway design is typical of the older docks at the marina.

N Dock

N Dock is located along the Harbor Basin's western shore. The dock is comprised of a single main walkway which runs parallel to the shore, from which the fingers extend. All slips at N Dock are 45' long. N Dock is in overall moderate condition.

The docks at N Dock are precast concrete dock modules made by Bellingham Marine, Inc. There are small cracks at the edges of several of the concrete floats on both the main walkway and fingers. Occasionally, fingers are warped about their connection to the main walkway. Some fingers at N Dock have been replaced with new aluminum framed, composite deck fingers. These fingers have the same issues found at the other finger dock replacements throughout the marina.

Piles and guides at N Dock are in moderate condition. N Dock has the overall best conditioned timber piles at the

marina, with only one pile showing moderate damage and one pile showing severe damage. The 3 precast concrete piles supporting this dock are all in excellent condition. The pile guides are in good condition. The only damage of note being that a few of the guides have damaged connections to the dock.

Slips at N Dock have access to electrical and water utilities. Storage boxes located on knee braces have attached electrical power centers and water spigots are next to the storage boxes.

The access pier and gangway perpendicular to the shore are both in excellent condition. The gangway is 35' long and a design similar to that found at J Dock. The gangway attaches to the dock via wheels on each side of the gangway which roll in dedicated wheel guides. These wheels and guides show discoloration from rusting but no further physical signs of damage from corrosion.

Figure 1-15 N Dock



Aerial photo of N Dock

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O Dock

O Dock is located on the Harbor Basin's western shore, south of the harbor entrance. O Dock houses the largest number of slips in the marina. The head walkway, from which the multiple main walkways branch from, runs perpendicular to the shore. Slips at O Dock vary between 25' and 60' in length. Overall, O Dock is in moderate condition.

O Dock is comprised of precast concrete dock modules made by Bellingham Marine, Inc. In general, the more damaged fingers at this dock are located closer to the harbor entrance. Some concrete floats have cracks at their edges, similar to the other older docks at the marina. These cracks are often covered by plywood, but there are instances of diamond plate sheet covers. Concrete spalls are less common at O Dock. Occasionally, concrete fingers are slightly warped, but these fingers are still serviceable. A few concrete fingers have been replaced with aluminum framed, composite timber deck fingers as part of the Finger Dock Replacement Project and some have been completely covered in plywood. The replacements at the 60' slips on the eastern side of O Dock are very unstable as one walks towards their end. This is due partly due to a limited number of guide piles along their length (only one pile at the end of the finger typically) and partly due to the stability issues associated with the finger dock replacements that has been seen at other locations in the marina.

Piles and guides at O Dock are in moderate condition. A little less than half of the treated timber piles are exhibiting major damage (less than 50% of cross-section remaining). The precast concrete piles, mostly located on the northern half of O Dock, are in excellent condition with no observable defects. Steel hoops at a few external pile guides show significant section loss from corrosion. These

damaged guides are typically located in the northern half of O Dock where they are exposed to wave action created by vessels traversing the interior channel of the Harbor Basin.

A single access pier and gangway perpendicular to the shore connect the head walkway to the shore. The gangway is 35' long and has a design similar to that found at J Dock. The wheels at the bottom of the gangway are rusting but showing no further physical signs of damage from corrosion.

Aerial photo of O Dock



Figure 1-16 O Dock



Diamond plate sheet covers and a newly replaced finger along O Dock's eastern edge.

1.1.2 Launch Facilities

There are three small sailing docks and a boat launch facility at the Berkeley Marina. The sailing docks are located in the South Sailing Basin and the Boat Launch is located in the northwest corner of the Harbor Basin. The sailing docks are in excellent condition and the boat launch is in good condition.

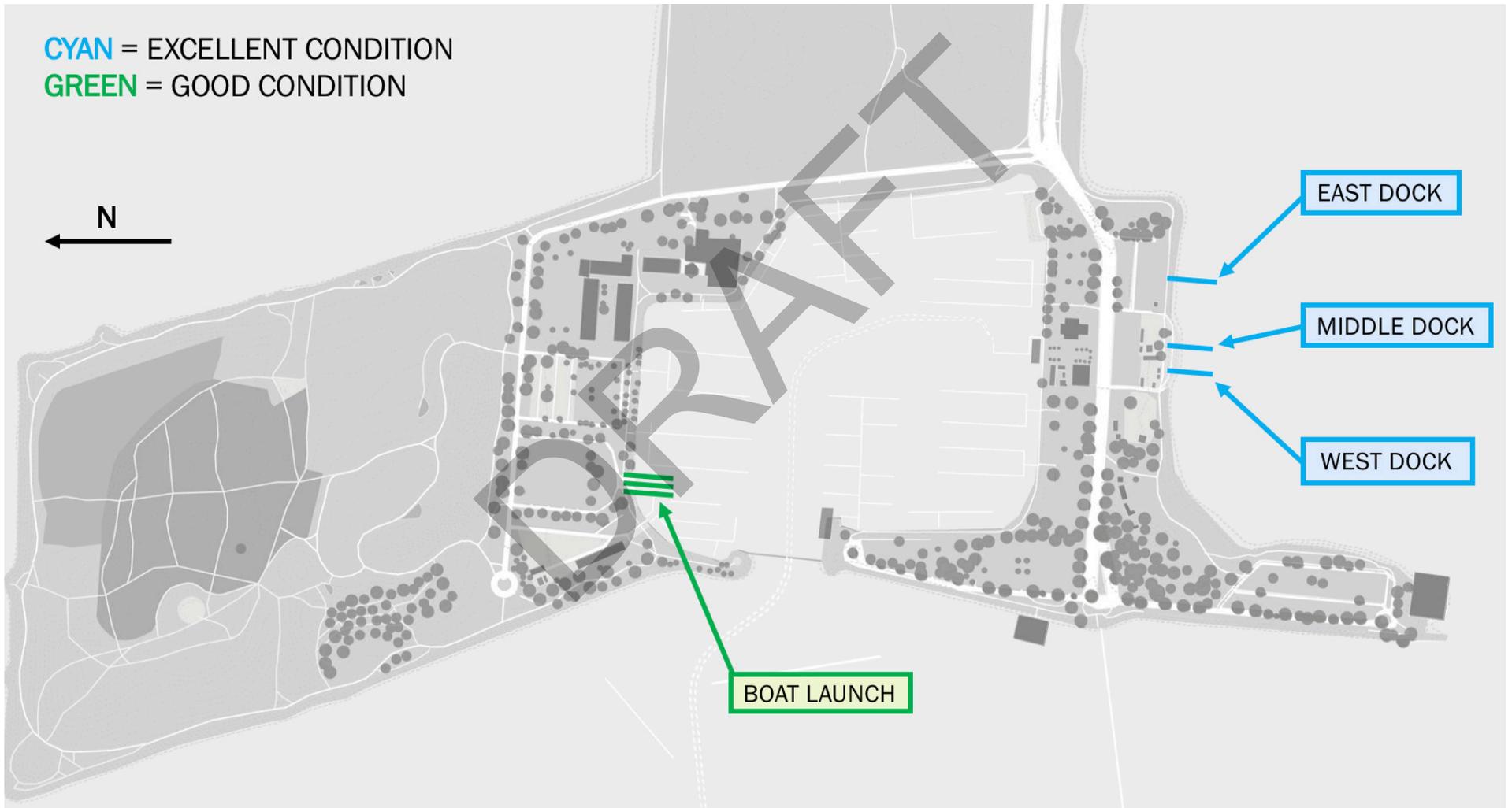
The three sailing docks are named by their position relative to each other (i.e., the East Dock is the easternmost of the three docks). The purpose of the three sailing docks is to provide public access to the San Francisco Bay for non-motorized activities, such as sailing, windsurfing, kayaking, etc. All three docks are open to the public at no cost, 24 hours a day. Cal Sailing Club and Cal Adventures (both organizations associated with UC Berkeley) often use the Middle and West Docks due to their facility's proximity to the docks, but do not have exclusive or reserved access to the docks. Extending water utility service to the vicinity of the docks would be greatly beneficial to users, as they currently do not have nearby water access to rinse off their bodies, clothing, and equipment.

There are two boat hoists adjacent to the West and Middle Docks which are fully available to the general public. Cal Sailing Club and Cal Adventures both contribute some funding for annual maintenance of the hoists, per the terms in their leases. The rest of the funding for the maintenance of the hoists comes from the City.

The small sailing docks at the South Sailing Basin are in shallow waters, with the elevation of the bay bottom near $\pm 0.0'$ MLLW. The shallow depth causes the docks to ground out at lower tides, preventing access to the

bay and causing operating hour losses for the Cal Sailing Club and Cal Adventures organizations. This issue has persisted since the installation of the first docks here in the 1970's and dredging of the area has been a controversial topic in the past. Dredging a channel in the South Sailing Basin to the docks would likely be unviable considering the high upfront costs and funding needed to maintain the dredged depths, especially when considering the fast rate of sediment accumulation in the South Sailing Basin. More viable solutions include extending the existing docks further into the South Sailing Basin where the water is deeper or adding new docks to the marina at other locations where there is ample water depth and a slower rate of sediment accumulation.

Figure 1-17 Launching Facilities Condition



East Dock

The East Dock is located east of the South Sailing Basin Seawall and extends perpendicularly from the shore. It is primarily used by windsurfers and other recreational boaters (kayaks, canoes, etc.). The dock is colloquially known as “The Windsurfer Dock”. The East Dock was replaced in 2020 and is in excellent condition.

The dock modules are in excellent condition. The modules have aluminum frames and composite timber decks. The piles at this dock are all precast concrete in excellent condition. One of the piles was rotated when installed and as a result the roller assemblies on its guide are skewed to account for this. The other pile guides are in excellent condition.

The gangway leading to the dock is approximately 35' long, is made of aluminum, and has a steep slope. A timber access pier bridges the gangway to the shore. The wheel guides at the bottom of the gangway are discolored from rusting but show no signs of damage from corrosion. The wheels are in excellent condition.

Figure 1-18 East Dock Assessment Images



View of East Dock on the dock

Skewed roller assemblies at southern end of East Dock



East Dock as seen from the shore

Middle Dock

The Middle Dock is located at the South Sailing Basin Seawall's east side and was replaced in 2010. An ADA accessible gangway and associated landing attachment were added to the dock in 2020. The Middle Dock is in excellent condition.

The Middle Dock modules are made with aluminum frames, with flotation tubs attached to the bottom of the frames. The deck surface appears to be made of aluminum sheets. The deck, frame, and flotation tubs are in excellent condition. The piles are all precast concrete and are in excellent condition with no observable defects. The steel members at this dock, specifically the pile guides and hinges between floats, are corroding and the texture of the steel is rough and chipping away. Dock appurtenances were found to be in excellent condition.

The landing platform for the ADA accessible gangway is constructed similar to the Middle Dock with aluminum frames and aluminum sheet decking. A railed gangplank bridges the landing platform to the Middle Dock. The

gangplank attaches to the landing platform with a piano hinge and rests on the Middle Dock deck.

The non-ADA accessible gangway is approximately 33' long with a steep slope. The gangway is made of aluminum. A transition plate located at the bottom of the gangway skids on a steel plate attached to the dock's deck. The hinge connection at the shore abutment for this gangway is rusting and the texture of the steel is rough. It appears that both the hinge and abutment were not replaced with the dock in 2010.

The ADA accessible gangway is approximately 80' long. It has plastic wheels which roll in wheel guides on the landing platform. The wheels are undamaged and the wheel guides shown no signs of corrosion. The gangway itself is in excellent condition with no observable defects.



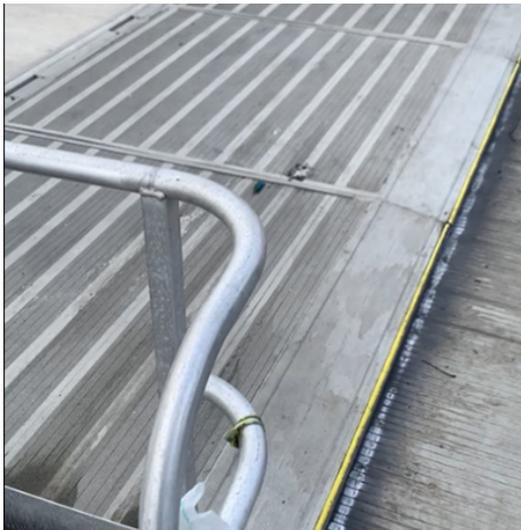
Middle Dock as seen from the South Sailing Basin Seawall.



View of the deck surface from the gangway



Corroding steel hinge and pile guide



Aluminum gangplank between the Middle Dock landing attachment



Corroding hinge at the top of the non-ADA accessible gangway.

Figure 1-19 Middle Dock Assessment Images

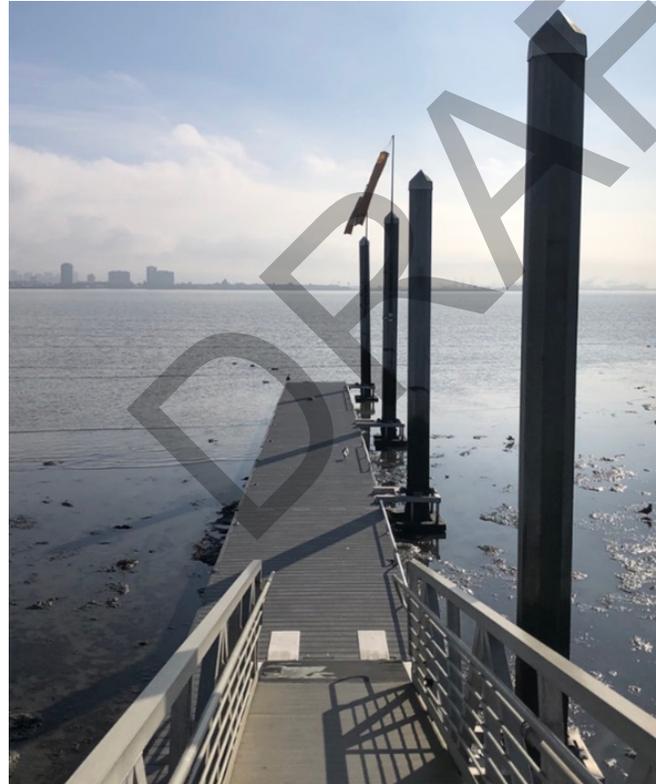
West Dock

The West Dock is located at the western edge of the South Sailing Basin Seawall and was replaced in 2020. The dock is in excellent condition.

The West Dock has an aluminum frame with composite timber decking. Flotation tubs are attached to the bottom of the frame. The deck, frame, and flotation tubs are all in excellent condition. The piles at this dock are precast concrete and had no observable defects. The steel members of the pile guides and hinges between floats show no signs of rusting or corrosion related damage.

The gangway for the West Dock is approximately 40' long and has a steep slope. The gangway is made of aluminum and skids along plates attached to the dock's deck. The gangway connects to the shore with a link connection that was not replaced with the dock in 2020. The steel members of the connection are discolored from rust, but no further damage as occurred. The abutment to which the link connection is attached to is a concrete ramp built above the seawall. A piece of the railing on the east side of the gangway needs to be reattached, but other than this, the gangway is in excellent condition.

Figure 1-20 West Dock Assessment Images



View of the West Dock from its gangway



Raised concrete abutment for West Dock's gangway

Boat Launch Facility

The Boat Launch is located in the northwest corner of the Harbor Basin. The original facility was constructed in 1969 and was replaced in 1988. The launch ramp and associated boarding docks are in good condition.

The concrete apron from which the boats launch into the water is starting to show signs of wear. The v-groove texture of the concrete apron is much less pronounced where it has prolonged exposure to saltwater. The upper portion of the apron has large cracks in the surface which span several feet. These are both normal signs of wear and are not yet a concern to the serviceability of the facility.

The concrete abutments for each of the three boarding docks at the facility are in excellent condition. The concrete is undamaged and there is no evidence of rebar exposure to the atmosphere. The boarding docks have metal frames with timber decks. The decks are generally

in good condition. A few deck panels are raised creating a tripping hazard. The hinges which connect the dock modules are corroding, particularly the hinge pins near the tidal zone which are starting to expand and chip due to corrosion damage. The easternmost of the three docks is seeing gaps develop between the waler and deck.

The piles and guides at the boarding docks are in excellent condition. The pile guides are rectangular in shape and their design differs from those found throughout the rest of the marina. These pile guides have concrete rub strips, which are bolted to the long sides of the rectangular guide. Having the concrete pile rub against a concrete rub strip might pose problems in the future, as the rough texture of the concrete will wear down both the pile and the guide at a faster rate.

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Figure 1-21 Boat Launch Facility



Aerial photo of Boat Launch



Corroding hinge between boarding float modules



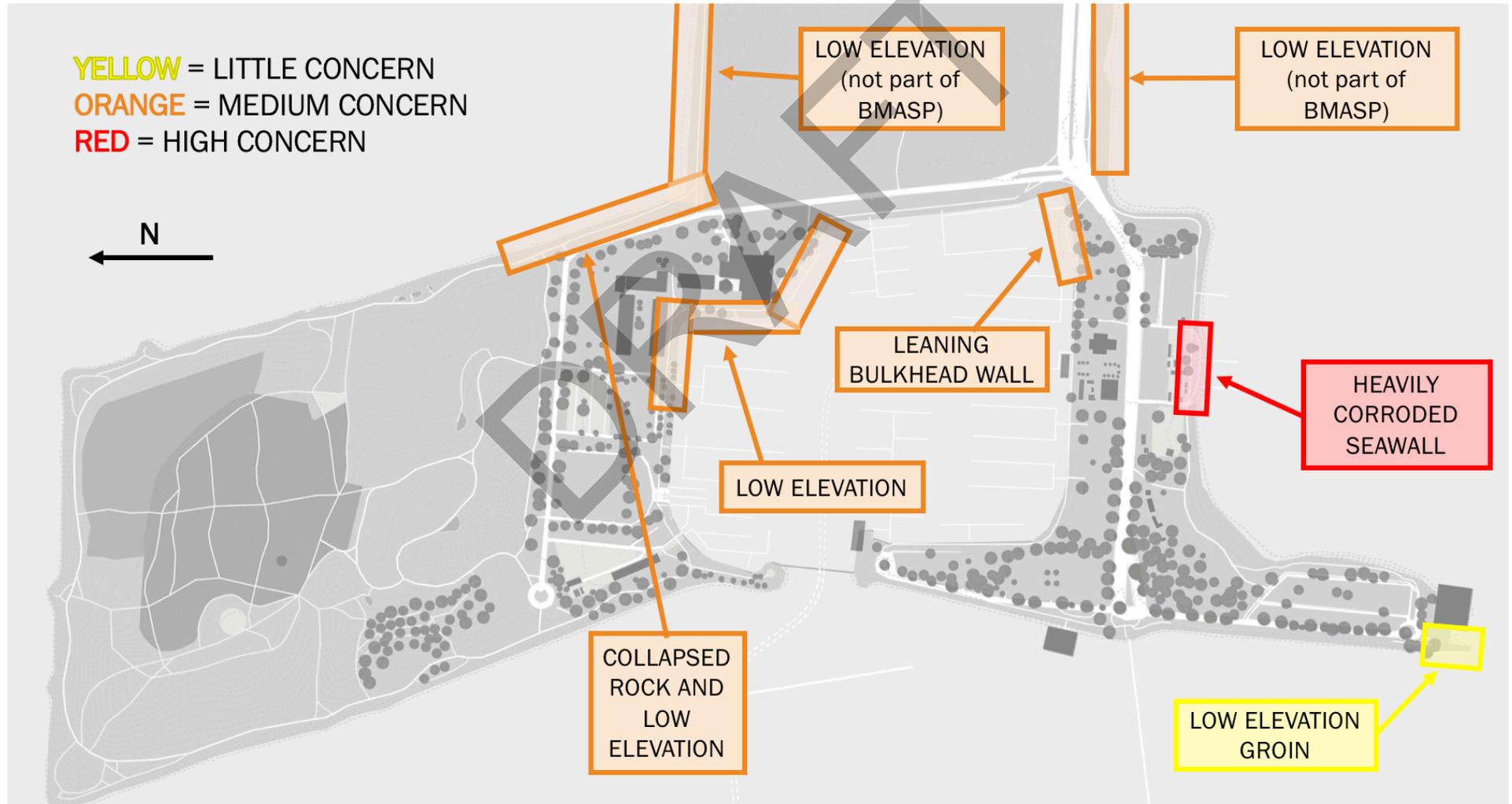
Pile guide with concrete rub strips

1.1.3 Shoreline

Riprap Revetment

The riprap revetment along the perimeter of the Berkeley Marina shoreline is in good condition. The outer shoreline's riprap is comprised of large armor rock, due to its exposure to stronger waves, with some pieces of broken concrete occasionally used. The riprap comprising the Harbor Basin's shoreline consists of smaller rock due to its protected nature.

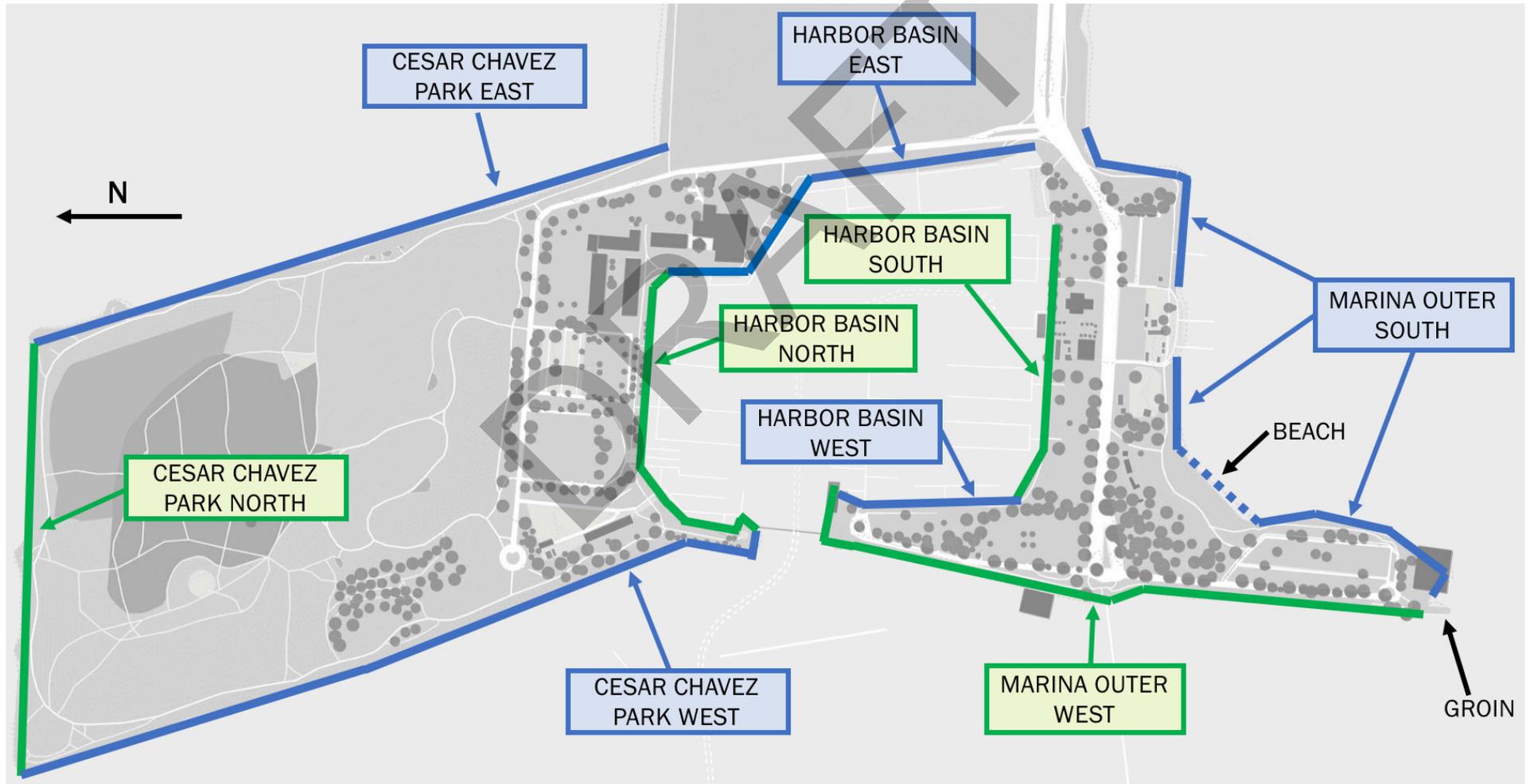
Figure 1-22 Shoreline inspection points of interest



No major changes to the marina's revetment have occurred since the 1970s, when layers of filter rock and armor rock were placed around the perimeter of Cesar Chavez Park. To make referencing observations easier, the riprap revetment has been split into segments identified by their location relative to the center of the marina. Figure 1-23 below highlights the segments of the rip rap

revetment discussed in this report. The revetment crest and slope information presented in the sections below comes from NOAA Lidar data, specifically the "2018 - 2019 USGS Lidar: Northern California Wildfire - QL2" data set.

Figure 1-23 Revetment segments map



Cesar Chavez Park East Revetment

The revetment on the east side of Cesar Chavez Park is in moderate condition. This segment of revetment spans from the shoreline at the intersection of Marina Blvd. and Virginia St. Ext. (south end) to the northeast corner of Cesar Chavez Park (north end).

The elevation of the revetment crest in this segment varies between +7' NAVD88 and +14' NAVD88, with an average crest elevation of +11' NAVD88. The +7' elevation is located at the segment's southern end and is the lowest revetment crest elevation at the Berkeley Marina. As a result, this corner is the most susceptible part of the shoreline to sea level rise. This portion of the revetment has been overtopped in the past during King Tide events (+7.4' NAVD88) and chances of overtopping only increase if the crest height here is not addressed and sea levels continue to rise. Rock size at the susceptible portion of

the revetment is nominally 15" and the revetment slope is 3H:1V. The slope gradually transitions to a slope of 2H:1V at the segment's halfway point.

The revetment is of higher quality in the northern half of the segment, where it is exposed to stronger wave action. Here, the slope is generally 2H:1V, with select locations where the slope is nearer to 2.5H:1V. The rock size in the northern portion of the segment is larger, with a nominal rock size of 24".

There are occasional scarps (eroded slopes) in the southern 500' of this segment. At these scarps, the smaller 15" rocks have dislodged and fallen to the revetment toe. There are two additional areas where riprap was missing at top of the revetment, approximately 1200' south of the northeast corner of Cesar Chavez Park.



Low elevation area at the shoreline where Marina Blvd meets Virginia St Ext



Typical scarp in revetment slope

Figure 1-24 Cesar Chavez Park East Revetment

Cesar Chavez Park North Revetment

The revetment on the north side of Cesar Chavez Park is in excellent condition. This segment of the revetment spans from the northwest corner of Cesar Chavez Park (west end) to the northeast corner of Cesar Chavez Park (east end).

The elevation of the revetment crest is fairly consistent in this segment, varying between +11' NAVD 88 and +14' NAVD88. The average revetment crest elevation is near +13' NAVD88. The high points of the revetment crest occur at the ends of this segment and the low points are located at the 1/4 and 3/4 length points. The slope of the

revetment at the north shore varies between 2H:1V and 2.5H:1V. The riprap is nominally 24" in size.

There are two storm drains located 400' west of the park's northeast corner, both of which are in excellent condition. An additional storm drain is located 100' east of the northwest corner of the park and it is also in excellent condition. The rip rap below the storm drain has been grouted to ensure that the storm drain runoff does not displace the rip rap. Rock is missing from the top of the revetment slope approximately 150' east of the northwest corner of the park.

Figure 1-25 Cesar Chavez Park North Revetment



Storms drain atop the Cesar Chavez Park North Revetment

Cesar Chavez Park West Revetment

This revetment on the west side of Cesar Chavez Park is in excellent condition. This segment of the revetment spans from the northwest corner of Cesar Chavez Park (north end) to the north mole at the harbor entrance (south end).

The elevation of the revetment crest varies between +12' NAVD88 and +15' NAVD88. The northern end of this segment has higher crest elevations which gradually lower as the segment progresses southward. The slope of the revetment cross section is typically 2.5H:1V. Variances from the typical slope occur at both ends of the segment, where the slope is near 3H:1V. The toe of the revetment

rarely deviates from its straight-line path and is very consistent. The riprap at this segment is consistent with the north shore of the park, with a nominal rock size of 24".

Near the middle of the segment, riprap has fallen from the top of the revetment into the San Francisco Bay. Because the area where the rock fell is near the top of bank, the missing rock has a minimal effect on the integrity of the revetment.



Typical revetment section on the west side of Cesar Chavez Park.

Figure 1-26 Cesar Chavez Park West Revetment

Harbor Basin North

The revetment at the Harbor Basin's north shore is in moderate condition. This segment spans from the north mole at the harbor entrance (west end) to the northeast corner of the Harbor Basin, where the DoubleTree Hotel is located (east end).

The revetment transitions from unprotected to protected shoreline in this segment and as a result the size of the riprap transitions from 24" to 12" nominal. The elevation of the revetment crest in the western half of this segment is highly variable, as is its slope. At the harbor entrance, the revetment crest is near +12' NAVD88 and the slope is 3H:1V. Between the entrance and the Boat Launch Facility, the revetment crest lowers to 11.5' and the slope flattens to 3.5H:1V.

The portion of the revetment west of the B and C Dock gangway is inconsistent, with missing rocks at the top of slope and an inconsistent toe. Rocks dislodging and falling from the top of slope to the bottom are likely the cause.

The revetment slope gradually flattens as it nears the segment's east end. Between C and D Docks, the revetment crest is +10.5' with a slope of 4H:1V. East of the D and E Dock gangway, the crest lowers to +9' with a slope of 5H:1V. This span of the revetment is a sea level rise concern because this is the lowest revetment crest elevation within the Harbor Basin and it is near a considerable amount of landside infrastructure. The DoubleTree Hotel is located just behind the low portion of the revetment, so if the revetment is overtopped here as a result of sea level rise, there is potential for costly infrastructure damage.

Figure 1-27 Harbor Basin North Revetment



Revetment section near A Dock



Revetment east of the D and E Docks

Harbor Basin East

The revetment on the east shore of the Harbor Basin is in good condition. This segment spans from the northeast corner of the Harbor Basin (north end) to the southeast corner of the Harbor Basin (south end).

The revetment crest elevation is +10' NAVD88 south of the DoubleTree Hotel and +11' for the rest of the segment. The slope adjacent to the DoubleTree is 3H:1V and gradually steepens to 2H:1V until the last 100' at the south end of the segment. The final 100' of the segment's south end is where the original boat launch facility was located at the marina. The revetment crest elevation (+6' NAVD88) here

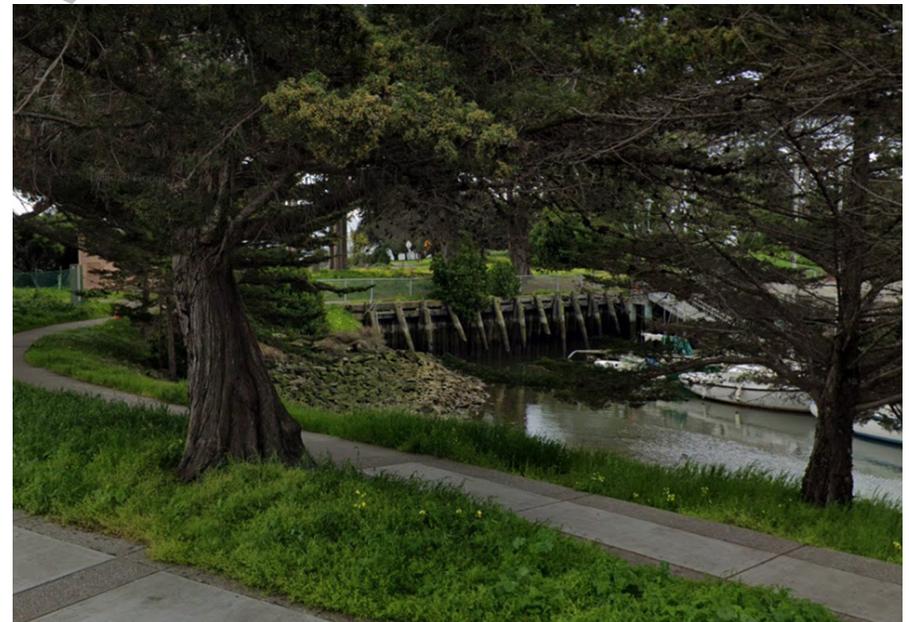
is lower than the top of bank elevation by approximately 5' and the slope is flatter than the rest of the segment. The revetment crest should be raised here to prevent the erosion of the bank as sea levels rise.

The rock size in this segment remains consistent with the rest of the Harbor Basin, with a nominal size of 12". Some rocks have been dislodged from the revetment crest near the restroom between G and H Docks. Because this segment of the revetment rarely sees significant wave action and the rocks are missing at the top of slope, these gaps do not diminish the integrity of the revetment.

Figure 1-28 Harbor Basin East Revetment



Typical example of the revetment on the Harbor Basin's east shore



Revetment at the old boat launch facility. Note the crest elevation and top of bank elevation do not match.

Harbor Basin South

The revetment along the south shore of the Harbor Basin is in excellent condition. This segment begins at the west edge of the Harbor Basin Bulkhead Wall (east end) and ends at the southwest corner of the Harbor Basin (west end).

The crest and slope of the revetment are both consistent along this segment of shoreline. The revetment crest is at +10' NAVD88 throughout its length and the slope gradually transitions from 3H:1V at its east end to 2.5H:1V at its west end.

Rock size along this segment is 12". There are occasional instances of missing rocks near the crest of the revetment, where vegetation growth has dislodged the riprap.

Figure 1-29 Harbor Basin South Revetment

Revetment at the southwest corner of the Harbor Basin



Harbor Basin West

The revetment along the west side of the Harbor Basin is in excellent condition. This segment spans from the Berkeley Yacht Club (north end) to the southeast corner of the Harbor Basin (south end).

The revetment crest and slope are uniform in this segment, with a crest elevation of +11' NAVD88 and slope of 2.5H:1V. The rock size in this segment is 12" along the Harbor Basin, then abruptly changes to 24" at the harbor entrance where the shore is exposed to stronger waves (shown in the photo below). There were no gaps or missing rocks in this segment of the revetment.

Figure 1-30 Harbor Basin West Revetment

Rock size transition from protected to unprotected shoreline



Marina Outer West

The revetment along the outer west shoreline of the marina is in excellent condition. This segment of the revetment spans from the harbor entrance (north end) to the groin located at the marina's southernmost point (south end).

The elevation of the revetment crest varies from +12' NAVD88 to +14' NAVD88, with an average crest elevation of +13.5'. The slope of the revetment is 2.5H:1V for most the segment length, except adjacent to the Berkeley Pier, where the slope is 2H:1V.

Rock size along this segment is 24". There was one location about halfway between the Berkeley Pier and 199 Seawall Drive where rocks had fallen from the top of the revetment to the bottom. The top, toe, and slope of the

revetment remain consistent and stable for the majority of this segment.

As the revetment approaches the groin at the southern tip of the marina, the revetment slope recedes landward and reveals a low-lying portion of the marina's original revetment. The groin begins at this low-lying area and is partially submerged due to its low finished grade elevation of +6' NAVD88. The purpose of the groin is to provide protection to the pilings supporting the 199 Seawall Drive structure. The riprap making up the groin mostly consists of flat, 10" nominal pieces of demolished concrete and rock at an approximate 4H:1V slope. The armor rock revetment remains inland of the groin with a revetment crest elevation of +13' NAVD88, providing protection of the shoreline and upland areas.



Groin at the southern tip of the Berkeley Marina with 199 Seawall Drive in the background



Figure 1-31 Marina Outer West

Typical revetment section north of the Skates on the Bay restaurant



Typical revetment section south of the Berkeley Pier

Marina Outer South

The marina outer south shore revetment is in moderate condition. This segment of the revetment runs along the South Sailing Basin from beneath 199 Seawall Drive (west end) to the shore south of the intersection of University Ave and Marina Blvd (east end). There is a small beach area located west of the South Sailing Basin Seawall.

The elevation of the revetment crest varies west of the South Sailing Basin Seawall and is consistent east of the seawall. Starting from the west end of the segment to the beach, the revetment crest varies between +12' NAVD88 beneath the 199 Seawall Drive structure to +14.5' NAVD88 just west of the beach. Between the beach and the South Sailing Basin Seawall, the crest elevation is +11' and remains at that height east of the seawall.

The slope of the revetment beneath 199 Seawall Drive was not able to be accurately obtained from the NOAA lidar data. Between the structure and the beach, the slope of the revetment is 2H:1V. East of the beach, the slope varies between 2.5H:1V and 3H:1V.

The riprap size transitions from 24" to 18" beneath 199 Seawall Drive. The placement of rock becomes scattered underneath the structure, but the overall condition of the revetment remains good. There did not appear to be any scarps or collapsed portions of the revetment in this segment, despite the smaller rock size. This indicates that the waters in the South Sailing Basin are relatively calm. East of the South Sailing Basin Seawall, the rock size is 24".

Figure 1-32 Marina Outer South Shore Revetment and Beach



Groin at the southern tip of the Berkeley Marina with 199 Seawall Drive in the background

Harbor Basin Bulkhead Wall

The Harbor Basin Bulkhead Wall is in fair condition. The wall is located along the south shore of the Harbor Basin on both sides of and beneath the Wharf. The bulkhead is comprised of steel sheet pile and timber batter piles which connect to large timber walers at the top of the wall. It is likely that the batters and walers acted as braces to stabilize the wall against the retained soils. All of the timber batter piles at the retaining wall have broken and the wall is bowing outward as a result. The sheet piles are beginning to corrode but are not near the level of damage exhibited by the seawall at the South Sailing Basin.



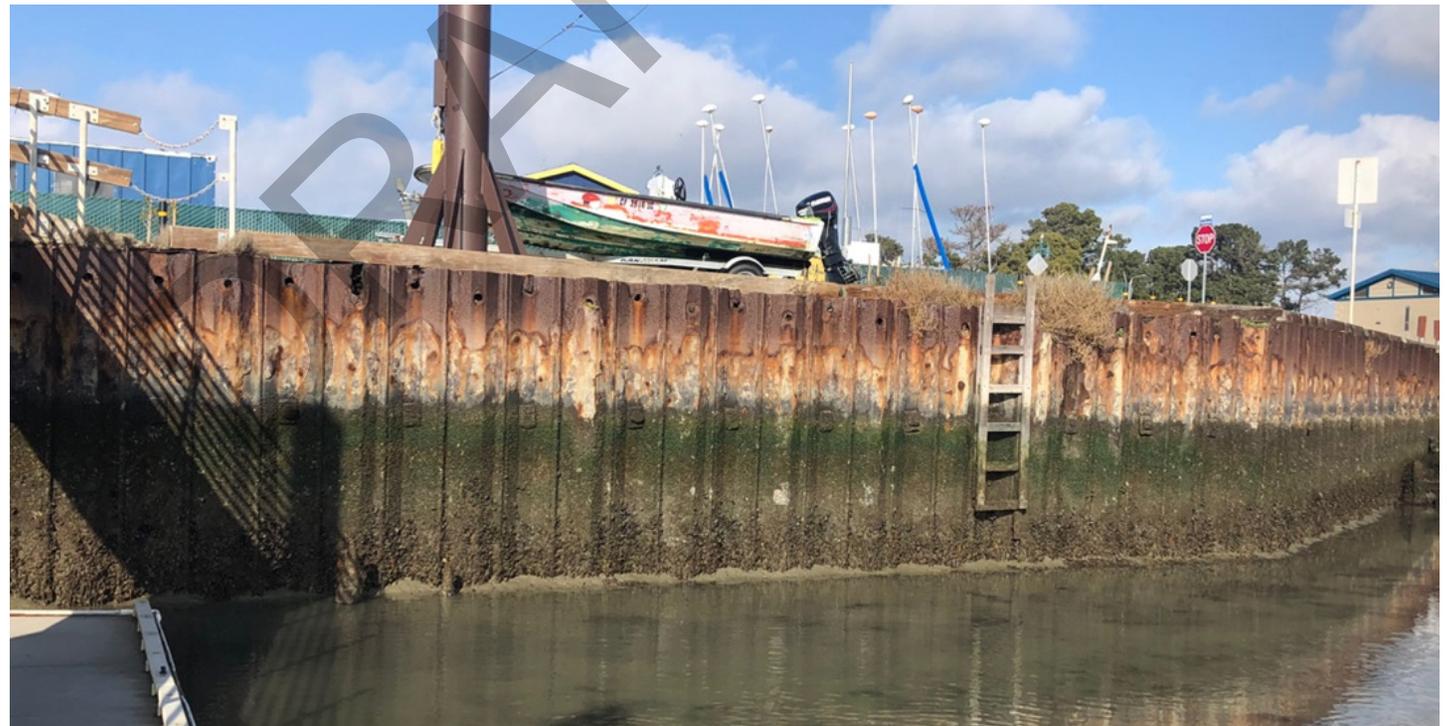
Harbor Basin Bulkhead Wall. Note the broken batter piles

Figure 1-34 Harbor Basin Bulkhead Wall

South Sailing Basin Seawall

The South Sailing Basin Seawall is located on the shoreline at the center of the South Sailing Basin. The seawall retains approximately 12' of artificial fill. The seawall is in poor condition due to heavy corrosion from prolonged saltwater exposure. The exposed upper portion of the wall is beginning to chip and break off in small pieces. The seawall was recommended to be replaced in the "1999 Boating Infrastructure Assessment" and today the replacement project is an even higher priority due to increased damage to the seawall over the last 20+ years.

Figure 1-35 South Sailing Basin Seawall



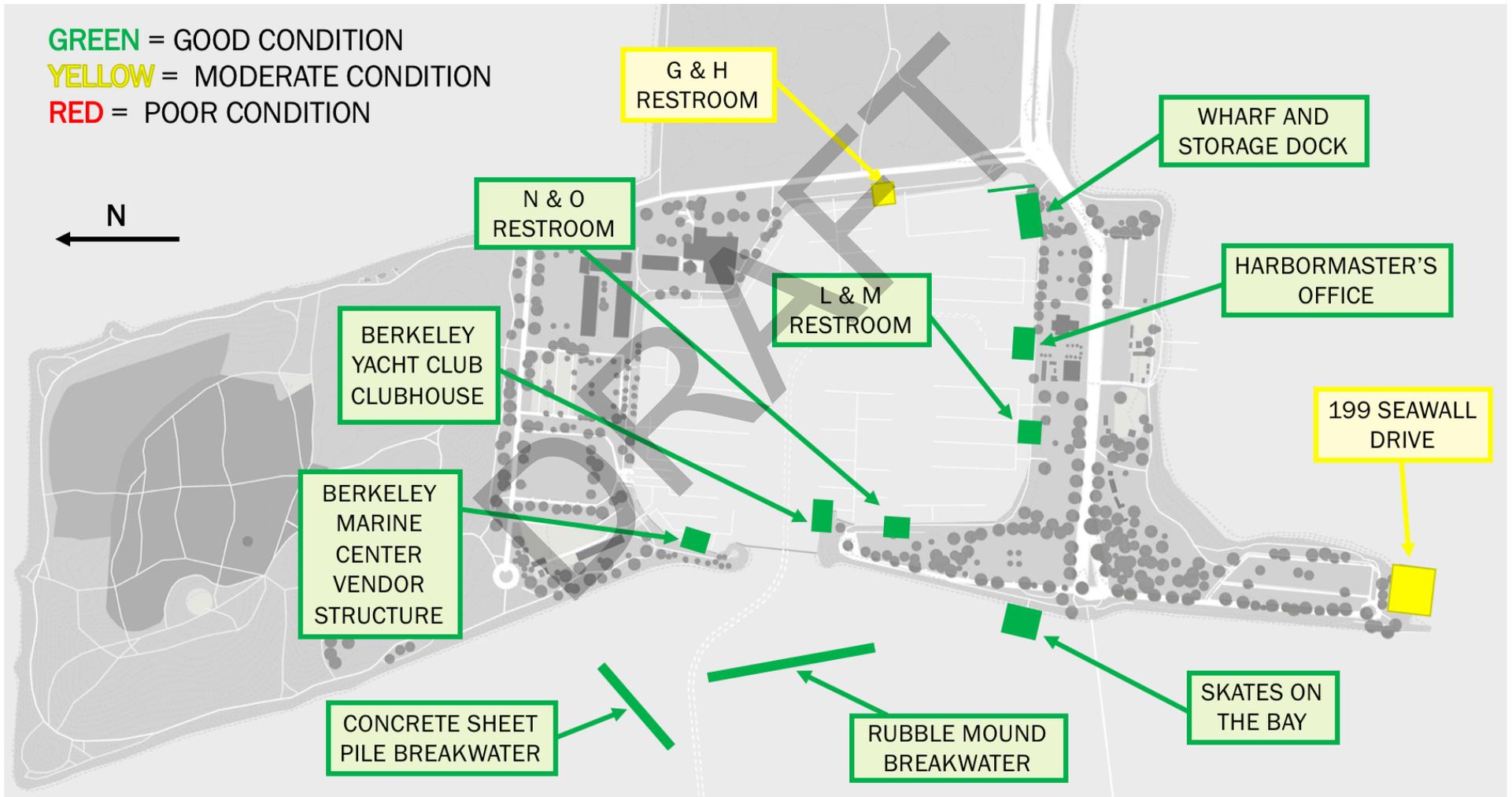
South Sailing Cove Seawall. Note the heavily corroded steel of the sheet piles.

1.1.4 Waterside Structures

Figure 1-36 summarizes the findings from the inspection of the waterside structures. Waterside structures were inspected visually and tactilely. Only the foundations of the buildings structures were inspected (pilings and support beams). Inspections of the buildings themselves will need to be done as part of a separate project scope and a more thorough analysis will be required to determine how the stringer-pile connections would respond to seismic loads.

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Figure 1-36 Waterside Structures



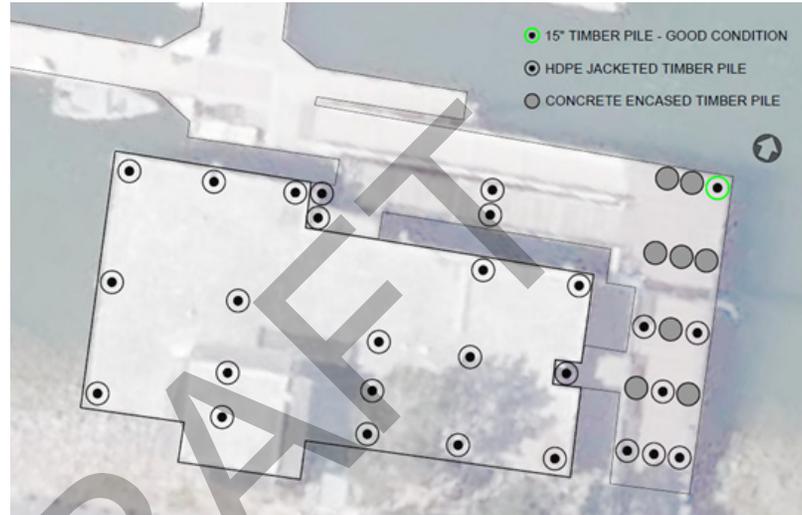
Harbormaster's Office

The Harbormaster's Office is located at the center of the Harbor Basin's southern shoreline, adjacent to K Dock. The structure has elevated walkways on its north and east side which provide direct access to the gangway at K Dock.

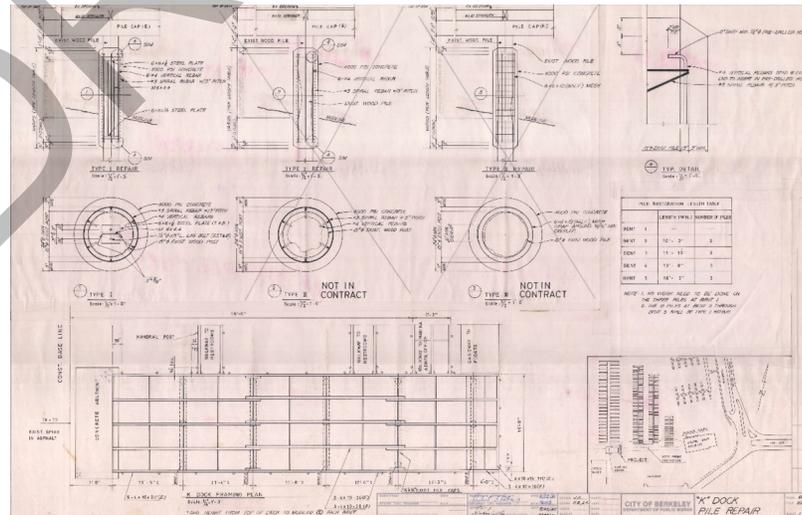
The pilings for the Harbormaster's Office are all in good condition. There are 16 piles beneath the office structure and 20 beneath the elevated walkways. All but one of the piles are jacketed 15" timber piles. The unjacketed pile is in good condition with no observable defects. The jacketed piles are either sleeved with HDPE or encased in a 4.5" thick concrete shell. The concrete shells were installed in 1985.

The pilings were hammer tested to gauge the structural integrity of their interior. All the piles beneath the structure sounded solid, indicating no identifiable deficiencies beneath the jackets and encasements.

Figure 1-37 Harbormaster's Office pile map and images



Pile map and condition summary for the Harbormaster's Office



Original drawings for the concrete shell encasements at the Harbormaster's Office

Figure 1-38 Over-water restrooms pile map and images



Pile maps and condition summary for the Over-Water Restrooms



Damaged pile beneath the G and H Dock restroom



N and O Dock restroom

Over-Water Restrooms

There are three over-water restrooms at the Marina. They are located between G and H Docks, L and M Docks, and N and O Docks. Each restroom is supported by 8 creosote treated timber piles with 4 pilings embedded into the seafloor and 4 embedded into the shoreline. All of the piles have a 13" diameter.

The only bad piling beneath the restrooms was the northwest pile at the G and H Dock restroom. This pile showed more than 50% section loss within the tidal zone and will be repaired with a fiberglass jacket as part of the ongoing Selective Piling Replacement project. The rest of the piles are in good condition with no observable defects.

Wharf and Storage Dock

The Wharf and Storage Dock are located in the southeastern corner of the Harbor Basin, east of J Dock and south of H Dock. The Wharf has been repurposed several times throughout its history. It was originally part of the Berkeley Municipal Wharf, then was later repurposed as the foundation for a boathouse, bait and tackle shop, and fuel dock at the base of the Berkeley Pier. After the boathouse was demolished, the wharf was used for ferry service. The Wharf does not currently provide any services to the marina and is no longer subject to the horizontal berthing loads or large structural dead loads of its past.

The wharf is comprised of thick precast concrete slabs which bear on 17 stringer beams which run north-south. Each stringer is supported by 8 concrete encased timber piles. There are a total of 160 piles beneath or adjacent to the Wharf, 24 of which are timber fender piles located along the Wharf's north side.

The concrete encased timber piles are square shaped with chamfered edges and a 20" edge-to-edge distance. Of the 136 concrete encased piles, 23 have a noticeable tilt, likely due to issues during the original driving of the piles. 5 of the encased piles have small spalls near their tops.

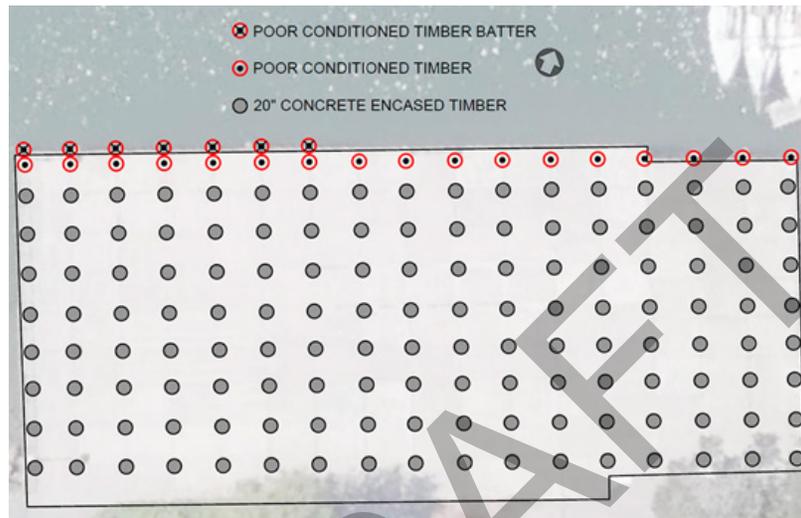
The cantilevered portion of the slabs on the north side of the Wharf have timber fender piles beneath them. These piles do not provide vertical load support to the Wharf, as the majority of them do not contact the concrete

slab above. Additional timber batter piles (also acting as fenders) are located at the first 7 rows (running north-south) of piles from the west side of the Wharf. The timber fender piles are severely damaged in the tidal zone as a result of wood rot and marine borer infestation.

If the Wharf is to be repurposed in the future, a thorough structural analysis will need to be conducted to determine if it can handle the vertical and lateral loads associated with its new use. According to the "1999 Boating Infrastructure Assessment" by Winzler & Kelly, the Wharf currently has no lateral force resisting components and does not meet current codes for resisting a seismic event. The depth of pile embedment beneath the Wharf would also need to be determined as part of this analysis, as this information is currently not known.

The Storage Dock located east of the Wharf is used for miscellaneous storage of small recreational watercraft and vessels. This dock is in very poor condition with an inconsistent freeboard, deteriorated deck surface, and deteriorated floats. Pieces of this dock have broken off in the past and floated to the parts of the marina, making the dock a navigational hazard.

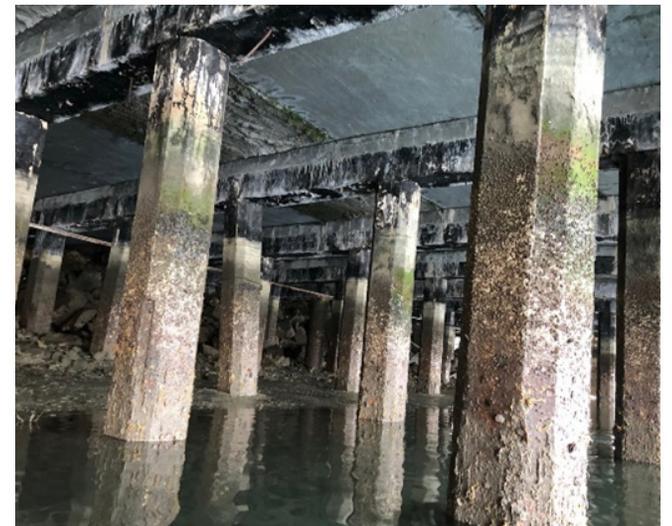
Figure 1-39 Wharf and Storage Dock pile map and images



Pile map and condition summary for the Wharf



View of the Wharf's north side from the water



Piles beneath the Wharf. Note the slanted pile in the back

Berkeley Yacht Club Clubhouse

The Berkeley Yacht Club Clubhouse is located on the south mole at the harbor entrance channel, just north of O Dock. The original structure was built in 1940 and was upgraded and renovated multiple times between 1956 and 1979. The building structure was recently assessed in the “Facilities Condition Assessment Report” by Kitchell in 2015. The west side of the clubhouse is built on grade inland of the riprap revetment and the east side cantilevers over the revetment. Only the cantilevered east side of the structure was investigated as part of this conditions assessment.

The cantilevered portion of the structure is supported by 17 piles, 12 of which support a stringer beam located 8’ from the structure’s eastern side. All of the piles which support the structure are encased in 6” thick concrete or an HDPE sleeve. The piles were hammer tested and sounded solid, indicating no identifiable deficiencies beneath the jackets and encasements. There were no visible defects to any of the pilings.

Figure 1-40 Berkeley Yacht Club Clubhouse pile map and images

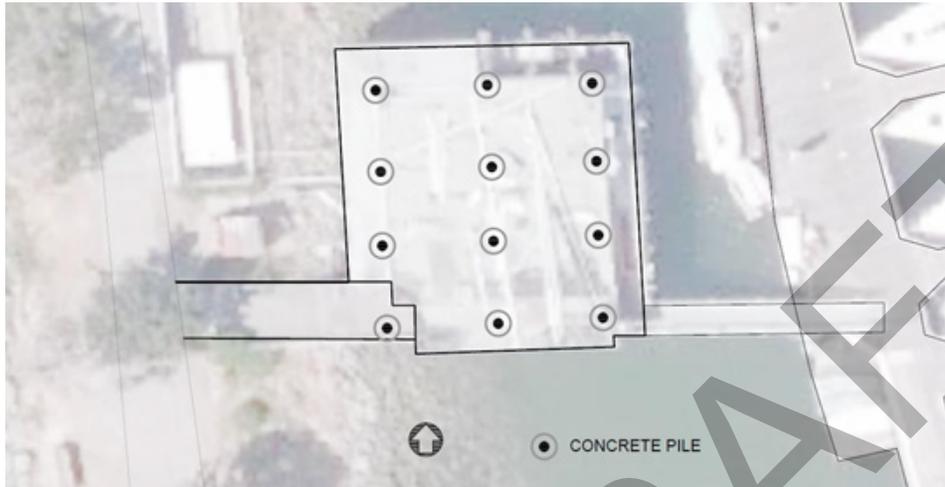


Pile map and condition summary of the Berkeley Yacht Club Clubhouse



Berkeley Yacht Club Clubhouse from the harbor entrance channel

Figure 1-41 Berkeley Marina Center Vendor Structure pile map and images



Pile map and condition summary for the Berkeley Marine Center Vendor Structure



Berkeley Marina Center Vendor Structure as seen from A Dock

Berkeley Marina Center Vendor Structure

The Berkeley Marina Center Vendor Structure is located in the northwest corner of the Harbor Basin, west of A Dock. The structure is supported by 12 piles, split into 3 rows

running north-south, each with 4 piles. All the piles are 10" square precast concrete with cap blocks. The piles and caps were in excellent condition, with no observable defects.

Skates on the Bay

The Skates on the Bay restaurant is located on the outer west shoreline of the Berkeley Marina, north of the Berkeley Pier. The restaurant was opened in 1984 but plans for a restaurant at this location were first proposed in the 1964 "City of Berkeley Marina: A Master Plan and First Stage Development Plan." The structure rests on a foundation built entirely over the San Francisco Bay.

The restaurant structure is supported by 8 cap beams running east-west. Each cap beam is supported by 7 piles, for a total of 56 piles beneath the structure. The piles are 14" square precast concrete. Many of the piles have marine growth/mussel habitation in the tidal zone, but there was no observed damage to the pilings and they are in excellent condition. The cap beams are also in excellent condition with no observed damage.

The restaurant is connected to the shore via two elevated walkways. The southern walkway is supported by 6 timber pilings which connect to the cover above the walkway. The piles are located on each side of the walkway. The northern walkway is supported by one 14" square precast concrete pile, similar to the piles supporting the restaurant structure. This pile is centered beneath the concrete walkway and is in excellent condition.

Figure 1-42 Skates on the Bay pile map and images



Pile map and condition summary for Skates on the Bay



Skates on the Bay seen from above.



View of the structure foundation from the water

Figure 1-43 199 Seawall Drive pile map and images



Pile map and condition summary for 199 Seawall Drive



199 Seawall Drive seen from above

199 Seawall Drive

199 Seawall Drive is located at the southwestern corner of the marina and is the former site of the Hs Lordships restaurant. The building rests on a concrete slab which is partially on grade and partially supported by piles.

A total of 25 piles support the structure: 3 concrete piles, 5 fiberglass jacketed timber piles, and 17 piles creosote treated timber piles of varying condition. All the piles supporting the structure have been retrofitted with concrete cap encasements at their tops. The caps were constructed around the existing piles and appear to provide improved support and connections to the stringer beams above.

The treated timber piles have a 14" diameter. Of the 17 treated timber piles, 3 exhibited signs of damage. The timber pile in moderate condition beneath the west side of the building sounded hollow during hammer tests but had no visible defects on its exterior. The timber pile in poor condition has complete section loss where it meets the revetment and is essentially floating above the revetment. This pile needs to be retrofitted as it currently does not provide any support to the structure. The pair of piles beneath the structure's east side do not have visible defects, but the pile to the right did sound hollow during hammer tests. The concrete piles and FRP jacketed timber piles were in excellent condition and all sounded solid when hammer tested.

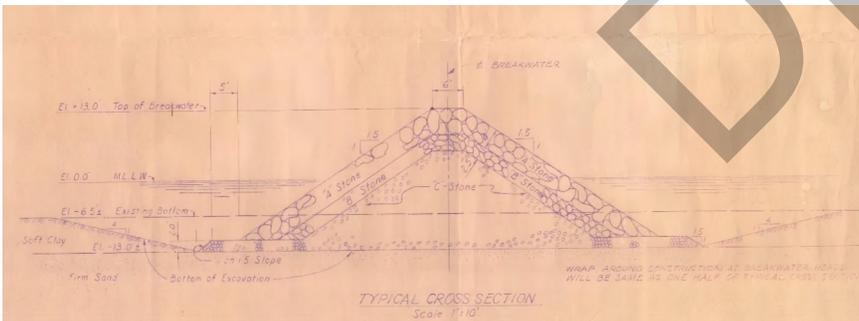
Concrete Sheet Pile Breakwater

The Concrete Sheet Pile Breakwater is located northwest of the harbor entrance and was constructed in 1980 by the US Army Corps of Engineers. The concrete sheets are supported by capped concrete batter piles along their east side. The breakwater is approximately 440' long and is in good condition. The concrete sheets were inspected visually by kayak and there were no observable defects in the concrete.

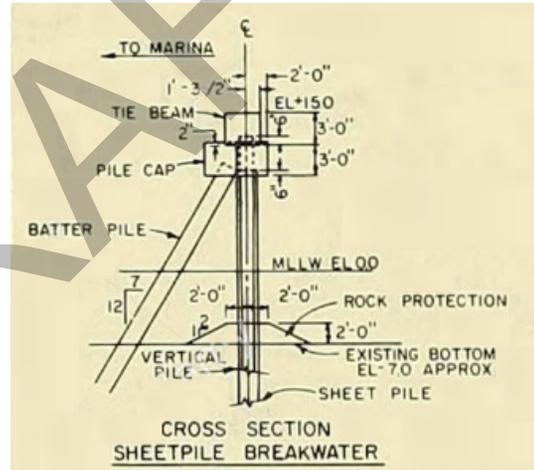
The Rubble Mound Breakwater located west of the harbor entrance was constructed in 1965 by the US Army Corps of Engineers. The breakwater is 725' long and is comprised of armor rock laid at a 1.5H:1V slope. The crest elevation of the breakwater is approximately +13' NAVD88. The breakwater is in good condition with no observable defects.



West face of the Concrete Sheet Pile Breakwater



Original drawing of the Rubble Mound Breakwater design



Cross-section of the Concrete Sheet Pile Breakwater

Figure 1-44 Concrete Sheet Pile Breakwater original drawings and images

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1.1.5 Sea Level Rise Assessment Recommendations

Draft Sea Level Rise Assessment by NCE

A sea level rise (SLR) assessment study for the Berkeley Marina site entitled “DRAFT Berkeley Marina Sea Level Rise AB 691 Assessment Study” was completed in August 2019 by NCE. The document outlines the projected impacts that sea level rise will have on the natural and built infrastructure at the marina. It then estimates the economic and societal costs associated with SLR and produces a schedule of SLR mitigation measures.

Sea level rise estimates vary greatly, depending on assumed greenhouse gas emission trends and how risk averse the estimate is desired to be. The NCE study utilizes low risk aversion SLR estimates and high future greenhouse emission trends from the “California Coastal Commission (CCC) Sea Level Rise Policy Guidance” document dated 2018. Low risk aversion estimates are typically used at sites where there are few coastal hazards and risks to human life, such as the mostly recreational land area of the Berkeley Marina.

The estimates used in the NCE report are from the upper end of the “likely” range of occurrence. These SLR estimates have a 17% likelihood of occurring, meaning that sea level rise has an 83% chance of being lower than the low risk aversion stated values. Estimated values of SLR used in the NCE report are boxed in Table 1-45.

In addition to using low risk aversion estimates of sea level rise, the study also assumes that a 100-year extreme tide and storm surge conditions will coincide with the sea level rise estimates. The purpose of this is to provide a more conservative analysis of potential damages and therefore improved mitigation measures. The 100-year extreme tide is independent of sea level rise and is dependent on the orbital alignment of the earth, moon, and sun. The increase in sea levels associated with the 100-year

extreme tide is constant and will not change in the future. The 100-year extreme tide has a 1% chance of occurring each year and is estimated to increase the sea level by approximately 6.4’. Estimates of the 100-year extreme tide come from Alameda County station 518 in the “San Francisco Bay Tidal Datums and Extreme Tides Survey” dated February 2016.

The value of the 100-year extreme tide in combination with the low-risk aversion estimates of sea level rise produce the following sea levels today and in the future; the NCE study uses the values in the last row of the table for its analysis.

Table 1-45 Elevations of the Water Levels in 2030, 2050, and 2100

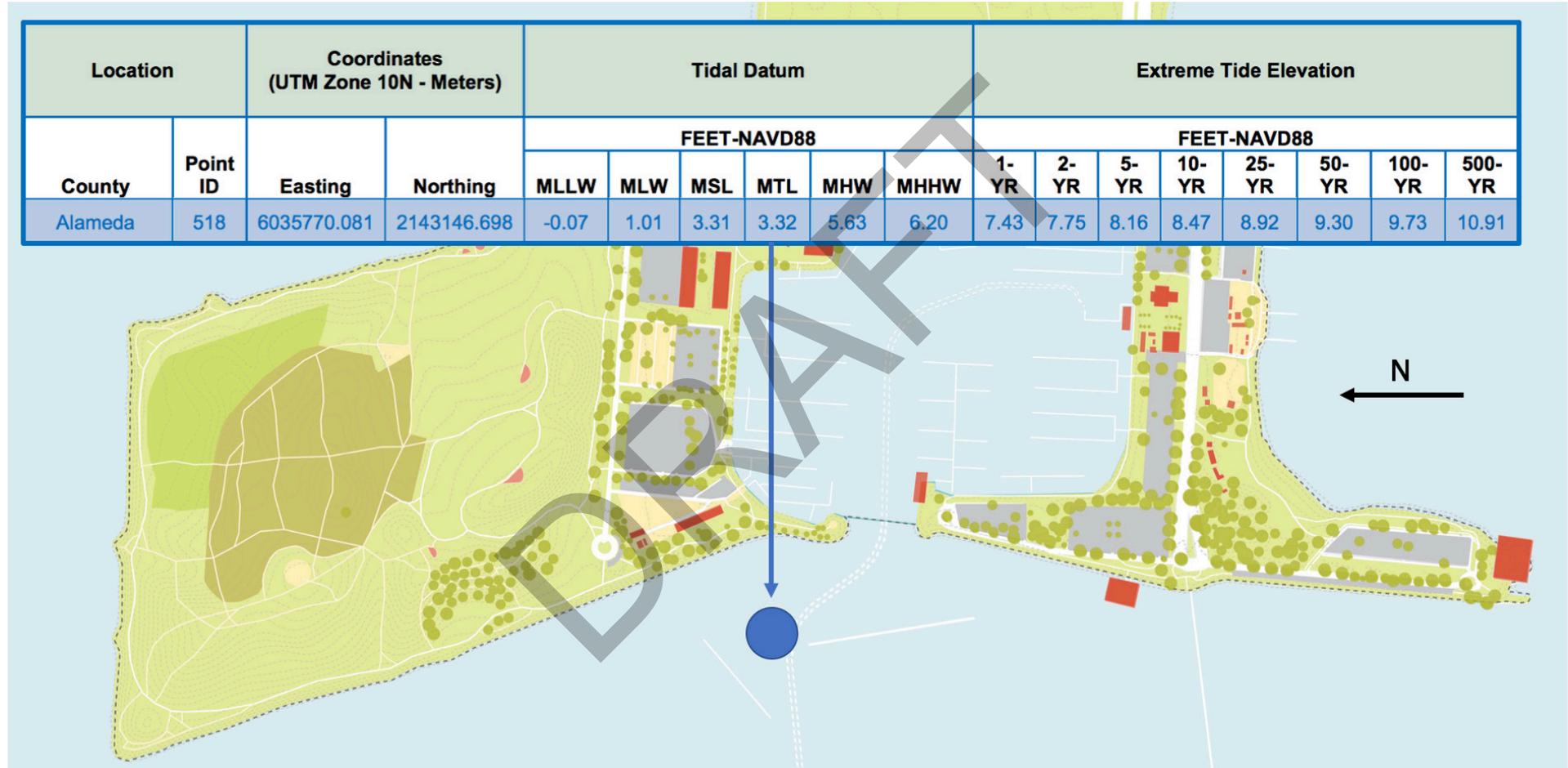
Datum (All elevations are in Feet – NAVD88)	2016 Elevation	2030 Elevation (+ 0.5-feet to 2016 for SLR)	2050 Elevation (+ 1.1-feet to 2016 for SLR)	2100 Elevation (+ 3.4-feet to 2016 for SLR)
Mean Lower-Low Water (MLLW)	-0.1’	0.4’	1.0’	3.3’
Mean Low Water (MLW)	1.0’	1.5’	2.1’	4.4’
Mean Sea Level (MSL)	3.3’	3.8’	4.4’	6.7’
Mean Tide Level (MTL)	3.3’	3.8’	4.4’	6.7’
Mean High Water (MHW)	5.6’	6.1’	6.7’	9.0’
Mean Higher-High Water (MHHW)	6.2’	6.7’	7.3’	9.6’
100-Yr Extreme Tide (Add 6.4-feet to MSL)	9.7’	10.2’	10.8’	13.1’

Table 1-46 Estimated Values of SLR

		Probabilistic Projections (in feet) (based on Kopp et al. 2014)				H++ scenario (Sweet et al. 2017) *Single scenario
		MEDIAN	LIKELY RANGE	1-IN-20 CHANCE	1-IN-200 CHANCE	
		50% probability sea-level rise meets or exceeds...	66% probability sea-level rise is between...	5% probability sea-level rise meets or exceeds...	0.5% probability sea-level rise meets or exceeds...	
				Low Risk Aversion	Medium - High Risk Aversion	Extreme Risk Aversion
High emissions	2030	0.4	0.3 - 0.5	0.6	0.8	1.0
	2040	0.6	0.5 - 0.8	1.0	1.3	1.8
	2050	0.9	0.6 - 1.1	1.4	1.9	2.7
Low emissions	2060	1.0	0.6 - 1.3	1.6	2.4	
High emissions	2060	1.1	0.8 - 1.5	1.8	2.6	3.9
Low emissions	2070	1.1	0.8 - 1.5	1.9	3.1	
High emissions	2070	1.4	1.0 - 1.9	2.4	3.5	5.2
Low emissions	2080	1.3	0.9 - 1.8	2.3	3.9	
High emissions	2080	1.7	1.2 - 2.4	3.0	4.5	6.6
Low emissions	2090	1.4	1.0 - 2.1	2.8	4.7	
High emissions	2090	2.1	1.4 - 2.9	3.6	5.6	8.3
Low emissions	2100	1.6	1.0 - 2.4	3.2	5.7	
High emissions	2100	2.5	1.6 - 3.4	4.4	6.9	10.2
Low emissions	2110*	1.7	1.2 - 2.5	3.4	6.3	
High emissions	2110*	2.6	1.9 - 3.5	4.5	7.3	11.9
Low emissions	2120	1.9	1.2 - 2.8	3.9	7.4	
High emissions	2120	3	2.2 - 4.1	5.2	8.6	14.2
Low emissions	2130	2.1	1.3 - 3.1	4.4	8.5	
High emissions	2130	3.3	2.4 - 4.6	6.0	10.0	16.6
Low emissions	2140	2.2	1.3 - 3.4	4.9	9.7	
High emissions	2140	3.7	2.6 - 5.2	6.8	11.4	19.1
Low emissions	2150	2.4	1.3 - 3.8	5.5	11.0	
High emissions	2150	4.1	2.8 - 5.8	5.7	13.0	21.9

*Most of the available climate model experiments do not extend beyond 2100. The resulting reduction in model availability causes a small dip in projections between 2100 and 2110, as well as a shift in uncertainty estimates (see Kopp et al. 2014). Use of 2110 projections should be done with caution and with acknowledgement of increased uncertainty around these projections.

Figure 1-47 Berkeley Marina Datums



SLR Impacts and Vulnerable Locations

When discussing the impacts analyzed in NCE's sea level rise assessment, it is important to remember that these impacts all include the 100-year extreme tide (an extreme tidal event with 1% chance of occurring annually, independent of sea level rise estimates from the melting polar ice caps) and that the duration of inundation will only be temporary, depending on how much water is able to overtop the revetment during the extreme tide and the duration of the extreme tide itself. It is also important to note that extreme wave runup and storm surge (included in the 100-year tide estimate) will have significant impacts on the amount of water that is able to overtop the revetment.

Berkeley Marina is better suited to resist SLR impacts than other nearby locations in the bay. This is because the majority of the shoreline revetment is built to at least +11' NAVD88. Damages from sea level rise and extreme tide are expected to be moderate by 2030 and will increase rapidly as the century progresses if no preventative mitigation occurs and if emission trends continue on their current path. By 2100, the marina has potential to essentially be an island during the 100-year extreme tide event.

The majority of the flooding in the vicinity of the marina occurs outside the project area at the McLaughlin Eastshore State Park. The most vulnerable portions of the shoreline to the impacts of sea level rise within the project area are the east shoreline of Cesar Chavez Park and the northeast corner of the Harbor Basin. The main concern with sea level rise at the marina is the impact it will have on accessibility to the site and potential damages to the existing infrastructure. Another concern with sea level rise is increased damage to the perimeter revetment, particularly at Cesar Chavez Park. Rock loss or damage to the revetment surrounding the park could lead to compromising of the capped landfill beneath the park. If this were to occur, toxic chemicals from the landfill could leak into the San Francisco Bay creating an environmental catastrophe.

2050 Impacts

By 2050, the sea level is expected to be +10.8' NAVD88 when a low risk aversion estimate of sea level rise (+1.1') coincides with a 100-year extreme tide event. In this scenario, roadways and parking lots are flooded in the same places as 2030, with the addition of Marina Blvd. adjacent to I Dock and shallow flooding near the intersection of University Ave. and W Frontage Rd. (outside the project area). The shallow flooding at the intersection of University Ave. and W Frontage Rd. will likely not block access to the marina, but some visitors will inevitably turn around at the sight of ponding roadway. The parking lots for D and E Docks and the DoubleTree Hotel experience increased flooding, but no other lots are impacted.

The two northwesternmost buildings at the DoubleTree Hotel will experience flooding in this scenario. No other buildings will be impacted. The access piers for D and E Docks and the Hornblower Cruises Dock will be blocked by flooded trails. Perimeter trails located at the Harbor Basin north and south shore, as well as the trail south of University Ave will be inundated. The South Sailing Basin Seawall has potential to be overtopped in 2050.



Figure 1-48 2050 Sea Level Rise Impacts at the Berkeley Waterfront

2050 Inundation, Water Level: +10.8' NAVD88 (100-Year Extreme Tide + Low Risk Aversion SLR Estimate)



2050 SLR building impacts. Red buildings are impacted.



2050 SLR trail impacts. Red trails are impacted.

Figure 1-49 2100 Sea Level Rise Impacts at the Berkeley Waterfront



2050 Inundation, Water Level: +10.8' NAVD88 (100-Year Extreme Tide + Low Risk Aversion SLR Estimate)



2100 SLR building impacts. Red buildings are impacted.



2100 SLR trail impacts. Red trails are impacted.

2100 Impacts

By 2100, the sea level is expected to be +13.1' NAVD88 when a low risk aversion estimate of sea level rise (+3.4') coincides with a 100-year extreme tide event. In this scenario, all of Marina Blvd. and University Ave. will be inundated and access to the Berkeley Marina will be completely blocked if emissions trends continue and no mitigation measures are taken. Additionally, portions of roadway and the majority of the parking lots nearest the Harbor Basin and South Sailing Basin will be inundated, as the revetment at these locations will be overtopped.

The Harbormaster's Office, berth restrooms, and every structure at the DoubleTree Hotel will be impacted in this scenario. The majority of Cesar Chavez Park remains uncompromised, except a few low-lying segments of revetment along its east shore.

Access to the docks in the Yacht Harbor will be completely blocked, as all the access piers' finished floor elevations will be below the elevation of the sea. Only inland trails, the majority of Cesar Chavez Park's perimeter trail, and the trail located along with marina's outer west shoreline will remain unimpacted. The entire Harbor Basin perimeter trail will be inundated as a result of the revetment overtopping.

Addressing and Mitigating Sea Level Rise

SHORT-TERM ACTIONS

The following shoreline segments should be prioritized for capital improvements in the next 10 years:

1. North and east shoreline of the Harbor Basin between C Dock and G Dock.
2. East shoreline of Cesar Chavez Park adjacent to the northern end of Marina Blvd.

These segments are two of the four most vulnerable portions of the shoreline in the year 2030 (the other two segments being on the north and south shores of McLaughlin Eastshore State Park, which is outside the BMASP project area) and should be addressed in the next decade. These two locations are a high priority because of their proximity to important infrastructure at the marina and low top of bank elevations. If not addressed, major infrastructural and financial losses could occur including damage to buildings, parking lots, roads, and trails. In addition, these segments of shoreline need to be addressed to ensure access to all areas of the Berkeley Marina site.

For the Harbor Basin north and east shoreline upgrade, raising the existing revetment's crest would be an adequate solution to address sea level rise by 2030. The

elevated crest should meet SLR demand for the year 2050 (and 2100 ideally), so future improvements do not have to be made. An alternative solution is to start construction of a perimeter seawall along the Harbor Basin. By 2100, nearly all of the Harbor Basin's revetment crest elevation will need to be raised, but there may not be adequate space to raise the revetment a sufficient amount and still have a stable slope that does not interfere with the Yacht Harbor docks.

For the Cesar Chavez Park east shoreline, raising the revetment crest and upgrading to larger sized armor rock near Marina Blvd. will be an adequate solution. The segment of roadway adjacent to this shoreline will need to be raised in stages as well in order to provide a 2' freeboard above the projected extreme water level at the forecasted end of pavement life.

Despite being outside the BMASP project area, raising the revetment and trail elevation along the Virginia St. Ext. is critical to the long-term health of the marina and should not be ignored.

LONG-TERM PLANNING

In order to avoid large financial impacts and infrastructure losses at the marina, the City of Berkeley needs to have sea level rise in mind when doing any work over-water or near the shoreline. One way for the City to incorporate this into future projects is to develop a Sea Level Rise Repair and Upgrade Plan specifically designed to improve resiliency to sea level rise at the Berkeley Waterfront. The plan would contain design guidelines that can apply to a wide variety of over-water and shoreline projects at the marina, as well as the other waterfronts managed by the City. These standards could include requirements for revetment crest heights and finished floor elevations of future structures. The City could make implementation of the guidelines a requirement in the design process prior to construction of any shoreline or over-water project. The plan would also identify and prioritize future capital improvement projects on the basis of sea level rise resiliency, and work to identify means of funding and timelines for these projects.

As sea level rise science and knowledge advance, the Sea Level Rise Repair and Upgrade Plan can be updated every 10 years to incorporate the latest findings and analysis into the plan. This way, the recommendations, prioritizations, and guidelines in the plan are always up-to-date and costs associated with unneeded or outdated projects and guidelines can be avoided.

An example of how the design guidelines could be used is below. This example is not indicative of a real project, but it illustrates how having the guidelines could work in the future:

If the City wants to improve a trail at the perimeter of the marina in 2030, the design guidelines in the Sea Level Rise Repair and Upgrade Plan would state what elevation the trail needs to be built to in order to resist SLR impacts up to the year 2050. Then in 2060, when the trail has reached a point where it needs further improvement (this does not necessarily have to be related to SLR), the updated SLR guidelines would state a new elevation for the trail to be raised to. The guidelines could also state that a seawall needs to be built adjacent to the trail now, as a result of the latest update to the guidelines based on new scientific findings. Perhaps, if estimates for sea level rise are lower in the future, the updated plan would state that no further resiliency developments need to take place.

1.2 Landside Infrastructure

Four major civil infrastructure areas were studied within the Berkeley Marina, including parking lots, streets, pathways, and utilities. The goal was to evaluate the infrastructure and provide recommendations and costing for improvements. There are a number of opportunities to improve existing infrastructure, as well as user experience throughout the Berkeley Marina.

1.2.1 Parking Lots

There are many parking lots throughout the Berkeley Marina serving the docks, Cesar Chavez Park, and other amenities. The pavement condition ranges from recently paved to severely deteriorated to unpaved. These parking lots should be repaired and maintained based on the condition of the existing pavement. The parking lots serving the DoubleTree by Hilton Hotel are the responsibility of the hotel to repair and maintain the pavement.

High Priority Parking Lots

The parking lots serving at the F & G Dock, J & K Dock, O Dock, and Launch Ramp have severely failed pavement throughout the entire parking area. Some areas also appear to have recurring ponding issues and other areas appear not to be paved at all. These lots should be considered a high priority for repaving. Due to the level of pavement damage, the full pavement section needs replacement and each lot should be regraded to facilitate drainage. The South Cove West Lot should also be considered a high priority for improvements, as it is currently unpaved. This lot is progressing through the design phase, but requires funding for construction.

Medium Priority Parking Lots

While not as damaged as the lots mentioned above, the parking lots serving the L & M Dock, N Dock and

Skates, and Seawall Drive also need repaving to avoid further damage. Extensive alligator cracking and deteriorating pavement is present in all three lots. Each lot will require replacement of the full asphalt section and regrading to facilitate drainage. During design of the parking lots, value engineering and further pavement assessment may allow less extensive pavement repair methods in some areas to control costs.

Accessible Parking

Accessible parking stalls should be assessed throughout all parking lots, including but not limited to total stalls provided, location, dimensioning, path of travel, and signage and striping. Table 1-50 lists the total number of parking stalls per parking lot, the existing accessible parking stall count, and the required accessible stall count per the 2019 California Building Code. Most of the accessible parking stalls in the high and medium priority parking lots are no longer compliant with current code and will require reconfiguration and new or updated pathways. Using concrete pavement at all newly updated and installed accessible parking stalls is recommended to increase the longevity of the pavement. Concrete provides a more durable surface to prevent the deterioration experienced with the pavement, which is likely due in large part to poor soil conditions.

Currently at the Dock A-E lot, there are accessible stalls on the west side that lack an accessible path.

An accessible path should be provided to connect the existing sidewalk and accessible stalls. There is also a group of accessible stalls in the center of the southern edge of the lot, where motorcycles regularly park and block the accessible pathway. The accessible pathways should be restriped in these areas and include a “No Parking” traffic marking on the pavement in accordance with the 2019 California Building Code.

Stormwater Treatment

Stormwater treatment requirements should be considered while improving these parking lots by installing bioretention areas, or other treatment measures outlined in Alameda County’s C.3 Stormwater Technical Guidance. The Marina’s parking lots directly discharge into the San Francisco Bay and the Marina’s harbor, and bioretention areas will assist in removing trash, debris, and pollutants before the stormwater is discharged. Figure 1-52 shows ideal locations for the bioretention area based on available space and general drainage patterns, and Table 1-51 estimates bioretention area sizing that achieves Alameda County stormwater treatment standards.

Table 1-50 Number of Parking Stalls and Required Accessible Stall Per Parking Lot

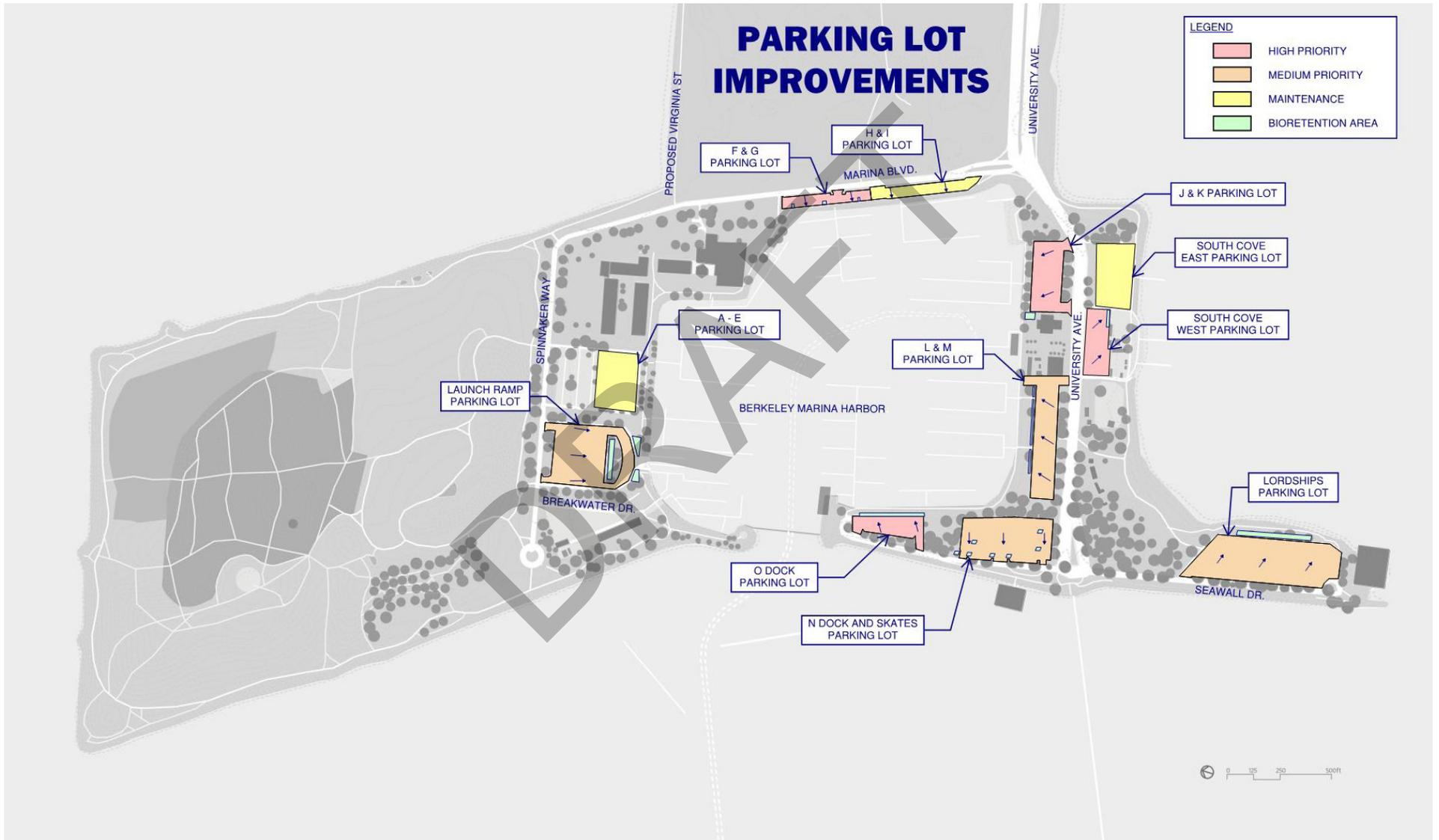
Parking Lot	Total Parking Spaces	Existing ADA Parking Spaces	Required ADA Parking Spaces
A, B, & C Dock	128	6	5
F & G Dock	64	2	3
H & I Dock	52	3	3
J & K Dock	98	3	4
L & M Dock	147	5	5
N Dock	125	9	5
O Dock	68	4	3
Launch Ramp	98	2	4
Lordships	317	15	8
South Coast East	96	4	4
South Coast West*	95	-	4

*The South Coast West Parking Lot is unpaved, therefore 9' x 18" stalls were assumed in estimating the potential parking count.

Table 1-51 Estimates Size of Bioretention Area

Parking Lot	Paving Area (SF)	Bioretention Area (SF)
A - E Dock	42,900	1,720
F & G Dock	19,500	780
H & I Dock	27,200	1,090
J & K Dock	49,800	2,000
L & M Dock	67,700	2,710
N Dock	70,300	2,820
O Dock	32,000	1,280
Launch Ramp	111,000	4,440
Lordships	119,000	4,760
South Coast East	38,300	1,540
South Coast West	35,300	1,420

Figure 1-52 Parking Lot Improvement and Ideal Locations for the Bioretention Area



1.2.2 Streets

All of the major roads serving the Berkeley Marina are in need of pavement improvements. University Avenue (W Frontage Road to Marina Boulevard), Marina Boulevard, and Spinnaker Way are designed and currently out to bid through the City of Berkeley. Construction is scheduled for completion in 2021. Pavement repair should extend throughout the Berkeley Marina, and special consideration should be given to University Avenue (Marina Blvd to Seawall Dr), Seawall Drive, and the Marina Boulevard off-street parking to avoid more severe pavement deterioration.

University Avenue (Marina Blvd to Seawall Dr)

The University Avenue pavement from Marina Boulevard to Seawall Drive is worn, cracking, and showing root intrusion in some areas. Due to the extensive alligator and longitudinal cracking, it is recommended the full asphalt section be replaced similarly to the eastern segment of University Avenue, which is slated for pavement rehabilitation. Full depth reclamation may be utilized to maximize material reuse and limit off haul. The existing asphalt sidewalks should be replaced on both the north and south sides of the street in conjuncture with the roadway. It is recommended the sidewalks be widened and replaced with concrete for longevity of the pavement. Using concrete increases the life of the infrastructure, and a wider sidewalk creates a more receptive and accessible path.

In order to maximize usability, incorporate bike lanes on University Avenue in each direction. The current street width is 40 feet, which allows for two 12-foot vehicular lanes and two 5-foot bike lanes with additional width for a barrier to protect bicyclists if desired. Collectively these improvements create a more welcoming route to the beautiful views of the Berkeley Marina, particularly along Seawall Drive.

Seawall Drive

The Seawall Drive pavement is also worn and cracking and in need of pavement rehabilitation. Similar to University Avenue, full depth reclamation can be performed to maximize material reuse and limit off haul. Seawall Drive should shift to the east to accommodate a larger water front path that meets the Bay Trail requirements. It is recommended that the Bay Trail in this area be completed in conjuncture with the Seawall Drive improvements for more a seamless process through design and construction, and it would also reduce overall construction costs. Refer to the Pathways section for recommendations regarding the Bay Trail.

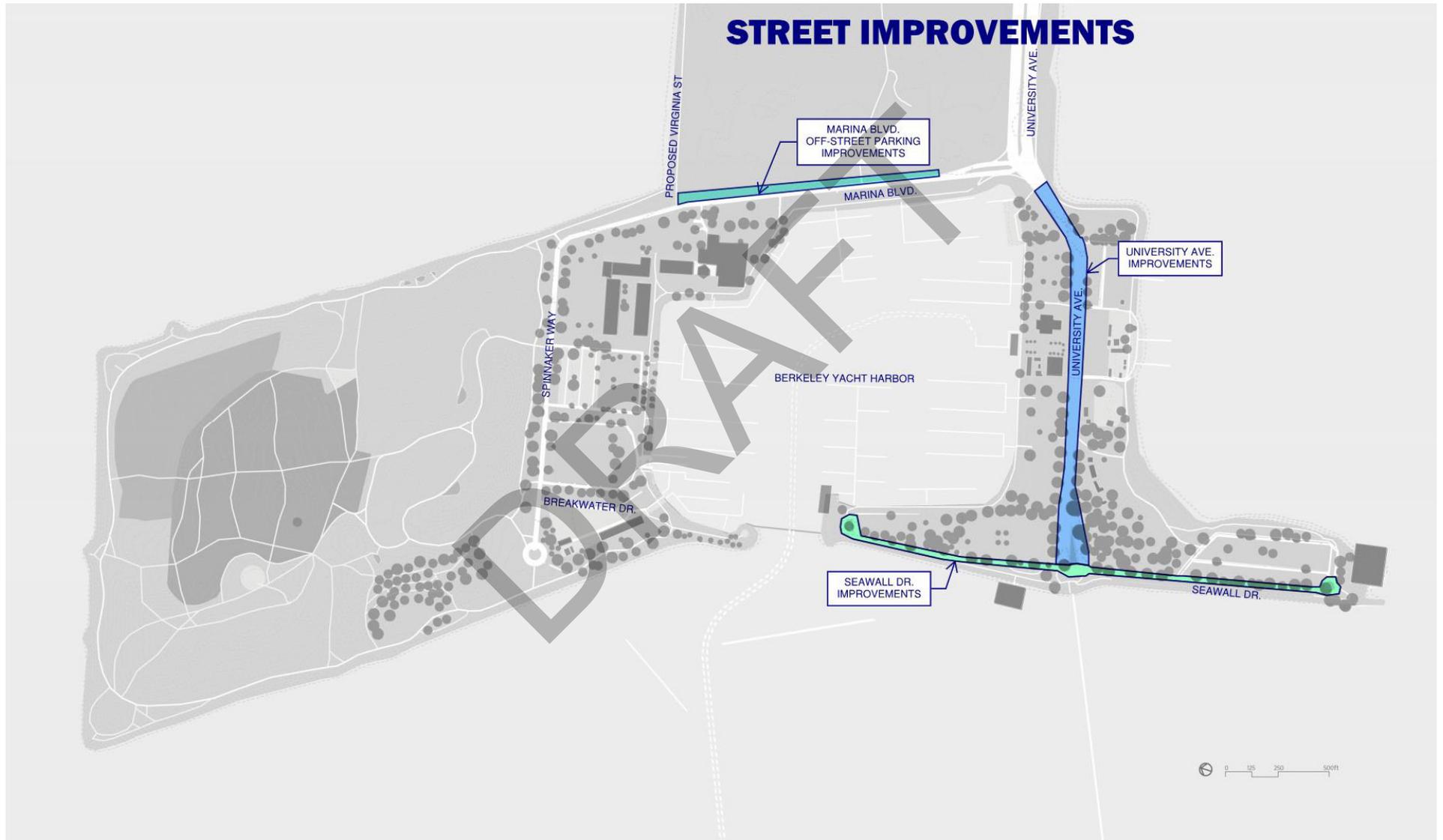
Additionally, there are currently wheel stops protecting the walkway from parked vehicles; however, the wheel stops don't provide adequate clearance to the walkway and are missing in some areas. A more appropriate barrier should be installed and setback for better separation of vehicles from the walkway.

The existing off-street parking to the west of Seawall Drive will also need pavement rehabilitation. The completed street rehabilitation plans for Spinnaker Drive show pervious pavement installation for the off-street parking along Spinnaker Drive. It is recommended to install pervious pavement west of Seawall Drive as well for the off-street parking and stripe parking stalls to maximize parking efficiency. The pervious pavement will treat the stormwater runoff from both the parking stalls and drive aisle, which will remove trash, debris, and pollutants prior to discharging into the San Francisco Bay.

Marina Boulevard Off-Street Parking

East of Marina Boulevard is off-street parking in an unpaved area. By improving the parking infrastructure in this area, it will create a more inviting parking option for easy access to walking trails in Cesar Chavez Park. Pervious pavement is also recommended for the Marina Boulevard off-street parking east of Marina Boulevard, as well as parking stall striping to maximize parking efficiency. The pervious pavers

Figure 1-53 Street Improvements



will assist in treating the stormwater runoff from both the off-street parking and the Marina Boulevard drive aisle, which was not designed for stormwater treatment. Furthermore, there is ample room for a paved trail east of the existing parking to connect into the Bay Trail at Cesar Chavez Park and University Avenue. Refer to the Pathways section for recommendations regarding the Bay Trail.

1.2.3 Pathways

New Bay Trail

Beautiful views surround the Berkeley Marina, and completing Bay Trail Master Plan throughout the Marina will bring exceptional access for the community. All Bay Trail improvements should follow the most recent Bay Trail Plan and San Francisco Bay Trail Design Guidelines and Toolkit. See Figure 1-54 for the typical cross section and design guidelines published in 2016. It was assumed that the Bay Trail is funded through grants and not through the Berkeley Marina general fund.

Bay Trail Design Guidelines

Currently the Bay Trail extends along the southern waterfront of the Marina up to Shorebird Park and surrounds Cesar Chavez Park, shown as a solid green line in Figure 1-55. The southern peninsula and interior harbor, as well as along Seawall Drive, are a part of the planned Bay Trail Master Plan shown as a dashed green line in Figure 1-55. The Marina can capitalize on some of the best San Francisco Bay cityscapes and vistas the Berkeley Marina has to offer by building out the remaining planned segments in the Bay Trail Master Plan.

Beginning at Seawall Drive, an existing unpaved trail runs along the peninsula on the western side of the roadway; however, it does not meet minimum widths listed in the Bay Trail Design Guidelines. In order to achieve the Bay Trail minimum requirements, Seawall Drive should

be realigned to accommodate the new trail along the waterfront. Since the roadway in Seawall Drive needs full depth asphalt replacement, it would be financially beneficial to repair the roadway and construct the Bay Trail simultaneously.

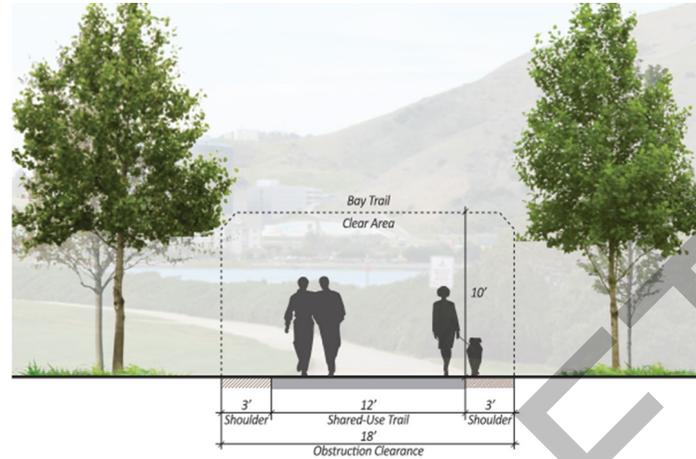
Moving northeast from Seawall Drive, an existing paved pathway follows the western and southern interior of the harbor from the Yacht Club to Lot J & K. The pathway appears to be in good condition, though must be widened to meet minimum Bay Trail Design Guidelines. Additionally, multiple locations must be evaluated for accessibility, in particular, where the dock ramps and trash enclosures meet the pathway there tends to be abrupt pavement slopes. Trash enclosures locations should be evaluated for relocation to parking lot areas for better pathway design flexibility and pavement longevity.

Near Lot F & G and Lot H & I along the harbor, the existing pathway is concrete and does not meet the minimum requirements for the Bay Trail. The Bay Trail Plan allows the alignment of the trail to be directed inland in constrained areas. It appears it would be a hardship to widen the pathway along the east edge of the harbor due to its proximity to the water, as well as the parking lots and roadways. Along Marina Boulevard east of the off-street parking, there is an ideal location, wide enough to accommodate the design guidelines for the Bay Trail. This additional segment would run parallel with Marina Boulevard and connect the Bay Trail north at Cesar Chavez Park and south at University Avenue.

Cesar Chavez Park

While the Bay Trail was previously installed around Cesar Chavez Park, the pavement is in poor condition and the asphalt is very rough and worn from use. Grinding and overlaying the pathway north of Spinnaker Drive will provide a much smoother and safer trail, especially for those with accessibility needs.

Figure 1-55 Bay Trail Typical Section and Guidelines



Bay Trail Design Guidelines					
Item	High-use facilities (separate paths)*	Multi-use paths*	Bicycle-only paths*	Hiking-only paths	Natural trails
Min. width (one way)	8-10'	10'	8'	5'	3-5' ^a
Min. width (two way)	10-12'	10-12'	10-12'	8-10'	5'
Surface	asphalt ^b	asphalt	asphalt	hardened	natural/boardwalks ^c
Horizontal clearance (incl. shoulders)	12-16'	14-16'	10'	9-12'	7-9'
Shoulder ^d	2'	2'	2'	2'	unspecified
Vertical clearance	10'	10'	10'	10'	unspecified
Cross slope	2% max	2% max	2% max	2% max	unspecified
Maximum grades ^e	5%	5%	5%	5%	unspecified

* Standards meet Caltrans Class I bikeway standards

^a Minimum widths that are less than 5' will be required to have 5'x5' turnouts at intervals to meet accessibility standards

^b High-use pedestrian path could be hardened surface other than asphalt ^c Natural surfaces may require surface hardening to provide accessibility ^d Area specified is area on both sides of the trail

^e Percentage grade for short distances with flat rest areas at turn outs, except where site conditions require a greater slope for short distance

Figure 1-54 Bay Trail



1.2.4 Utilities

Fire Water Loop

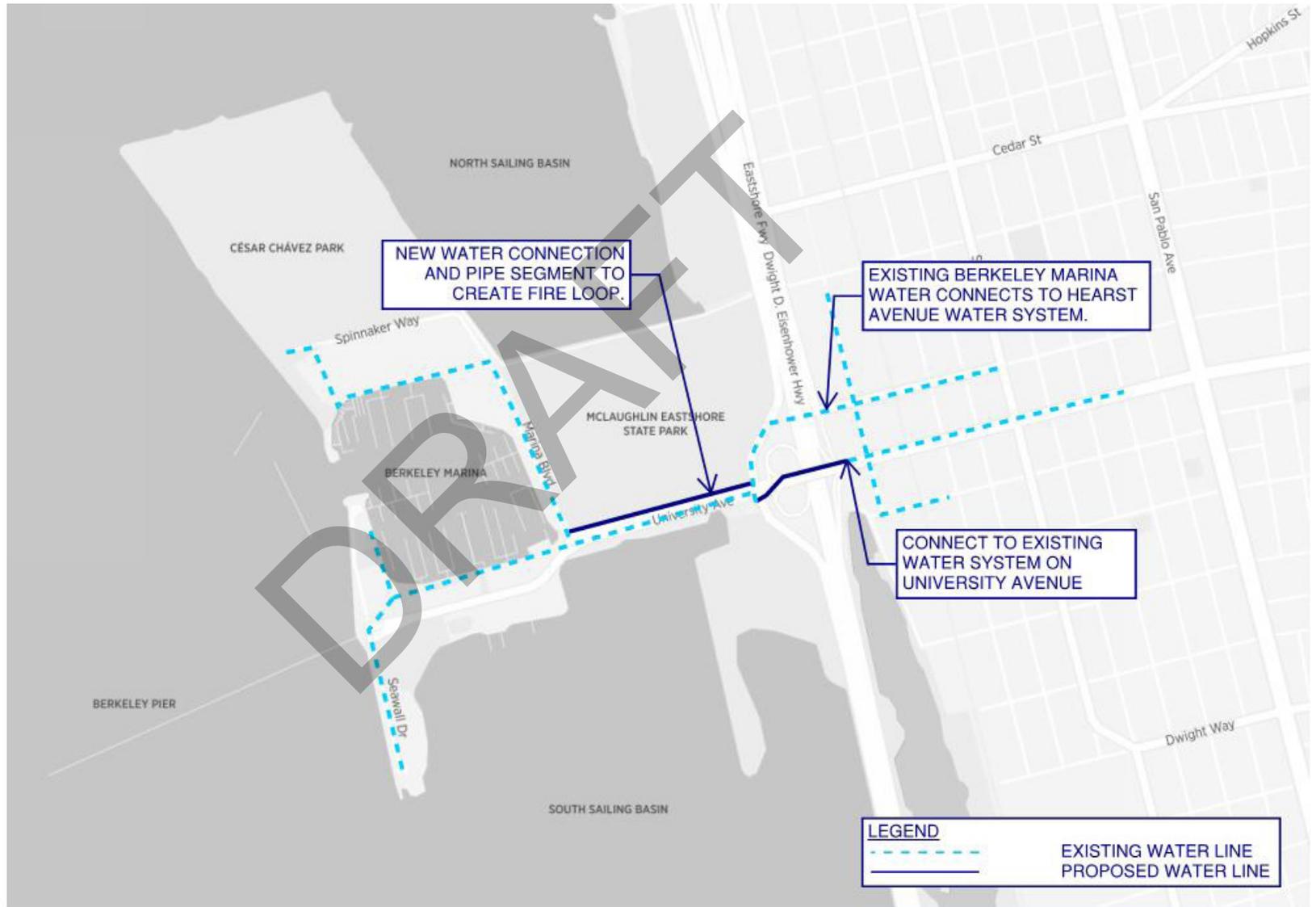
Per the 1999 Boating Facilities and Infrastructure Assessment for the Berkeley Marina, the Fire Department expressed concerns that there is only one water source to the Marina, which does not allow for a backup supply in the event of an emergency or natural disaster. The existing lateral serving the Berkeley Marina resides within University Avenue and connects to the existing East Bay Municipal Utility District (EBMUD) water main on West Frontage Road. The existing West Frontage Road water main in ends just south of University Avenue. This makes creating a complete fire loop at the marina challenging.

In order to make a true fire loop, a new water line servicing the Marina would need to connect to an EBMUD water main from a separate source than the one on W Frontage Road. The existing water line in W Frontage Road is a branch from the Hearst Avenue main. There is another existing main in University Avenue east of Interstate 80 (I-80). Per discussions with the City of Berkeley, Caltrans will be working on the roadway infrastructure at University Avenue. The City of Berkeley should approach Caltrans about extending the existing water main in University

Avenue across I-80 to the west side of the freeway. The Berkeley Marina would then connect to the extended main from University Avenue, extend it further, and connect to the Marina's existing System. This would create two connection and two sources to complete a fire loop.

Working with Caltrans to extend the water main across the freeway may be a lengthy process. In the intermediary, a new line can be installed down University Avenue from Marina Boulevard to W Frontage Road. While it will not create a truly looped system, it still provides a secondary main should the primary main be damaged. Furthermore, smaller loops throughout the site can support the hotel, restaurants, and some of the larger marina buildings and amenities. Figure 1-56 shows a few miniature fire loops, which provide an alternative supply in case of pipe breakages in the existing line, or even for maintenance purposes.

Figure 1-56 Existing and Proposed Water Utility



Sewer Pump Stations

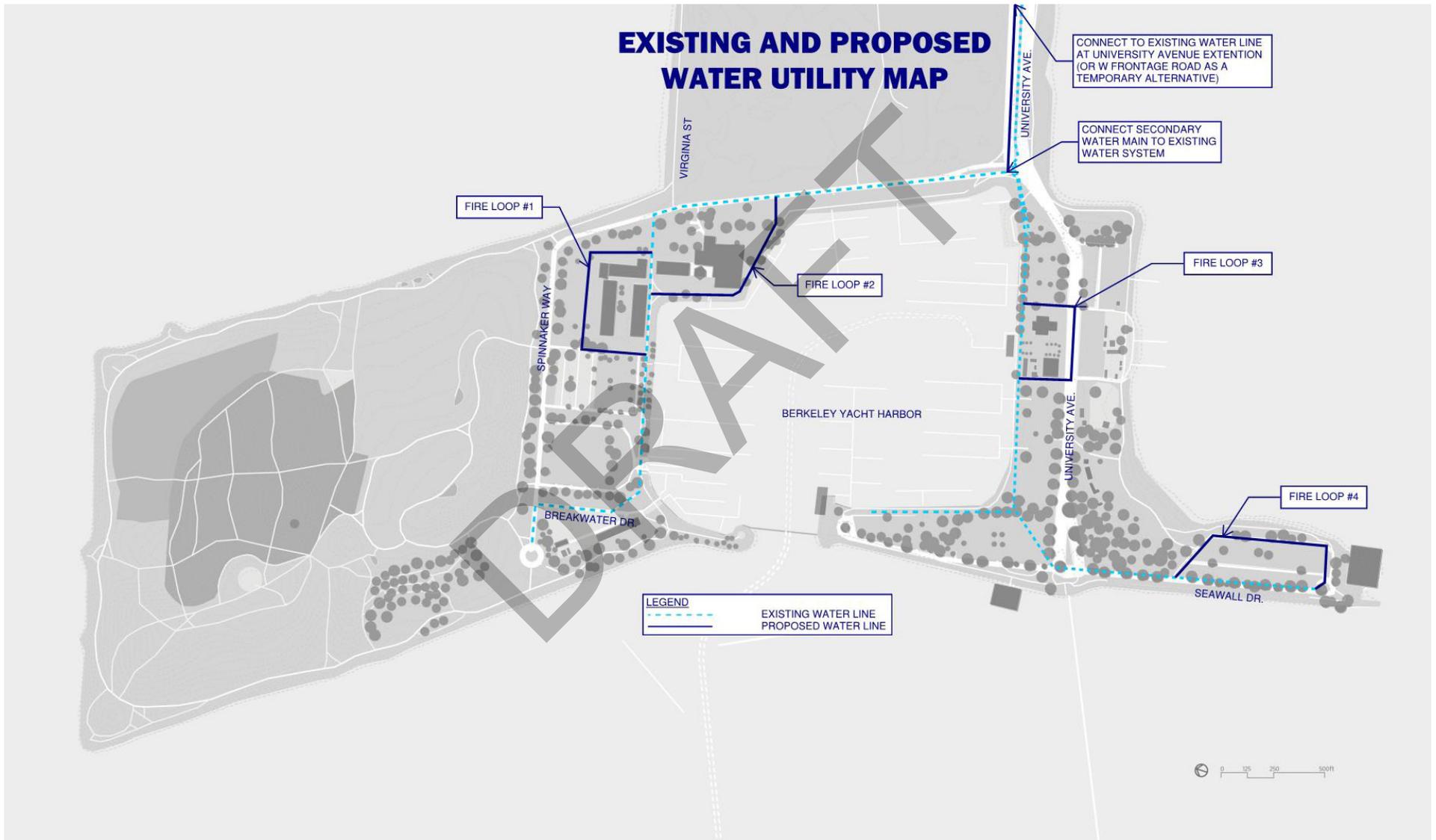
The existing sewer system was evaluated based on site visits and the Sanitary Sewer Rehabilitation and Replacement plans prepared by the City of Berkeley dated December 2020, as well as the Boating Facilities and Infrastructure Assessment for the Berkeley Marina prepared by Winzler & Kelly dated April 1999.

A more in depth sewer pump investigation is recommended to identify the components in need of replacement for Pump Stations 1, 2, 3, 4, & 5. The sewer pumps are expected to be at the end of their life cycle and in need of full replacement. The 1999 Infrastructure Assessment report noted that while the pumps operated properly, they are inefficient. When the pumps are replaced, the pump selection should include evaluation of the flow and elevation head for optimal efficiency. (Assume power supply is adequate)

The City of Berkeley and Marina Waterfront Management team cited issues with sewer backups at Buildings 125-127, which cause temporary business closures. All laterals experiencing backflow issues should install inline check valves. This will prevent sewage backflow occurring within the building and force any overflow to occur at an exterior sewer structure. If the sewer backups are occurring during storm events or high tides, it is probable that the sewer system is experience high inflow and infiltration levels. Check valves are a temporary solution to a larger problem for the sewer system. For a more complete solution, the sewer lines and pump stations serving the southern Marina should be evaluated as an entire system for complete pipe replacement and upsizing as needed.

DRAFT

Figure 1-57 Existing and Proposed Water Utility



1.2.5 Traffic & Mobility

A balanced transportation network—including roadways, parking facilities, and multimodal facilities—is essential for supporting safe, equitable, and sustainable access to, from, and within the Berkeley Waterfront. An evaluation of traffic and mobility conditions in the Waterfront identified the following four key takeaways:

1. There is existing roadway capacity on University Avenue, even at peak times.

The planned reconfiguration of University Avenue and the addition of a roundabout at the intersection at Marina Boulevard will help minimize vehicular delays. Design improvements and traffic calming elements on roadways throughout the Waterfront would help manage the speed of vehicular traffic and support shared use of the roadway.

2. Transit service is limited.

Only one bus route serves the Waterfront, and many of the destinations and activity centers in the waterfront are not within walking distance of a stop. There are few supporting amenities such as seating, shelters, lighting, or information for bus riders.

3. Bicycle access to the Waterfront from West Berkeley is available via the Bay Trail Bicycle and Pedestrian Bridge.

Within the Waterfront, bicycle travel is supported by a mix of bike routes and shared-use paths. Bicycle parking is limited—more bicycle parking that includes both quick-access bicycle racks as well as secure bike lockers would better support the needs of all types of bicyclists in the Waterfront.

4. There are over 2,000 parking spaces in the Waterfront, with varying levels of public access.

A variety of parking regulations and management strategies are currently used in the Waterfront to balance parking access—these strategies could be expanded, refined, and streamlined to maximize the usefulness of existing supply.

Overview

A balanced transportation network that supports all modes of travel is essential for meeting the needs of all people and activities in the Berkeley Waterfront. This chapter summarizes and evaluates existing traffic and mobility conditions in the Waterfront today, and identifies preliminary goals and potential opportunities to improve access to, from, and within the site.

Preliminary Goals

- Improve Waterfront access for people walking, riding bikes, riding transit, and using shared mobility services.
- Improve multimodal circulation within the waterfront.
- Ensure safe and equitable access to the Waterfront for all people and activities.
- Minimize vehicle delay, but carefully manage vehicle speeds to support the vision for the Waterfront as a shared, accessible space.
- Manage parking supply and leverage sharing opportunities to support the needs of all activities.

Key Opportunities

- Create a comprehensive parking plan to leverage shared parking opportunities, support a “park once” vision for the Waterfront, and avoid overbuilding parking.
- Simplify and standardize parking regulations to make them easier to understand and enforce.
- Design roadways to manage vehicle speeds and balance all modes of travel.
- Leverage Bay Trail access to make the waterfront a first-class destination for people of all ages and abilities to ride bikes.
- Expand the reach, frequency, and reliability of transit. Support transit service with high-quality amenities and facilities.
- Develop a curb management strategy to address the needs of Lyft/Uber, shuttles, and other curb-dependent uses.

Traffic and Roadway Capacity

The only road into or out of the Berkeley Waterfront is University Avenue, which has a daily capacity of 40,000 vehicles. In 2016, daily traffic volumes on this road between Marina Boulevard to Frontage Road were 9,000 on weekdays and 12,000 vehicles/day on weekends. Based on these daily volumes, there is available vehicle capacity remaining on University Avenue from West Frontage, even at peak times.

The intersection of University Avenue and Marina Boulevard is the main gateway to the Marina for vehicular traffic. Traffic volumes at this intersection are summarized in Figure 1-58. Major traffic volumes are those to/from Berkeley point and to/from Cesar E Chavez Park, with 250 vehicles/hour and 150 vehicles/hour on weekend days and weekdays, respectively. However, there is also internal traffic during weekend days, with 170 vehicles/hour from Berkeley point to Cesar E Chavez Park.

While its current design allows vehicles to operate with minimal delay in peak hours, its geometry is not safe for pedestrians and bicyclists. The “Feasibility Study on Mitigation of Undulating Pavement at University Avenue” recommends a roundabout at the University Avenue and Marina Boulevard intersection to maintain smooth traffic flow and improve safety for bicycles and pedestrians at this location. The same study’s preferred alternative included re-aligned 4-lane alternative for the portion of University Avenue from Marina Boulevard to Frontage Road, which will provide a wider buffer between the vehicular traffic and the Bay Trail. As of March 2021, the City of Berkeley is soliciting bids for the implementation of these improvements to University Avenue and Marina Boulevard.

Figure 1-58 Auto Traffic Volumes at University Avenue and Marina Boulevard (2016)

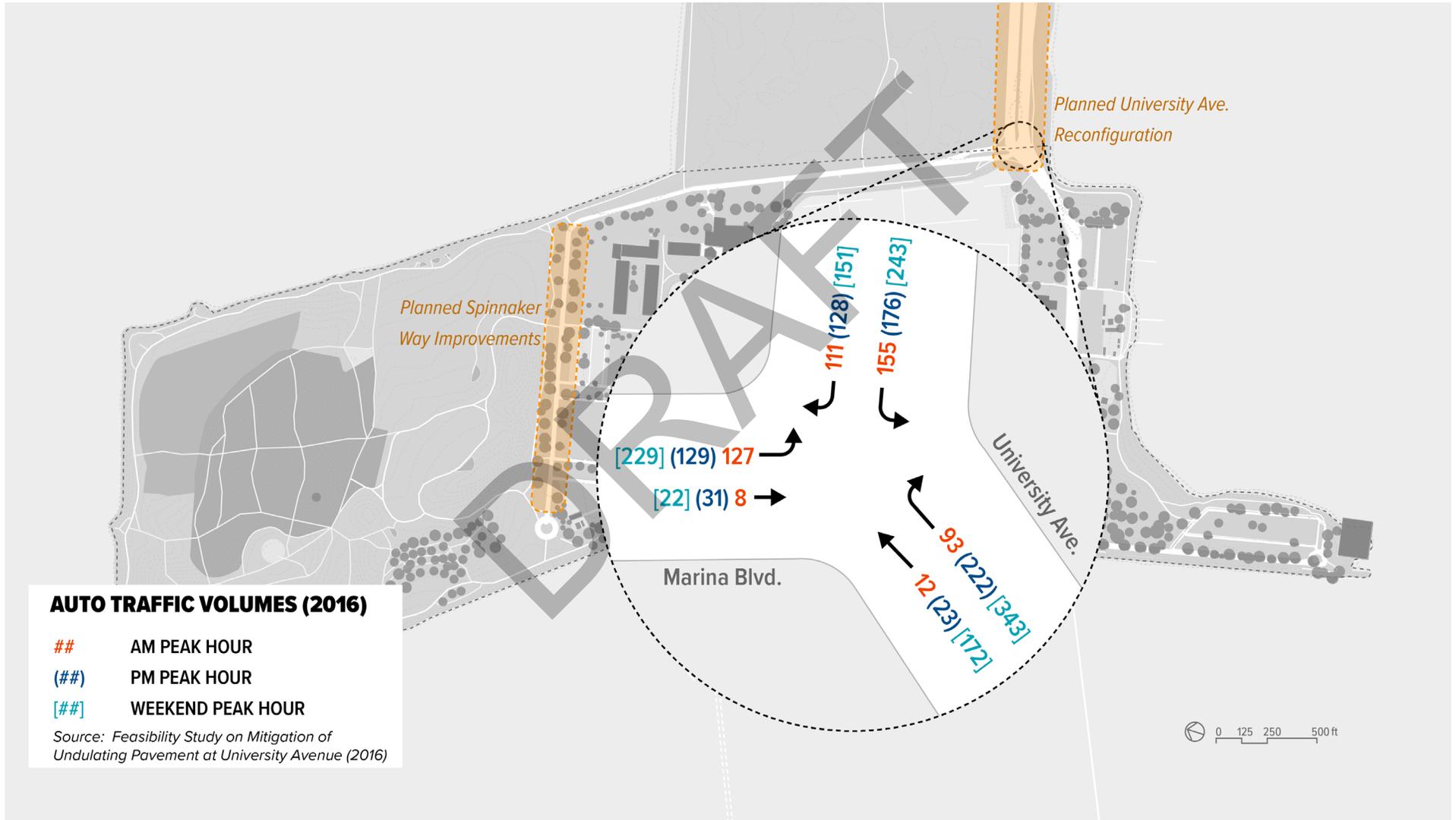
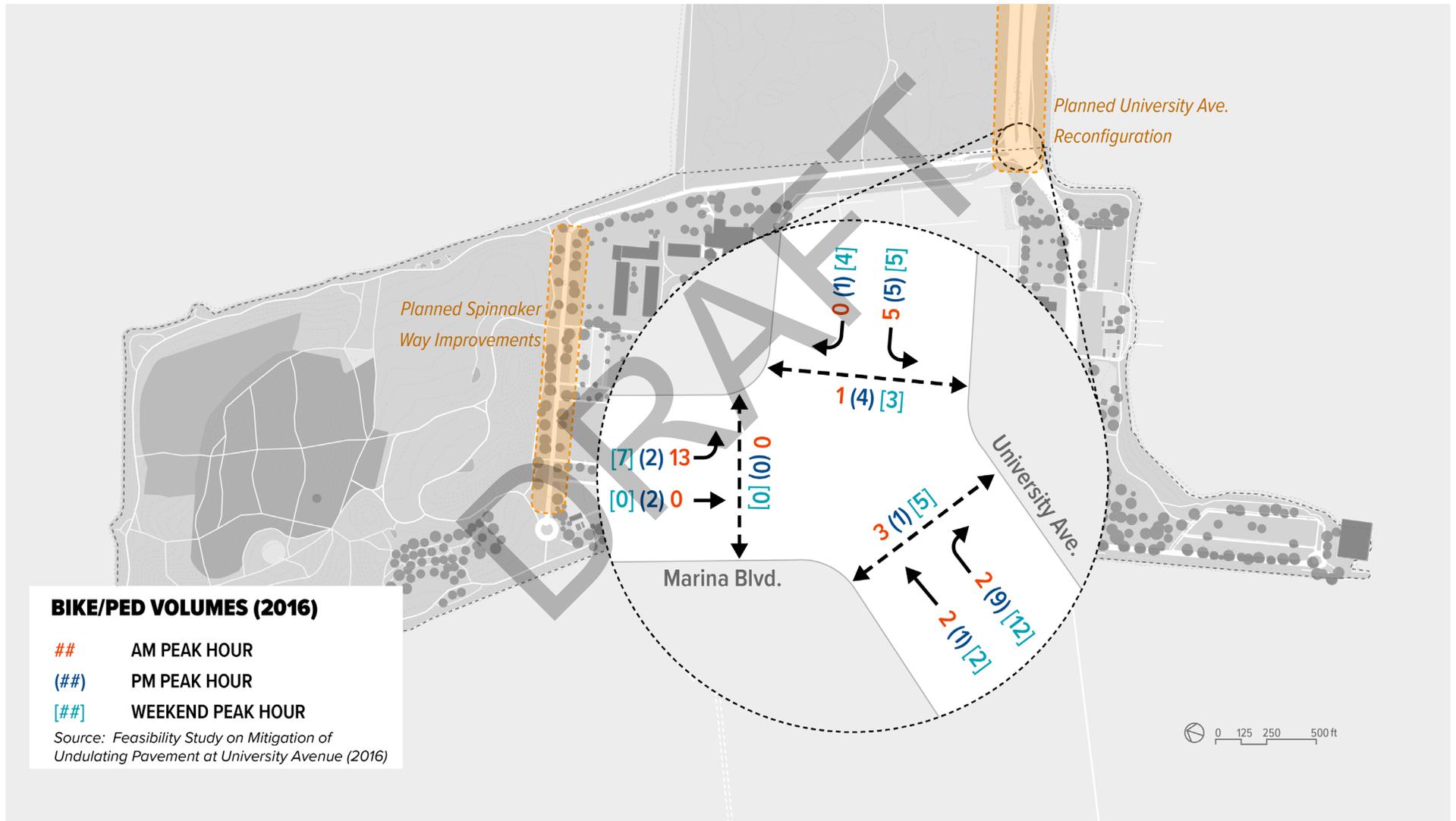


Figure 1-59 Bike/Ped Volumes at University Avenue and Marina Boulevard (2016)



Multimodal Travel

Multimodal travel includes riding a bicycle, walking, and riding transit. Multimodal travel in the waterfront is supported by transit stops, bicycle racks, and a network of bicycle and pedestrian paths. The location of these supporting multimodal facilities is shown in Figure 1-60. For detailed evaluation of existing bicycle and pedestrian path conditions, see Chapter 1 - Assessment of Infrastructure.

Transit Service

The only transit service available today within the Waterfront is AC Transit Route 51B, which connects between Rockridge BART and Seawall Drive via College Avenue, Downtown Berkeley BART, and University Avenue in west Berkeley. Only one out of every three scheduled trips between 7AM and 9PM on Route 51B provides service to the Marina—all other trips terminate at the Berkeley Amtrak station. This schedule design effectively creates 30-minute headways to and from the Waterfront.

Route 51B only serves the southern portion of the waterfront along University Avenue—Cesar Chavez Park and destinations in the north are well beyond walking distance of transit service. Bus stop amenities in the waterfront are extremely limited—none of the stops include shelters or lighting, or information, and only one includes seating.

Bicycle Access

The Bay Trail Bicycle and Pedestrian Bridge, which spans I-80, connects the waterfront with the main line of the Bay Trail and Addison Street in West Berkeley. The Bay Trail Extension is being constructed in segments and will create a continuous bicycle loop along the southern portion of the waterfront. Aside from the Bay Trail, bicycle facilities within the Waterfront include a mix of paved and unpaved bicycle trails, paths, and routes. There is limited support for

on-street bicycling within the Waterfront along University Avenue, Marina Boulevard, and Spinnaker Way.

There are currently 12 bike racks distributed throughout the waterfront, with 20 bicycle e-lockers planned for installation in summer 2021 near the current location of the Hana Japan restaurant.

City of Berkeley Bicycle Plan (2017)

As part of the City of Berkeley Bicycle Plan's low-stress bikeway network, Addison Street is identified as a recommended bicycle boulevard that connects directly to the waterfront via the Bay Trail Bicycle and Pedestrian Bridge. Gilman Street is recommended for a cycletrack study and a new multimodal crossing over I-80. The Plan also contains design recommendations and guidelines that apply to any potential street or trail changes in the Waterfront.

Draft Pedestrian Plan (2020)

The Draft Pedestrian Plan did not identify any recommended projects within or connecting to the waterfront. However, some of the recommended projects in West Berkeley—which is identified as a historically underserved community—could improve nearby transit accessibility or direct access for recreational walkers or joggers. Designs and enhancements to the pedestrian environment identified in the plan should be applied to any potential street changes in the Marina.

Ferry Feasibility Study (Ongoing)

The City of Berkeley and WETA are currently collaborating on a feasibility study to evaluate the potential for ferry service between the Berkeley Waterfront and San Francisco. As the findings and recommendations of that study are completed, they will be addressed and incorporated within the Berkeley Marina Area Specific Plan as appropriate.

Figure 1-60 Multimodal Infrastructure in the Waterfront



Parking Supply and Management

There are approximately 2,249 total parking spaces in the waterfront today, with varying levels of public access and restrictions. These parking spaces support a wide variety of activities, each with a unique pattern of parking demand that varies by time of day and day of week.

When different activities have complimentary patterns of parking demand, it creates opportunities for shared parking arrangements. For example, a restaurant with peak parking demand in the evening and on weekends may be able to share a parking lot with an office that is busiest during the day on weekdays. A variety of parking regulations and management strategies—including parking permits/passes, time limits, and hourly or daily pricing—are currently used in the waterfront to support shared parking and maximize access to the existing parking supply.

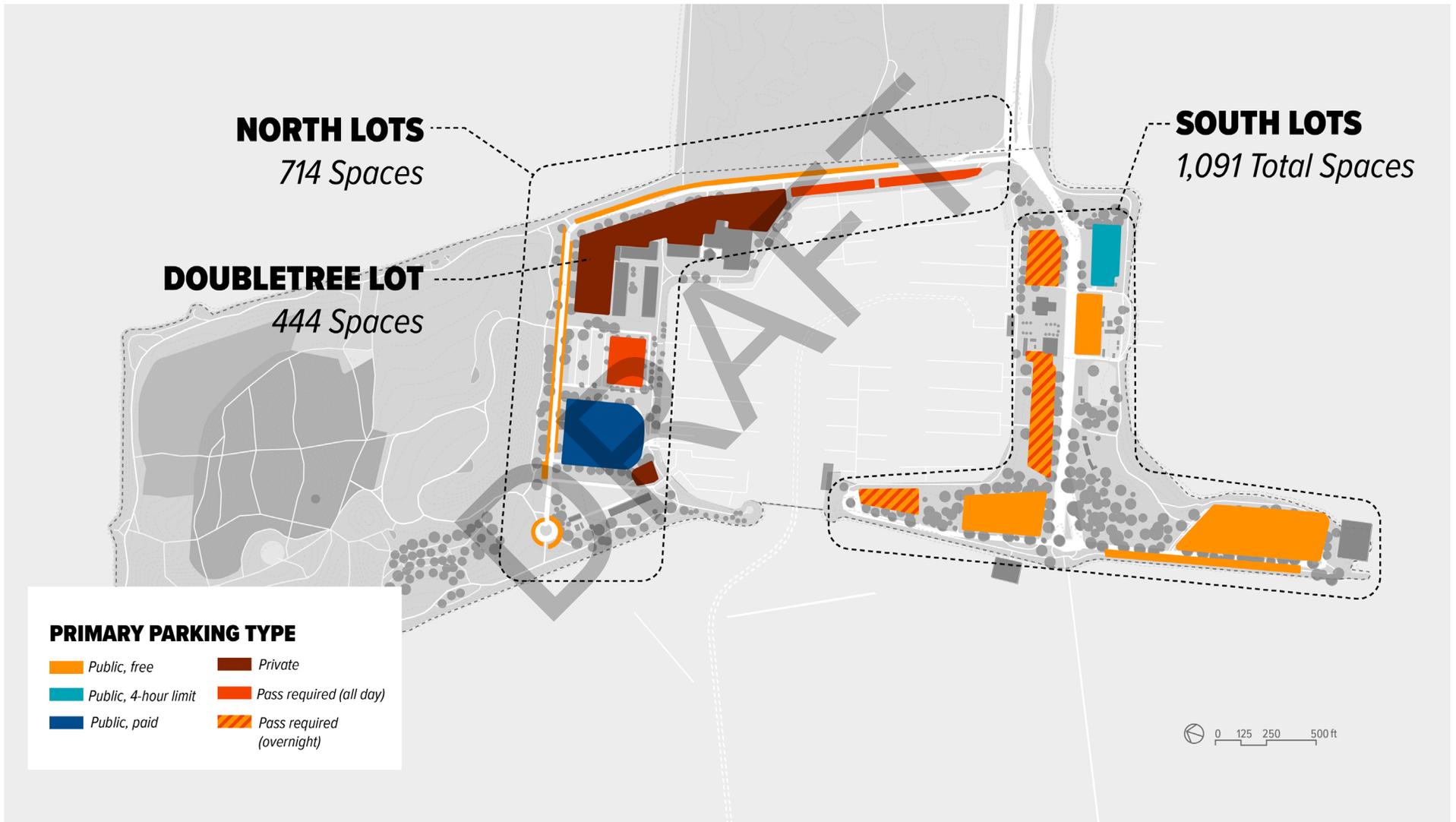
Waterfront Parking Study (2018)

In September 2018, the City of Berkeley completed a study of parking supply, utilization, and management in the waterfront. The study identified several parking-related challenges and recommended potential near-term solutions. Some of the key findings and priorities from that study included:

- Overcrowding in the South Cove lots
- Vehicles parked all day in some of the most convenient and centrally-located spaces
- Limited convenient parking options for watersports activities (including windsurfing)
- Slipholder demand for parking close to docks
- Parking requirements of waterfront restaurants, including Hana Japan
- Challenges associated with overnight parking/camping and vehicle storage

Since completing the study, the City has modified time limits and pass/permit requirements to help address these challenges. Figure 1-61 summarizes the regulations and restrictions for all parking lots and on-street parking spaces in the waterfront as of March 2021.

Figure 1-61 Berkeley Waterfront Parking



1.3 Recreational Infrastructure

The Berkeley Waterfront is a recreational area comprised of the Berkeley Marina and also over 100 acres of park space including 7 miles of trails, a 17-acre off-leash dog area, picnic areas, bird-watching, educational programming at the Shorebird Park Nature Center, the nationally celebrated Adventure Playground, unparalleled panoramic views, and amenities for boaters and non-boaters alike.

Within the Berkeley Waterfront its parks include Cesar Chavez Park, Horseshoe Park, Shorebird Park and Adventure Playground. There are several additional open spaces that are currently not designed within the Waterfront Area - See Figure 1-62.

Parks and Open Spaces in the City of Berkeley have a special designation per Measure L. See section 1.5 for more information.

Field Investigations

Hargreaves Jones conducted two site visits to assess the recreational infrastructure at the Berkeley Waterfront on December 04, 2020 and April 15, 2021. The investigations involved visually evaluating each park and open space for maintenance issues, topographical challenges, views and vistas, and their vegetative character.

Focused Meetings

Hargreaves Jones conducted two focused meetings on March 15 and 18, 2021 with city staff to gain further insight into the parks and open spaces. These meetings were attended by individuals from the City of Berkeley – Parks, Recreation and Waterfront Department and the City of Berkeley – Public Works Department who are involved in programming the park spaces and who look after the maintenance and upkeep of the Waterfront Area.

Figure 1-62 All recreational infrastructure at Berkeley Marina



1.3.1 Cesar Chavez Park

Overview

Cesar Chavez Park is a 90-acre park on the northern edge of the Berkeley Marina - See Figure 1-63. The site operated as a landfill until 1957. From 1957 onward, the site sat untouched until it was transformed into a recreational amenity for the City which includes a wildlife sanctuary and a 17-acre dog park. In 1996, the site was named Cesar Chavez Park after the farm labor activist and founder of the United Farmer Workers of America.

Expanding from the original wildlife sanctuary and dog off-leash park, Cesar Chavez Park now includes many recreational areas and activities such as:

- A large multi-purpose turf area;
- Picnic areas with BBQ;
- Hiking trails (1.25 mile Dorothy Stegmann trail around perimeter is fully wheelchair accessible); and,
- The Cesar Chavez Memorial Solar Calendar

The park's unique location in the Bay offers 360 degree views of the Golden Gate Bridge, downtown San Francisco, Alcatraz, Angel Island, and Mount Tamalpais to the north. The park provides large open spaces, fresh air, and a respite from the City. It is an ideal place for kite flying and the Berkeley Kite Festival is held on the last weekend of July every year.

Figure 1-63 Cesar Chavez Park Map of Existing Conditions



Assessment

From our observations, the park is much loved. During a Thursday morning, several visitors were seen walking around, enjoying the open space, and taking in the views. However, due to deferred maintenance for many years, there are several areas that should be addressed.

Across the site, many of the furnishings are in disrepair and have either rusted due to their extreme saltwater environment or are deteriorating. In addition, the pathways are inconsistently paved and do not meet the accessibility standards causing dangerous and unsafe conditions.

There is limited to no vegetation. Most of the more natural areas are overgrown and overtaken by weeds and non-native plant species. The limited trees that do exist are mature and are exposed to high winds. A full vegetation and tree health survey assessment would be needed to catalogue and accurately assess the status of the park's vegetation.

The majority of the park spaces available for human use are wide open, mown grasses with limited shade or shelter from winds. Additional tree planting could be considered to offer shade and shelter belts as well as more visual interest.

In discussions with City Staff, several additional maintenance issues were brought up including:

- Ground squirrels are causing issues and might be digging through the landfill cap
- Landfill cap is just above the water table
- Hill soils stay saturated for the entire summer season which could indicate drainage problems
- Irrigation has not been turned on in the park for over 10 years. Expectation is that if it is turned on, it would leak.
- Saltwater is hard on site furnishings and they are all

Figure 1-64 Cesar Chavez Park Assessment Photos



Several park furnishings are in disrepair and inaccessible



There are only a few hills which contain vegetation. The environment is harsh and the trees are exposed to high winds and extreme weather



360 degree views from the hills



Pathways are inconsistently paved throughout the park causing access and accessibility issues

Figure 1-65 Horseshoe Park, Shorebird Park & Adventure Playground Map of Existing Conditions



Figure 1-66 Horseshoe Park Assessment Photos



Typical views out to the Marina from the edge of Horseshoe Park



Benches and furnishings are newer and in good condition. Paths leading to furnishings have been worn out from foot traffic.



Vegetation is overgrown and needs maintenance



Vegetation is overgrown and trampled in several spots. Needs regular maintenance and upkeep.

1.3.2 Horseshoe Park

Overview

Horseshoe Park is a small 3.4-acre park located on the western shore of the Berkeley Waterfront - See Figure 1-65. A grassy area with wooded surrounds, the park offers protection from the westerly winds and affords expansive views across the harbor and East Bay Hills.

The main features of Horseshoe Park include:

- a multi-purpose turf area;
- picnic and grilling areas; and,
- pathways.

It's an excellent place to take a stroll, jog, walk the dog, play Frisbee, or settle down for a picnic and lounge in the sun.

Assessment

Overall, the park is in fair condition. The furnishings are newer and do not need replacing immediately. The vegetation has started to get wild due to a lack of maintenance which is blocking some of the views out to the water. Additionally, there is evidence of no irrigation as the turf and planting is browning in several areas.

1.3.3 Shorebird Park

Overview

Shorebird Park is located on the southern edge of the Berkeley Waterfront - See Figure 1-65. This 6-acre park is shaped by the natural bay morphology and is unique due to its natural shore edge and beach. The beach is tide-driven and changes throughout the day – often disappearing at night at high tide. Its waters are calm, making it the ideal spot of swimming and getting into the water.

There is a large berm on the North-West that protects and shelters park users from the wind. A flatter, more enclosed area for small events and picnicking is available to the South-East. As a slightly more programmed area, this park offers:

- A large multi-purpose turf area;
- Children’s Play area featuring disabled-accessible playground equipment for both tot and school-age children, including swings, and climbing apparatus;
- Picnic areas with BBQ (limit to groups under 50);
- Drinking Fountains;
- Hiking Trails
- A Beach; and
- The Shorebird Nature Center

Shorebird Nature Center

The Shorebird Park Nature Center is the first municipal straw bale building in the United States. It has a solar hot water radiant system to provide heating year-round in the cool marina climate, and a solar photovoltaic electrical system to power its aquariums, computers, lighting and other equipment. Within the Nature Center, there is a 50-gallon salt tank, a 30-gallon fresh water tank and displays on Marine mammals and birds. The building itself is a display on green building.

Assessment

From our general observations, Shorebird Park is in good condition overall. The playground is well maintained and well used.

From our discussion with City Staff, several issues were noted:

Shorebird Park:

- There is no formal way to enter the park. Most people walk past the beach thinking that you are not supposed to go down there.
- The waters are extremely calm and the beach is filled with all kinds of muddy ecology. There is an opportunity for environmental education connected with the Nature Center Programming.
- The Native Plant Garden does not have a strong enough presence as there is no signage. It is currently used as part of the curriculum.

Nature Center:

- Needs adequate maintenance and an opportunity to address it proactively.
- Solar panels are working at half efficiency as trees have grown since installation. Windmill exists on site but does not currently function.
- Washrooms have the perception of being unsafe, not inviting.

Figure 1-67 Shorebird Park Assessment Photos



Playground is well maintained



Rough patches of dirt within turf



Shorebird Nature Center



Evidence of poor irrigation with brown patches in turf.



Slope to waters edge



The picnic area is well maintained and protected from winds



Outdoor amphitheater is in poor condition



Picnic tables are in good condition



Some of the vegetation is poorly maintained.

1.3.4 Adventure Playground

Adventure Playground has been on the southern end of Berkeley Marina since 1979. It has been gradually formed over time as kids have played in the space. Painted and unpainted wooden structures are scattered around the space connected by ropes and other discarded industrial pieces (tires, pipes, etc). There is a zipline on one end finishing in a pile of sand.

The playground operates during set hours and parents can drop their kids off to play for a nominal fee. There is minimal supervision, so while children are within the playground, they are encouraged to roam freely, experiment, and challenge themselves.

Assessment

Due to COVID, the Adventure Playground has been closed and we were unable to do any observations during the time of this report.

However, in speaking with City Staff, they noted:

- The zipline needs to be constantly manned / staffed.
- The Adventure Playground cannot be significantly altered or moved without triggering significant ADA code upgrades and City liability. It can continue to operate “as-is” and City Staff would like it to remain in it’s same location if possible.
- The playground is a City supervised program (overseen by the Nature Center Staff) – there are full time and part staff.
- Children say its “better than Disneyland”

Figure 1-68 Shorebird Park Assessment Photos



Playground is well maintained



Playground is well maintained

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1.4 Facilities

Buildings in the Project Area are operated either by the City of Berkeley, or by private entities that lease land and facilities from the City of Berkeley. Publicly operated buildings include the Waterfront Office, Corp Yard, and Shorebird Nature Center. Privately operated buildings include a full-service hotel, multiple restaurants, and a yacht club. While the City is responsible for all improvements to publicly operated buildings, the lease structures of privately operated buildings require tenants to fund most improvements on leased premises.

Over the next five years, the City will need to make modest improvements to publicly operated buildings in the Project Area, based on prior building condition assessments. Private tenants are expected to address most near-term capital needs of privately operated buildings. However, the City might need to address at least a portion of the

capital needs identified at 125-127 University Avenue, a multi-tenant office building, and 199 Seawall Drive, a vacant restaurant owned by the City that must be renovated for a new tenant.

Renovating 199 Seawall Drive in coordination with a new tenant is the highest-priority building project to be completed in the next five years based on the potentially substantial Marina Fund revenues that the 25,000 square foot restaurant would generate when occupied. The City and the selected tenant, once identified, will negotiate the scope of improvements to 199 Seawall Drive and their respective responsibilities for funding and completing the improvements.

1.4.1 Privately Operated Buildings

Private entities operate commercial and recreational buildings in the Project Area under lease and license agreements with the City of Berkeley. Privately operated buildings include a full-service hotel, multiple restaurants, and a yacht club. Table 1-56 summarizes the lease structure and ownership of privately operated buildings in the Project Area.

The City of Berkeley owns all privately operated buildings in the Project Area, except for the Doubletree Hotel and the Marine Center, which are built on City-owned land and will revert to City ownership upon lease termination. The City is seeking a tenant to occupy a 25,000 square foot restaurant at 199 Seawall Drive. All other City-owned buildings are currently leased.

City-owned buildings are typically leased to private entities in an “as-is” condition, requiring tenants to assume responsibility for most property maintenance. The City’s role in maintaining privately operated buildings is generally limited to maintaining exterior structural elements. The City is only responsible for maintaining interior common areas at 125-127 University Avenue, a multitenant office building that includes the Berkeley Police Department Traffic Bureau on the ground floor and private tenants on the second floor.

Because of the “as-is” structure of existing leases, tenants will likely address most of the near-term capital needs of privately operated buildings, with a few possible exceptions. A prior building condition assessment identified deficiencies at 125-127 University Avenue that will likely be the City’s responsibility to resolve. In addition, 199 Seawall Drive requires renovations to prepare the space for a new tenant. The new tenant, once identified, might request that the City complete certain improvements as a condition of leasing the space.

Table 1-69 Privately Operated Buildings in Project Area

Property	Building Owner ⁽¹⁾	Tenant or Licensee (L)	Approx. Land Acres	Building SF or Keys	Lease Expiration/Options
200 Marina Blvd	Tenant	Doubletree	13.8	378 keys	2080
1 Spinnaker Way	Tenant	Marine Center	4.5	8,000 SF	2028
100 Seawall Dr	City	Skates	0.3	12,400 SF	Holdover ⁽²⁾
199 Seawall Dr	City	Seeking Tenant	0.7	25,000 SF	N/A
235 University Ave	City	Hana Japan	0.3	9,200 SF	2025
225 University Ave	City	Bait Shop	0.1	1,800 SF	2023/25
1 Seawall Dr	City	Yacht Club	0.2	6,100 SF	2045/65
124 University Ave	City	Cal Adventure (L)	0.3	<1,000 SF	MTM
124 University Ave	City	Cal Sailing (L)	0.2	<1,000 SF	MTM
125-127 University Ave	City	Multiple	0.7	11,800 SF	Varies

Source: Lease documents

⁽¹⁾ In all cases, buildings revert to City ownership upon lease expiration.

⁽²⁾ City intends to negotiate a lease extension.

1.4.2 Publicly Operated Buildings

The City occupies several buildings in the Project Area, listed in Table 1-66. These buildings include the Waterfront Office, Corp Yard, and Shorebird Nature Center. In addition, the Berkeley Police Department Traffic Bureau occupies the ground floor of 125-127 University Avenue, which this assessment identifies as a privately operated building because the second floor is leased to commercial tenants.

The City is responsible for maintaining publicly operated buildings in sound condition. Prior building condition assessments have identified modest capital improvements needed at the Waterfront Office and the Shorebird Nature Center to satisfy current building code requirements.

Table 1-70 Publicly Operated Buildings in Project Area

Building	Building SF
Waterfront Office	2,529 SF
Corp Yard	3,170 SF
Shorebird Nature Center	960 SF
Public Restrooms (x8)	+/- 4,000

Source: City of Berkeley

1.5 Permits

1.5.1 Identify Regulatory Agency Permit Requirements

United States Army Corps of Engineers

Clean Water Act Section 404

The U.S. Army Corps of Engineers (USACE) regulates “Waters of the United States” under Section 404 of the Clean Water Act (CWA). Waters of the United States are defined in the Code of Federal Regulations (CFR) as including the territorial seas, and waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, such as tributaries, lakes and ponds, impoundments of waters of the U.S., and wetlands (33 CFR 328.3). Potential wetland areas, according to the three criteria used to delineate wetlands as defined in the USACE Wetlands Delineation Manual, are identified by the presence of (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Unvegetated waters including lakes, rivers, and streams may also be subject to Section 404 jurisdiction and are characterized by an ordinary high water mark (OHWM) identified based on field indicators such as the lack of vegetation, sorting of sediments, and other indicators of flowing or standing water.

Under Section 404 of the Clean Water Act the USACE has authority to regulate activity that could discharge fill or dredge material or otherwise adversely modify wetlands or other waters of the United States. The USACE implements the federal policy embodied in Executive Order 11990, which, when implemented, is intended to result in no net loss of wetland values or acres. In achieving the goals of the Clean Water Act, the Corps seeks to avoid adverse

impacts and to offset unavoidable adverse impacts on existing aquatic resources. Any fill or adverse modification of waters of the U.S. would require a permit from the Corps prior to the start of work. Typically, permits issued by USACE require a project to offset unavoidable impacts on wetlands and other waters of the U.S. in a manner that achieves the goal of no net loss of wetland acres or values.

Rivers and Harbors Appropriation Act of 1899

USACE also regulates construction in navigable waterways of the U.S. through Section 10 of the Rivers and Harbors Act (RHA) of 1899 (33 USC 403). Section 10 of the RHA requires USACE approval and a permit for excavation or fill, or alteration or modification of the course, location, condition, or capacity of, any port, roadstead, haven, harbor, canal, lake, harbor or refuge, or enclosure within the limits of any breakwater, or of the channel of any navigable water of the United States. Section 10 requirements apply only to navigable waters themselves, and are not applicable to tributaries, adjacent wetlands, and similar aquatic features not capable of supporting interstate commerce.

United States Fish and Wildlife Service

Endangered Species Act

Specific species of plants, fish, and wildlife may be designated as threatened or endangered (referred to as listed species) by the federal Endangered Species Act (ESA). Federally listed plant species are only protected when take occurs on federal land. Species designated

proposed or candidate are those that are being considered for listing and are not protected until they are formally listed as threatened or endangered. The U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS; see below) share responsibility for implementing the ESA (16 USC § 153 et seq). The USFWS generally implements the ESA for terrestrial and freshwater species, while the NMFS implements the ESA for marine and anadromous species.

The ESA also provides for designation of critical habitat, which are specific geographic areas containing physical or biological features “essential to the conservation of the species”. Protections afforded to designated critical habitat apply only to actions that are funded, permitted, or carried out by federal agencies. Critical habitat designations do not affect activities by private landowners if there is no other federal agency involvement.

Under the ESA, authorization must be obtained from the USFWS or NMFS prior to “take” of any listed species. Take under federal definition means to harass, harm (which includes habitat modification), pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

The authorization process is used to determine if a project would jeopardize the continued existence of a listed species and what measures would be required to avoid jeopardizing the species. Depending on the involvement by the federal government in permitting and/or funding of a project, authorizations under the ESA are obtained through either Section 7 consultation, which is an interagency process initiated by a federal lead agency or permitting agency (such as USACE), or through Section 10 consultation when there is no federal nexus.

Marine Mammal Protection Act

The Marine Mammal Protection Act (MMPA) was enacted on October 21, 1972. All marine mammals are protected under the MMPA. The MMPA prohibits, with certain exceptions, the “take” of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. Jurisdiction for MMPA is shared by USFWS and NMFS. The USFWS’s Branch of Permits is responsible for issuing take permits when exceptions are made to the MMPA.

Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act

The Migratory Bird Treaty Act of 1918, as amended in 1972, protects nesting migratory birds by making it illegal to “take” (kill, harm, harass, etc.), possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird listed in 50 CFR 10.13, , or their nests, eggs, parts, or products, except under the terms of a valid permit issued pursuant to the Federal Regulations. Migratory birds include geese, ducks, shorebirds, seagulls, raptors, songbirds, and many other species. A complete list of birds protected under the act are found in 50 CFR 10.13.

National Marine Fisheries Service

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (FCMA), as amended (16 U.S.C. 1801 et seq.) established:

- A fishery conservation zone between the territorial seas of the United States and 200 nautical miles offshore;

- An exclusive U.S. fishery management authority over fish within the fishery conservation zone (excluding highly migratory species);
- Regulations for foreign fishing within the fishery conservation zone through international fishery agreements, permits, and import prohibitions; and
- National standards for fishery conservation and management and eight regional fishery management councils to apply those national standards in fishery management plans.

Congress enacted the 1996 amendments to the Act, known as the Sustainable Fisheries Act (SFA) (P.L. 104-297), to address the substantially reduced fish stocks that declined as a result of direct and indirect habitat loss. In 2007, President Bush signed the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006. It mandates the use of annual catch limits and accountability measures to end overfishing, provides for fishery management by a limited access program, and calls for increased international cooperation.

Similar to authorizations under the ESA, the FCMA SFA requires that other agencies (project permitting or lead agencies, i.e., USACE) consult with, and obtain authorization from, NMFS concerning actions that may adversely impact Essential Fish Habitat (EFH).

Advisory Council on Historic Preservation

National Historic Preservation Act of 1966

Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA), requires Federal agencies to take into account the effects of their undertakings on Historic Properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to

comment on such undertakings. Therefore, prior to the issuance or authorization of any permit under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act, USACE Regulatory Division must consider the effect the permit may have on Historic Properties. Historic Properties may include prehistoric or historic districts, sites, buildings, structures, objects, sacred sites, and traditional cultural places, that are included in, or eligible for inclusion in, the National Register of Historic Places.

Regional Water Quality Control Board

Porter-Cologne Water Quality Act and Clean Water Act Section 401

The Porter-Cologne Act is the principal law governing water quality regulation in California and incorporates parts of the CWA such as National Pollutant Discharge Elimination System permit requirements and Clean Water Act Section 401 water quality certification. The Act also includes water quality standards and sets the state's antidegradation policy. It establishes a comprehensive program to protect water quality and the beneficial uses of water. The Porter-Cologne Act applies to any surface waters, wetlands, and ground water, including saline waters, within the boundaries of the state (waters of the State) and to both point and nonpoint sources of pollution. Pursuant to the Porter-Cologne Act (California Water Code section 13000 et seq.), the policy of the State is as follows:

- The quality of all the waters of the State shall be protected
- All activities and factors affecting the quality of water shall be regulated to attain the highest water quality within reason
- The State must be prepared to exercise its full power and jurisdiction to protect the quality of water in the State from degradation

The Porter-Cologne Act established the State Water Resources Control Board (SWRCB) as the state water quality planning and control agency and gives authority to nine, semi-autonomous Regional Water Quality Control Boards (RWQCB) to carry out water quality planning and control activities within their regions. The State Water Resources Control Board (SWRCB) provides program guidance and oversight, allocates funds, and reviews RWQCB decisions. In addition, the SWRCB allocates rights to the use of surface water. The RWQCBs have primary responsibility for individual permitting, inspection, and enforcement actions within each of the nine hydrologic regions. The SWRCB and RWQCB have numerous nonpoint source related responsibilities, including monitoring and assessment, planning, financial assistance, and management.

The SWRCB and RWQCB issue permits for the discharge of fill material into surface waters through the State Water Quality Certification Program, which fulfills requirements of Section 401 of the CWA and the Porter-Cologne Water Quality Control Act. Projects that require a Section 404 CWA permit are also required to obtain a Water Quality Certification in accordance with Section 401 of the CWA. If a project does not require a federal permit but does involve discharge of dredge or fill material into surface waters of the State, the SWRCB and RWQCB may issue a permit in the form of Waste Discharge Requirements.

Bay Conservation and Development Commission

McAteer-Petris Act

Enacted in 1965, the McAteer-Petris Act (California Government Code Section 66600 et seq.) established the San Francisco Bay Conservation and Development Commission (BCDC) as a state agency charged with

preparing a comprehensive and enforceable plan for the conservation of the water of the San Francisco Bay and the development of its shoreline for the long-term use of the Bay. In 1969, BCDC submitted the completed San Francisco Bay Plan to the Governor and Legislature. The McAteer-Petris Act was later amended to give the Bay Plan the force of law. BCDC has jurisdiction over all filling, dredging, and changes in use in the San Francisco Bay; regulates new development within 100 feet of the shoreline subject to tidal action to ensure that maximum public access to the Bay is provided; and ensures that the limited amount of shoreline suitable for regional high-priority water-oriented uses is reserved for such purposes. Any person or governmental agency wishing to place fill, to extract materials, or to make any substantial change in use of any water, land or structure within BCDC jurisdiction must secure a permit from BCDC.

California Department of Fish and Wildlife

California Fish and Game Code

The CDFW derives its authority from the Fish and Game Code of California. The California Endangered Species Act (CESA) (Fish and Game Code Section 2050 et. seq.) prohibits “take” of State-listed threatened and endangered species. Take under CESA is restricted to direct harm of a listed species and does not prohibit indirect harm by way of habitat modification. Fish and Game Code Sections 3503, 3503.5, and 3511 describe unlawful take, possession, or needless destruction of birds, nests, and eggs. Section 3511 specifically prohibits any take of Fully Protected birds and states that no provision of the Fish and Game Code or any other law shall be construed to authorize the issuance of a permit or license to take a fully protected bird species. The only circumstances under which CDFW may authorize the taking of a fully protected bird is for necessary scientific

research or efforts to recover fully protected, threatened, or endangered species.

Species of Special Concern (CSC) is a category used by CDFW for those species considered to be indicators of regional habitat changes or considered to be potential future protected species. Species of Special Concern do not have any special legal status except that afforded by the Fish and Game Code. The CSC category is intended by the CDFW for use as a management tool to include these species into special consideration when decisions are made concerning the development of natural lands. The CDFW additionally prohibits take for species designated as Fully Protected under the CFGC under various sections.

Projects that would result in take of any State-listed threatened or endangered species are required to obtain an incidental take permit (ITP) pursuant to Fish and Game Code Section 2081. The issuance of an ITP is dependent upon the following: 1) the authorized take is incidental to an otherwise lawful activity; 2) the impacts of the authorized take are minimized and fully mitigated; 3) the measures required to minimize and fully mitigate the impacts of the authorized take are roughly proportional in extent to the impact of the taking on the species, maintain the applicant's objectives to the greatest extent possible, and are capable of successful implementation; 4) adequate funding is provided to implement the required minimization and mitigation measures and to monitor compliance with and the effectiveness of the measures; and 5) issuance of the permit will not jeopardize the continued existence of a State-listed species. CDFW also has authority to administer the Native Plant Protection Act (Fish and Game Code Section 1900 et seq). The Act requires CDFW to establish criteria for determining if a species, subspecies, or variety of native

plant is endangered or rare. Under Section 1913(c) of the Act, the owner of land where a rare or endangered native plant is growing is required to notify the department at least 10 days in advance of changing the land use to allow for salvage of the plant.

City of Berkeley

Oak Tree Ordinance

Ordinance No. 6905-N.S. of the Berkeley Municipal Code (BMC) declares a moratorium on the removal of coast live oak trees, to prohibit any pruning of an oak that is excessive and injurious to the tree. Under this ordinance, the "removal of any single stem coast live oak tree of a circumference of 18 inches or more and any multi-stemmed coast live oak with an aggregate circumference of 26 inches or more at a distance of four feet up from the ground within the City of Berkeley," is prohibited. An exception may be made to this ordinance if the City Manager finds that any tree is a potential danger to people or property due to its condition, and that the only reasonable mitigation would be tree removal.

Measure L Open Space

Berkeley voters passed Measure L in 1986, ensuring that all existing City open space would be preserved for open space use. Measure L established the requirement for a vote of the people to use or to develop a public open space or park for any purpose other than public park or open space unless a State of Emergency has been declared. The measure also requires that the City Council acquire and maintain public parks and open space, with the highest priority for funding going to census tracts and neighborhoods having less than the minimum amount of open space (two acres) relative to population (per 1,000.)

California State Lands Grant of 1913

In 1913 the California State Lands Commission granted all rights, title and interest to all sovereign salt marsh, tidal and submerged lands within the 1913 boundaries to the City of Berkeley in trust. The lands were restricted to use for the establishment, improvement, and operation of a harbor, including wharves, docks, piers, slips, and quays; and all associated utilities, structures, and facilities necessary for the convenient promotion and accommodation of commerce and navigation. In 1961 the grant was amended to approve additional uses that had general statewide interest, such as airports, highways, public recreation, small boat harbors, restaurants, and landscaping. Within the 1913 boundaries of the City of Berkeley for projects qualifying as described above, no lease is required from the California State Lands Commission.

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1.5.2 Potential Funding Sources

California Department of Parks and Recreation

Land and Water Conservation Fund Act of 1965

The Land and Water Conservation Fund (LWCF) Act of 1965 was enacted to help preserve, develop, and ensure access to outdoor recreation facilities to strengthen the health of U.S. Citizens. The act created the LWCF in the U.S. Treasury as a funding source to implement its outdoor recreation goals. The LWCF provides funding to federal agencies for land acquisition, funds federal programs with natural resource-related purposes, and provides financial assistance to states through authorization of a matching grant program to assist in recreational planning, acquiring recreational lands and waters, and developing outdoor recreational facilities. There are two types of grants, traditional (formula) and competitive, both administered by the National Park Service or their state partners. In California, the Local Agency LWCF Competitive Program is administered by the California Natural Resources Agency Department of Parks and Recreation.

Grant eligible local agencies are Cities and Counties; federally recognized Native American tribes; joint powers authorities where all members are public agencies and at least one is a local public agency or district formed for the purpose of providing park and recreation areas; non-state agency recreation and park districts and special districts with authority to acquire, operate, and maintain public park and recreation areas.

The maximum grant amount available is \$6,000,000 and a range may be requested. A match is required and must be no less than 50% of the total project cost and can range from 50% to 99% of the total project cost, i.e. the grant can fund no more than 50% of the total project cost.

Eligible project types are land acquisition projects or development projects, but must be for one type only, no combination acquisition and development projects. All projects must meet at least one of the Statewide Comprehensive Outdoor Recreation Plan (SCORP) priorities, which are updated every five years. These priorities linked with the selection criteria drive the selection process. Projects that address more than one SCORP priority will be more competitive.

Current 2015 (2020 is not yet available) SCORP priorities include:

- Create new parks within a half-mile of underserved communities;
- Expand existing parks to increase the ration of park acreage per resident in underserved areas;
- Renovate existing or create new outdoor facilities within existing parks not currently under federal LWCF Act protection;
- Provide community space for healthy lifestyles, children's play areas, environmental justice, cultural activities, historic preservation
- Engage community residents during the project concept and design process; and
- Increase the inventory of California Wetlands under federal LWCF Act protection that also meets public outdoor recreation needs through the efforts of multiple agencies.

Any in kind funds and/or donations used as a match cannot have any restrictions that might limit its intended public recreation use. Also, for acquisition projects, any donated real property used as all or part of the matching share must be acquired during the grant performance period and cannot have any restrictions that might limit its intended public recreation use.

Statewide Park Program

This program funds projects that create new parks and new recreation opportunities in critically underserved communities across California. Eligible applicants include cities, counties, districts, joint powers authorities (one member must be an eligible district, city, or county), and non-profit organization with 503(c) status. Eligible projects must involve either development or a combination of acquisition and development that creates a new park, expands an existing park, or renovates an existing park. All projects must create or renovate at least one recreation feature. Examples of recreation features include:

- Athletic fields or courts, or aquatic center, pool, fishing pier or paddling launch site;
- Jogging and walking loop, par course, or running track;
- Non-motorized trail, pedestrian/bicycle bridge, greenbelt/linear park;
- Open space and natural area for public recreational use;
- Playground and tot lot, picnic/barbeque areas, or dog park;
- Lighting to allow for extended night time use of a recreation feature; and,
- Shade structure/covered park areas to allow for extended day time use.

A project may also include major support amenities such as restroom building, snack shack, parking lot, staging area, pathway for access to a recreation feature, and landscaping or lighting construction throughout the park. A new recreation opportunity should be the primary goal. Projects where a majority of the total project cost is for a major support amenity will be less competitive. The minimum grant request per application/park is \$200,000 and the maximum per application/park is \$8,500,000. No match is required.

Recreational Trails Program

The Recreational Trails Program (RTP) is a U.S. Department of Transportation Federal Highway Administration (FHWA), state-administered local assistance program. At the state level the program is jointly administered by the Department of Parks and Recreation and the California Department of Transportation Active Transportation Program. The RTP provides funds to States to develop and maintain recreational trails and trail-related facilities for both non-motorized (through the Office of Grants and Local Services) and motorized (through the Off-Highway Motor Vehicle Recreation Division) recreation trail uses.

The non-motorized RTP funds recreation trail projects for pedestrians, bicyclists, and equestrians that may also serve as non-motorized transportation corridors. Eligible entities are cities and counties, districts, state agencies, federal agencies, and non-profit organizations with management responsibilities of public lands. For land acquisition projects, a Uniform Appraisal Standards for Federal Land Acquisitions appraisal is required before the project is recommended to the FHWA. Eligible development projects include construction of new trails, renovation of existing trails, pedestrian bridges over roads and waterways, and development of trailhead facilities (parking lot/staging area, restrooms, kiosk, entry gate) and features (benches, interpretive signage, drinking fountains). Landscaping is eligible only if the landscaping is needed to prevent erosion or trail degradation and it is immediately adjacent to the trail. Habitat restoration is eligible if it is needed where a trail is being realigned and the old trail alignment is decommissioned and restored to a natural state.

For development projects with trails, trails must be separated from a road and not within a road right-of-

way. A bike lane on a road is not eligible. Sidewalks are generally not considered trails. Any portion of a trail that extends into a road right-of-way is not eligible. Routine maintenance such as slough and berm, brushing, slurry seal, and crack repair is not eligible.

FHWA funds have been apportioned for FY 2021-2024; however, no information was available on the amount to be obliged in California for the RTP. The current recommended maximum grant request is no greater than \$1,560,000 per application. There is a match requirement with a maximum amount of RTP funds of 88% of the total project cost. Eligible matching sources are state funds, including state grant funds; local funds, including general funds and bond funds; private funds; donated materials and services; value of donated land; other federal funds.

Habitat Conservation Fund

The State appropriates approximately \$2,000,000 annually for the Habitat Conservation Fund for the protection of fish, wildlife, and native plant resources, acquisition or development of wildlife corridors and trails, and providing nature interpretation programs and other programs that bring urban residents into park and wildlife areas. Eligible projects must be either acquisition or for development, restoration, enhancement, or Wildlife Area Activities. Projects combining acquisition or development with any other category are not eligible.

Seven funding categories with separate application guides are available:

- Rare, Endangered, Threatened, or Fully Protected Species Habitat;
- Deer/Mountain Lion Habitat;
- Anadromous Salmonids and Trout Habitat;
- Riparian Habitat;

- Wetlands, including adjacent uplands;
- Trails; and,
- Wildlife Area Activities.

Eligible entities are cities, counties, and any regional park, open space, or recreation park district. There is no minimum or maximum grant request amount specified; however, the State recommends that grant requests generally should not exceed \$200,000. There is a dollar-for-dollar matching funding requirement. The match must be spent on eligible costs and may not come from another state funding source. Up to 25% of the grant and match amounts may be combined to cover pre-construction costs.

Less than fee simple property agreements must have a renewal clause and require at least 10 or 20 years of public recreation operation, depending on the amount of funds requested. Deed restrictions are required for conservation easements. Trails projects may be nearby or connect to neighborhoods, school sites, and/or employment locations. Projects that connect to all three locations will receive the maximum number of points for that criterion. Projects arising from a mitigation ruling at an offsite location and restoration maintenance costs are not eligible.

Recreational Trails Program

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Local Services) and motorized (through the Off-Highway Motor Vehicle Recreation Division) recreation trail uses. The non-motorized RTP funds recreation trail projects for pedestrians, bicyclists, and equestrians that may also serve as non-motorized transportation corridors. Eligible entities are cities and counties, districts, state agencies, federal agencies, and non-profit organizations with management responsibilities of public lands. For land acquisition projects, a Uniform Appraisal Standards for Federal Land Acquisitions appraisal is required before the project is recommended to the FHWA.

Eligible development projects include construction of new trails, renovation of existing trails, pedestrian bridges over roads and waterways, and development of trailhead facilities (parking lot/staging area, restrooms, kiosk, entry gate) and features (benches, interpretive signage, drinking fountains). Landscaping is eligible only if the landscaping is needed to prevent erosion or trail degradation and it is immediately adjacent to the trail. Habitat restoration is eligible if it is needed where a trail is being realigned and the old trail alignment is decommissioned and restored to a natural state.

For development projects with trails, trails must be separated from a road and not within a road right-of-way. A bike lane on a road is not eligible. Sidewalks are generally not considered trails. Any portion of a trail that extends into a road right-of-way is not eligible. Routine maintenance such as slough and berm, brushing, slurry seal, and crack repair is not eligible.

FHWA funds have been apportioned for FY 2021-2024; however, no information was available on the amount to be obligated in California for the RTP. The current recommended maximum grant request is no greater than \$1,560,000 per application. There is a match requirement

with a maximum amount of RTP funds of 88% of the total project cost. Eligible matching sources are state funds, including state grant funds; local funds, including general funds and bond funds; private funds; donated materials and services; value of donated land; other federal funds. Habitat Conservation Fund

The State appropriates approximately \$2,000,000 annually for the Habitat Conservation Fund for the protection of fish, wildlife, and native plant resources, acquisition or development of wildlife corridors and trails, and providing nature interpretation programs and other programs that bring urban residents into park and wildlife areas. Eligible projects must be either acquisition or for development, restoration, enhancement, or Wildlife Area Activities. Projects combining acquisition or development with any other category are not eligible.

Seven funding categories with separate application guides are available:

- Rare, Endangered, Threatened, or Fully Protected Species Habitat;
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- Riparian Habitat;
- Wetlands, including adjacent uplands;
- Trails; and,
- Wildlife Area Activities.

Eligible entities are cities, counties, and any regional park, open space, or recreation park district. There is no minimum or maximum grant request amount specified; however, the State recommends that grant requests generally should not exceed \$200,000. There is a dollar-for-dollar matching funding requirement. The match must be spent on eligible costs and may not come from another

state funding source. Up to 25% of the grant and match amounts may be combined to cover pre-construction costs.

Less than fee simple property agreements must have a renewal clause and require at least 10 or 20 years of public recreation operation, depending on the amount of funds requested. Deed restrictions are required for conservation easements. Trails projects may be nearby or connect to neighborhoods, school sites, and/or employment locations. Projects that connect to all three locations will receive the maximum number of points for that criterion. Projects arising from a mitigation ruling at an offsite location and restoration maintenance costs are not eligible.

California State Parks Division of Boating and Waterways

The California State Parks Division of Boating and Waterways administers several grant and loan programs designed to improve and enhance recreational boating infrastructure and safety throughout the state. Current grant program opportunities available to local public agencies include boat launching facilities, boating infrastructure, sewage management grants, shoreline erosion control and public beach restoration, and surrendered and abandoned vessel exchange.

The Publicly Owned Recreational Marina loan program is available to local public entities for funding to plan, design, renovate, and construct small craft harbors, marinas, dry storage facilities and fund emergency repairs. Loan applicants must have a dedicated source of revenue, a specific revenue stream to repay said loan, and the dedication of the revenue source must remain in full force and effect until the loan is fully repaid.

Application submittals require CEQA and NEPA compliance or a plan for compliance; applicants must obtain any and all permits for the project, complete a benefit/cost analysis, and prepare a feasibility report demonstrating the project is economically justified and feasible from both an engineering and financial perspective.

California Coastal Conservancy

The Coastal Conservancy (Conservancy) funds a wide variety of projects within their jurisdiction, which runs the length of California's coast and includes the San Francisco Bay, the Santa Ana River corridor, and coastal wetlands. In general, the Conservancy funds implementation of multi-benefit projects that: protect the natural and scenic beauty of the coast, enhance wildlife habitat, help the public to get to and enjoy beaches and parklands, keep farmland and timberlands in production, improve water quality, revitalize working waterfronts, and prepare communities for the impacts of climate change.

Eligible entities include government agencies (federal, state, local, and special districts), federally recognized tribes, and certain nonprofit organizations. The Conservancy may fund property acquisition and project planning, design, and/or construction. Regional planning, research, monitoring, and assessment projects will generally be considered only when directly tied to the furtherance of on-the-ground projects.

Projects should meet the goals and objectives in the Conservancy's Strategic Plan as well as being consistent with the purposes of the funding source, typically bond funds. The Conservancy bases the size of awards on project needs, benefits and competing demands for existing funding. There are no established minimum or

maximum grant amounts for most Conservancy programs.

Several statutory programs have been established including Coastal Access, Natural Resource Enhancement, Watershed Restoration, Urban Waterfronts, Environmental Education, and Climate Change. The San Francisco Bay Area Conservancy Program was added to the Conservancy's enabling legislation (Division 21 of the California Public Resources Code) in October 1997 to address resource and recreational goals within the entire nine county San Francisco Bay Area. While there is substantial overlap in the goals and objectives between the coastal regions and the San Francisco Bay Area, the Bay Area Conservancy Program is treated as its own section within the strategic plan because of its unique legislative mandate and jurisdiction.

The 2018-2022 Strategic Plan for the San Francisco Bay Area Conservancy Program has four major goals: 1) improving public access; 2) conserving and enhancing habitat; 3) implementing the Coastal Act, San Francisco Bay Plan, and other adopted plans; and 4) providing recreational and educational opportunities in open space and natural areas to urban populations. In addition to meeting the goals and objectives of the Strategic Plan, project applications should provide information that will enable consideration of any applicable project selection criteria established by the Conservancy's board. As of 2014, some of the required criteria are:

- Urgency;
 - Resolution of more than one issue;
 - Leverage (services or funding contributions by other entities);
 - Innovation;
 - Return to the Conservancy (funds repaid); and,
 - Minimization of greenhouse gas emissions among several others.
- Promotion and implementation of state plans and policies;
 - Support from the public;
 - Greater-than-local interest; and,
 - Sea-level rise vulnerability.
- Additional criteria identified include:

Part 2 5-Year Capital Improvement Project Priorities

DRAFT

2.1 Waterside Infrastructure Priorities

Annual Inspection and Maintenance

In addition to the list of capital improvements below, Moffatt & Nichol recommends that inspections of the docks occur every three years. In particular, the decking surface of the docks, hardware, appurtenances, utilities, and steel members should be inspected. Many of the steel members which support the waterside infrastructure at the marina (pile guides, hinges, etc.) show signs of corrosion damage which need to be monitored and addressed if the steel begins to expand or chip apart. Small repairs should be addressed where possible as part of ongoing maintenance.

5-Year Priority Capital Improvement Projects

Dredge Harbor Entrance Channel + Harbor Basin

Priority: High

Estimate Project Timeline: 2022

Estimated Cost: \$5,500,000

Project Duration: 1 year

Funding Source: Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: BCDC, USACE, RWQCB,

Project Scope: Dredge the Harbor Entrance Channel east of the two breakwaters and the Harbor Basin. The entrance channel will be dredged to -8' MLLW outside the Harbor Basin and the channel within the Harbor Basin will be dredged to -10' MLLW. Slips less than 45' long will be dredged to -8', slips between 45' and 55' will be dredged to -10', and slips larger than 55' will be dredged to -13' MLLW. A paid overdredge allowance of 1' will be permitted. Maintenance dredging should be performed every 10 years in the harbor entrance and every 20 years within the Harbor Basin.

D and E Dock Replacement

Priority: High

Estimated Project Timeline: 2021-2023

Estimated Cost: \$7,500,000

Funding Source: DBAW Loan, Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: BCDC, USACE, RWQCB

Project Scope: Replace and reconfigure D and E Docks. Improvements should include reconfiguration of the dock to better suit the marina's future needs and to maximize revenue generation, addition of ADA access to the docks, improved utility service, and raising of the access pier's finished floor elevation to prevent inundation due to extreme tide and sea level rise. The reconfigured docks should have some larger slips compared to the existing layout to reflect boater trends towards larger vessels.

South Sailing Cove Seawall Replacement**Priority:** High**Estimated Project Timeline:** 2022-2023**Estimated Cost:** \$4,800,000**Funding Source:** Marina Fund, General Fund**Regulatory Agency/Permitting Requirements:** BCDC, USACE, RWQCB

Project Scope: Replace the aging and heavily corroded steel sheet pile wall at the South Sailing Basin with a similar wall with higher top elevation. The elevation for the top of the new wall should be built up to a minimum of +12' NAVD88, to ensure protection of the facilities behind the wall until the year 2050. Connections, abutments, and access piers for the small sailing docks in the South Sailing Basin will likely have to be redone as part of this project.

J Dock Replacement**Priority:** Medium**Estimated Project Timeline:** 2023-2025**Estimated Cost:** \$9,000,000**Funding Source:** DBAW Loan, Marina Fund, General Fund**Regulatory Agency/Permitting Requirements:** BCDC, USACE, RWQCB

Project Scope: Replace and reconfigure the facilities at J Dock. Improvements should include reconfiguration of the dock to better suit the marina's future needs, addition of ADA access to J Dock, improved utility services, and raising of the access piers finished floor elevation to prevent inundation due to extreme tide and sea level rise. Boater trends indicate that people are buying larger vessels and this trend should be reflected in the reconfigured design of the docks with some larger slips.

Harbor Basin North Shoreline Revetment Upgrade**Priority:** Medium**Estimated Project Timeline:** 2025**Estimated Cost:** \$3,000,000**Estimated Project Duration:** 2 years**Funding Source:** Marina Fund, General Fund**Regulatory Agency/Permitting Requirements:** BCDC, USACE, RWQCB

Project Scope: The Harbor Basin revetment between C Dock and G Dock needs to have its crest raised to accommodate sea level rise impacts by 2030. This will mitigate potential inundation of the DoubleTree Hotel parking lots in the event of an extreme high tide. The revetment crest should be raised to a minimum of +12' NAVD88 to ensure protection against storm surge and extreme tides up to the year 2050.

Marina Blvd. Shoreline Revetment Upgrade

Priority: Medium

Estimated Project Timeline: 2025

Estimated Cost: \$4,000,000

Estimated Project Duration: 2 years

Funding Source: Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: BCDC, USACE, RWQCB

Project Scope: The revetment crest for the shoreline segment east of Marina Blvd. needs to be raised by 2030 to prevent overtopping in the event of an extreme tide. The roadway also needs to be raised to provide a 2' freeboard above the projected extreme water level. The crest should be raised to a minimum of +12' NAVD88 to ensure protection against storm surge and extreme tides up to the year 2050.

Please note: The shorelines adjacent to the Virginia St. Ext. and south of University Ave. on McLaughlin Eastshore State Park property need to be raised as well by 2030. However, these segments of shoreline are outside the BMASP project area and a scope and estimate will not be provided for these projects.

South Sailing Basin Dock Extension or New Dock

Priority: Low

Estimated Project Timeline: 2025

Estimated Cost: \$300,000

Estimated Project Duration: 2 years

Funding Source: Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: BCDC, USACE, RWQCB

Project Scope: Extend the length of one of the small sailing docks in the South Sailing Basin so it can be used during low tides. Extension would likely be between 200' and 300' long at a cost of approximately \$1000 per lineal foot of new dock. Project should include a feasibility study with an updated hydrographic survey of the South Sailing Basin. If determined infeasible to extend the existing docks, an alternative would be to install a new dock (approximately 200' in length) at a location where shoaling and water depth is less of an issue.

Fuel Dock Dispenser and Deck Upgrade

Priority: Low

Estimated Project Timeline: 2025

Estimated Cost: \$400,000

Estimated Project Duration: 1 year

Funding Source: Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: BCDC, USACE, RWQCB

Project Scope: Upgrade the existing fuel dock with improved fuel dispenser and decking surface. New deck surface should allow gas lines to run underneath or within the dock modules and should be easily removable or allow for easy access to the gas lines. Upgraded fuel dispenser should offer high speed fueling with a minimum flow of 35 gallons per minute (gpm). New fuel dispenser should have a rotary meter rather than the traditional piston pump mechanism for improved flow speeds. An engineer will need to assess the entire fueling system in order to verify the gas flow speed.

Concrete vs. Aluminum Framed Docks

The replacement docks for D, E, and J Docks should either be made of precast concrete dock modules or should be aluminum framed modules with composite timber decking. Both are adequate options with proven performance in the San Francisco Bay area. A breakdown of the pros and cons for each of these options is presented in the table below.

Precast Concrete	Aluminum Frame with Composite Timber Deck
<p>Pros</p> <ul style="list-style-type: none"> • Stable and uniform walking surface • Less maintenance needed • Longer service life • Higher load capacity <p>Cons</p> <ul style="list-style-type: none"> • Lack of drainage at decking • Expensive to repair/replace • Higher capital costs 	<p>Pros</p> <ul style="list-style-type: none"> • Drainage between deck planks • Cheaper/easier to repair/replace • Lower capital costs <p>Cons</p> <ul style="list-style-type: none"> • Less stable and prone to warping • Shorter service life • More maintenance needed • Lower load capacity

2.2 Landside Infrastructure

5-Year Priority Capital Improvement Projects

Parking Lots

F & G Dock Parking Lot

Priority: High

Estimate Project Timeline: 2022

Estimated Cost: \$301,744

Project Duration: 1 Year

Funding Source: TBD

Regulatory Agency/Permitting Requirements: City of Berkeley, RWQCB WDR

Project Scope: Remove existing pavement. Place new full asphalt section throughout parking lot and install a concrete section at ADA parking and walkways. Parking lot shall be graded to facilitate drainage and treat stormwater.

J & K Dock Parking Lot

Priority: High

Estimate Project Timeline: 2022

Estimated Cost: \$667,560

Project Duration: 1 Year

Funding Source: TBD

Regulatory Agency/Permitting Requirements: City of Berkeley, RWQCB WDR

Project Scope: Remove existing pavement. Place new full asphalt section throughout parking lot and install a concrete section at ADA parking and walkways. Parking lot shall be graded to facilitate drainage and treat stormwater.

O Dock Parking Lot

Priority: High

Estimate Project Timeline: 2023

Estimated Cost: \$459,593

Project Duration: 1 Year

Funding Source: TBD

Regulatory Agency/Permitting Requirements: City of Berkeley, RWQCB WDR

Project Scope: Remove existing pavement. Place new full asphalt section throughout parking lot and install a concrete section at ADA parking and walkways. Parking lot shall be graded to facilitate drainage and treat stormwater.

Launch Ramp Parking Lot

Priority: Medium

Estimate Project Timeline: 2023

Estimated Cost: \$1,175,648

Project Duration: 1 Year

Funding Source: TBD

Regulatory Agency/Permitting Requirements: City of Berkeley, RWQCB WDR. If project extends below Mean High Water, USACE 404/10, RWQCB WQC, and BCDC would be triggered.

Project Scope: Remove existing pavement. Place new full asphalt section throughout parking lot and install a concrete section at ADA parking and walkways. Parking lot shall be graded to facilitate drainage and treat stormwater.

L & M Dock Parking Lot**Priority:** Medium**Estimate Project Timeline:** 2024**Estimated Cost:** \$880,365**Project Duration:** 1 Year**Funding Source:** TBD**Regulatory Agency/Permitting Requirements:** City of Berkeley, RWQCB WDR**Project Scope:** Remove existing pavement. Place new full asphalt section throughout parking lot and install a concrete section at ADA parking and walkways. Parking lot shall be graded to facilitate drainage and treat stormwater.***N Dock/Skates Parking Lot*****Priority:** Medium**Estimate Project Timeline:** 2024**Estimated Cost:** \$1,013,198**Project Duration:** 1 Year**Funding Source:** TBD**Regulatory Agency/Permitting Requirements:** City of Berkeley, RWQCB WDR**Project Scope:** Remove existing pavement. Place new full asphalt section throughout parking lot and install a concrete section at ADA parking and walkways. Parking lot shall be graded to facilitate drainage and treat stormwater.***Seawall/Lordships Parking Lot*****Priority:** Medium**Estimate Project Timeline:** 2025**Estimated Cost:** \$1,413,448**Project Duration:** 1 Year**Funding Source:** TBD**Regulatory Agency/Permitting Requirements:** City of Berkeley, RWQCB WDR**Project Scope:** Remove existing pavement. Place new full asphalt section throughout parking lot and install a concrete section at ADA parking and walkways. Parking lot shall be graded to facilitate drainage and treat stormwater.**Streets*****University Ave (Marina Blvd to Seawall Dr)*****Priority:** Medium**Estimate Project Timeline:** 2024**Estimated Cost:** \$544,681**Project Duration:** 1 Year**Funding Source:** TBD**Regulatory Agency/Permitting Requirements:** City of Berkeley, RWQCB WDR, BCDC**Project Scope:** Grind and replace full asphalt section utilizing full depth reclamation. Replace existing asphalt sidewalks with concrete. Restripe road to integrate bike lanes.***Seawall Drive*****Priority:** Medium**Estimate Project Timeline:** 2025**Estimated Cost:** \$692,587**Project Duration:** 1 Year**Funding Source:** TBD**Regulatory Agency/Permitting Requirements:** City of Berkeley, RWQCB WDR, BCDC**Project Scope:** Grind and replace full asphalt section utilizing full depth reclamation. Install Bay Trail and provide barrier to protect trail along Seawall Drive in conjunction with the street improvements. Install pervious pavement west of Seawall Drive within the off-street parking.

Marina Blvd Off-Street Parking

Priority: Medium

Estimate Project Timeline: 2024

Estimated Cost: \$451,175

Project Duration: 1 Year

Funding Source: TBD

Regulatory Agency/Permitting Requirements: City of Berkeley, RWQCB WDR, BCDC

Project Scope: Install pervious pavement east of Marina Boulevard within the off-street parking. Consider installing Bay Trail to the east of the off-street parking in conjuncture with the parking improvements.

Utilities

Fire Water Loop

Priority: Medium

Estimate Project Timeline: 2022

Estimated Cost: \$1,953,000

Project Duration: 1 Year

Funding Source: TBD

Regulatory Agency/Permitting Requirements: City of Berkeley, RWQCB WDR, BCDC, EBMUD

Project Scope: Coordinate with Caltrans and EBMUD to extend water main on University Avenue east of I-80 to the west across I-80 and connect to the main on West Frontage Road. Install secondary main along University Avenue between West Frontage Road and Marina Boulevard. The West Frontage Road water main will then draw from two sources to create a true fire loop.

Sewer Pumps

Priority: Medium

Estimate Project Timeline: 2022 - 2025

Estimated Cost: \$672,000

Project Duration: 4 Years

Funding Source: TBD

Regulatory Agency/Permitting Requirements: City of Berkeley, RWQCB WDR, BCDC

Project Scope: Design and install new pump station to replace the existing pump stations.

2.3 Facilities

5-Year Priority Capital Improvement Projects

199 Seawall Drive

Priority: High

Estimated Project Timeline: 2022-2023

Estimated Cost: \$5 million

Estimated Project Duration: 1 year

Funding Source: Tenant likely to provide majority of funding.

Regulatory Agency/Permitting Requirements: RWQCB WDR, MBTA if nesting bird abatement/control is necessary

Project Scope: Renovate facility to meet requirements of a new tenant, once identified. The City and tenant will negotiate the City's role, if any, in funding and constructing improvements to this facility.

University Avenue Kiosk

Priority: Medium

Estimated Project Timeline: 2025

Estimated Cost: \$350,000

Estimated Project Duration: 6 months

Funding Source: Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: RWQCB WDR, BCDC

Project Scope: Construct a new entry kiosk near the intersection of University Avenue and Marina Boulevard.

125 - 127 University Avenue

Priority: Low

Estimated Project Timeline: 2024-2025

Estimated Cost: \$1.2 million

Estimated Project Duration: 1 year

Funding Source: Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: RWQCB WDR, MBTA if nesting bird abatement/control is necessary

Project Scope: Address building deficiencies identified in prior engineering assessments.

Marina Office Building

Priority: Low

Estimated Project Timeline: 2024-2025

Estimated Cost: \$1.2 million

Estimated Project Duration: 1 year

Funding Source: Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: RWQCB WDR, MBTA if nesting bird abatement/control is necessary

Project Scope: Address building deficiencies identified in prior engineering assessments.

Shorebird Nature Center

Priority: Low

Estimated Project Timeline: 2025

Estimated Cost: \$40,000

Estimated Project Duration: 6 months

Funding Source: Marina Fund, General Fund

Regulatory Agency/Permitting Requirements: RWQCB WDR, MBTA if nesting bird abatement/control is necessary

Project Scope: Address building deficiencies identified in prior engineering assessments.