

# FLOOD PROTECTION



Redwood Shores Levee Project

## BACKGROUND

Redwood Shores is located on San Francisco Bay and is protected from the bay by a system of levees that were constructed many decades ago. The Federal Emergency Management Agency (FEMA) periodically updates Flood Insurance Rate Maps (FIRMs), and these FIRMs determine whether or not an area is considered a flood plain or a Special Flood Hazard Area (SFHA). Areas that are deemed an SFHA are then required to purchase very costly flood insurance. Law mandates that all federally insured mortgages in SFHAs require flood insurance. Since over 90% of mortgages are federally insured, (Fannie Mae, Freddie Mac, FHA, VA) most communities fall under this mandate and aggressively seek a cost-effective solution to avoid SFHA designation.

## PROJECT SCOPE:

In 2008 FEMA began updating maps in the San Mateo County area. These maps had not been updated since 1982. With changes such as new mapping technology, increased concerns about "Katrina-like" flood events and sea level rise, much of the levee system was deemed unacceptable. In fact, the preliminary map released by FEMA in April of 2008 classified Redwood Shores as an SFHA. In order to reverse the SFHA designation, the city along with San Mateo County officials started an intense effort to work with FEMA and the community to find a viable, economically feasible solution to increase the height, stability and overall integrity of their levee system. Adding to the city's challenge environmental hurdles appeared at every turn including breeding seasons for endangered species, various US Fish & Wildlife regulations and a very limited construction time window. After analyzing multiple options including steel and concrete, a substantial portion of the improved levees were designed with ShoreGuard® Vinyl Sheet Piling. The cantilevered flood wall raises the effective level of the levees by adding 4-5 feet of freeboard. Additionally, the sheet piling also provides seepage protection and defends the levee from rodent damage.

## CONSTRUCTION:

ShoreGuard® had several performance advantages over steel and concrete. First, steel walls need continuous, costly upkeep to prevent excessive corrosion. ShoreGuard® is a corrosion resistant product and is virtually maintenance free. Secondly, steel and concrete require heavy equipment at the jobsite for unloading and staging. ShoreGuard® is comparatively light and easy to handle which is valuable in environmentally sensitive areas. ShoreGuard® and its high strength to weight ratio was a better choice than heavy concrete in the unstable soils of the bay. Two patented features also figured heavily in the material selection process. The CMI patented I-Beam Interloc™ design is optimized to provide lock integrity and maximum stiffness during high-impact installations. The advantages of the I-Beam Lock have long been recognized and specified by industry experts such as the USACE. In addition, the project utilized the patented ShoreGuard® 24" box profile which allows for faster installation and minimal seepage.

## CONSTRUCTION

Due to delays in the permitting process, Valentine Construction had only one month to install the sheet piling wall. During that month, intense storms forced a complete shutdown of the jobsite for almost a week. Teaming up with experienced subcontractor Hughes Construction, crews worked extended hours but they were able to complete the work by the hard deadline. One crew utilized an excavator mounted MKT vibratory hammer while the other used an ABI Mobilram unit. Crews were able to achieve over three times the production rate with the ABI unit compared to the excavator. Soil conditions were typical of the Bay Area comprised mostly of soft to firm clays and sandy clay loams.

## WALL SPECIFICATIONS:

SG 325

<b>Owner:</b> City of Redwood City	<b>Engineers:</b> Jacobs, Bohley Consulting, The Covello Group	<b>Depth</b>	12-20 ft	~4-6 m
<b>Contractor:</b> Valentine Corporation	<b>Date:</b> January 2010	<b>Length</b>	1.675 ft	511 m
		<b>Wall Area</b>	26,800 ft <sup>2</sup>	2,490 m <sup>2</sup>



An ABI mobilram unit helped complete installation of nearly 1700 linear feet wall in about 3 weeks.



ShoreGuard Sheet Piling offers a low carbon-footprint, and was an ideal solution with limited work space and soil conditions.



ShoreGuard is comparatively light and easy to handle which is valuable in environmentally sensitive areas



Completion of this project allowed Redwood Shores to be relieved from the very costly Special Flood Hazard Area FEMA Insurance

**CMI Limited Co. manufactures innovative products which provide value added sustainable solutions for the construction and engineering communities.**

Physical properties are defined by ASTM testing standards, The Aluminum Association Design Manual, The Naval Facilities Design Manual DM 7.2, and The US Army Corps of Engineers General Design Guide: PVC Sheet Pile and/or standard engineering practice. The values shown are nominal and may vary. The information found in this document is believed to be true and accurate. No warranties of any kind are made as to the suitability of any CMI product for particular applications or the results obtained there from. CMI products are covered by one or more of the following U.S. Patents and International Patents: 4,674,921; 4,690,588; 5,292,208; 5,145,287; 6,000,883; 6,033,155; 6,053,666; D420,154; 6,575,667; 7,059,807; 7,056,066; 7,025,539; 7,393,482; 5,503,503; 5,803,672; 6,231,271; 1,245,061CA; 7,914,237 and other patents pending. ©2005-2022 CMI limited Co. All Rights Reserved. CMI\_3-16