VENTURA PROMENADE PROJECT

BY GEORGE LEPORTE

With rising tides and severe storms becoming increasingly more commonplace, seawall integrity has become more and more important for oceanfront communities throughout the world. One city on the front lines of the never-ending war against the ocean is the peaceful surfer's paradise of Ventura, CA. Ventura is a haven for lovers of the sea, and the beautiful Promenade acts as both a barrier to the ever-encroaching sea and a relaxing pedestrian thoroughfare for cyclists, joggers, and dog walkers.

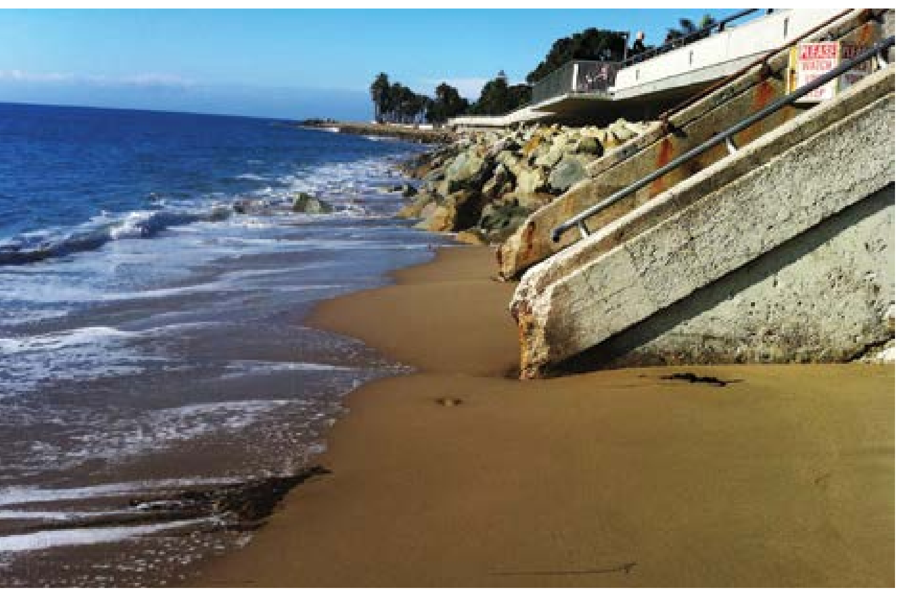

Fig. 1: Ventura seawall coastline

Fig. 2: King tide

Built between 1967 and 1970, the Promenade stretches over 2000 ft (610 m) from the Ventura Pier northwest to the Ventura County fairgrounds. Its average height is 6 to 8 ft (1.8 to 2.4 m) above the typically sand-covered rip rap and cobblestones below, as seen in Fig. 1. This area takes a serious pounding through the winter storm months, as the waves wash away the sand and expose the rock below.

The start of the project was delayed to obtain the necessary permits from the Coastal Commission. This formality is required to ensure that all contractors involved in the project are aware of the rules regarding environmental compliance before construction begins. However, this delay resulted in the project starting in the middle of one of the stormiest winters on record and also coincided with an extremely high tide, otherwise known as a "king tide."

An example of king tide pounding waves can be seen in Fig. 2. These relentless waves and the constant saltwater exposure create a rigorous and demanding environment for concrete structures. These harsh conditions were extremely corrosive to the reinforcement strengthening the Promenade,

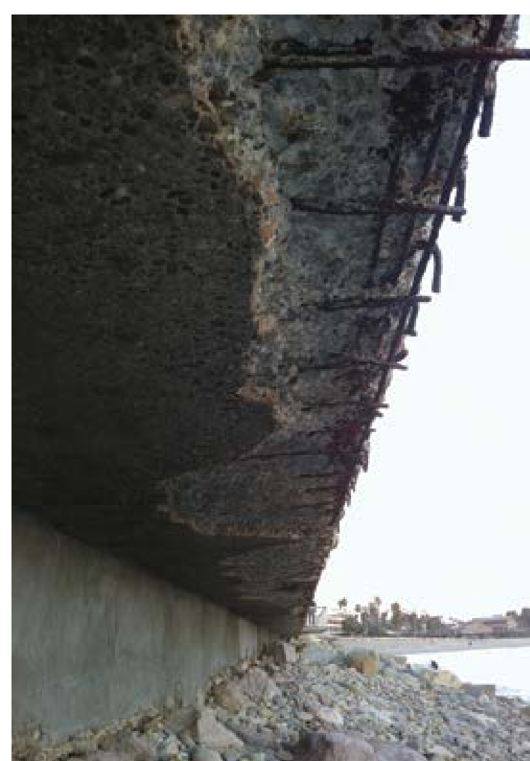

Fig. 3: Existing conditions

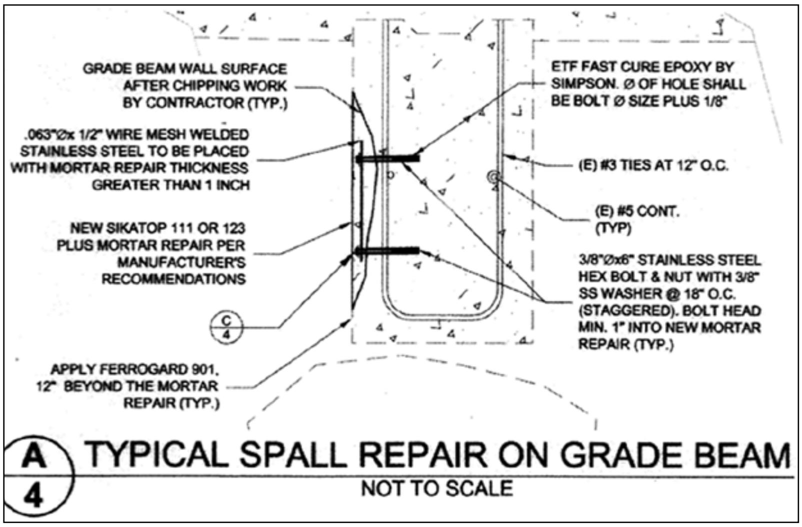

Fig. 4: Plan details


Fig. 5: Initial demolition

and the resulting expansive deterioration is one of the factors that created the need for repairs.

The 2300 ft^2 (214 m^2) of spall repairs were scheduled to be completed in 90 days. The initial investigation (Fig. 3) led to a scope for the project that required the contractor to chip away loose concrete to a depth of approximately 2 in. (15 mm) and attach stainless steel wire mesh secured with stainless steel pins (Fig. 4). To minimize structural damage beyond the delaminated concrete, the repair crew used lightweight electric demolition hammers. The initial demolition went very smoothly because of the low October tides and the failed concrete, which practically fell off by itself (Fig. 5).

Properly trained concrete restoration contractors are aware that all unsound concrete in the repair area must be removed or the applied patching mortar will simply fail and spall again. Most concrete failures are caused by corroded or rusted underlying reinforcement. This project was no exception. As the deteriorated concrete was removed, the depth of the spalls proved to be at least twice the depth that was anticipated and specified (Fig. 6); sometimes it reached as far back as 3 ft (0.9 m) under the cantilevered Promenade.

Because of a possible change in the scope of the project, a meeting with the engineering team was arranged to evaluate the revised conditions. The engineer agreed to follow standard repair methodologies recommended by the manufacturer, the American Concrete Institute (ACI), and ICRI. These procedures involved removing all unsound existing concrete; removing concrete behind the reinforcing steel to provide proper clearance and anchoring of the repair material; cleaning the reinforcing steel down to clean steel with a wire wheel brush; replacing reinforcement with more than 20% deterioration; coating clean steel with a heavy-duty corrosion-inhibiting primer; and patching the repair with a polymer-blended, corrosion-resistant spall repair mortar.

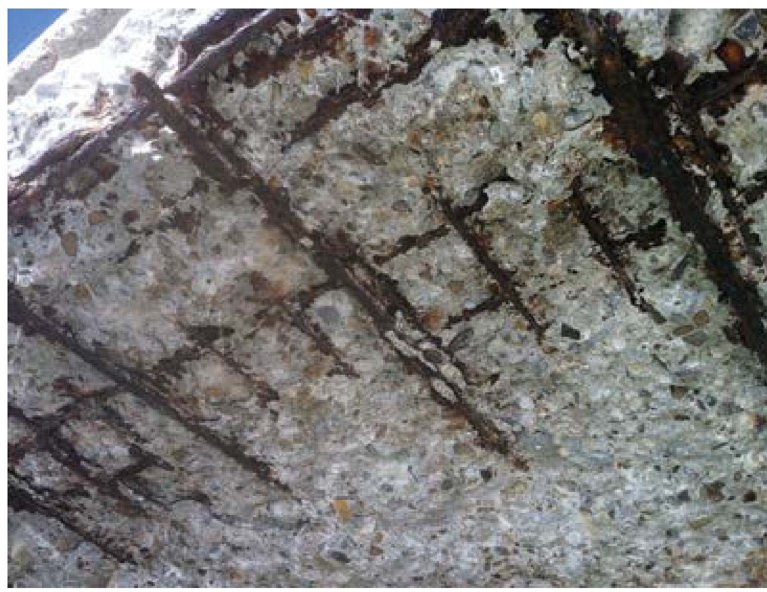
Fig. 6: Condition after initial demolition


Fig. 7: Patching grade beam wall

Fig. 8: Forms in place

Fig. 9: Generators and equipment topside

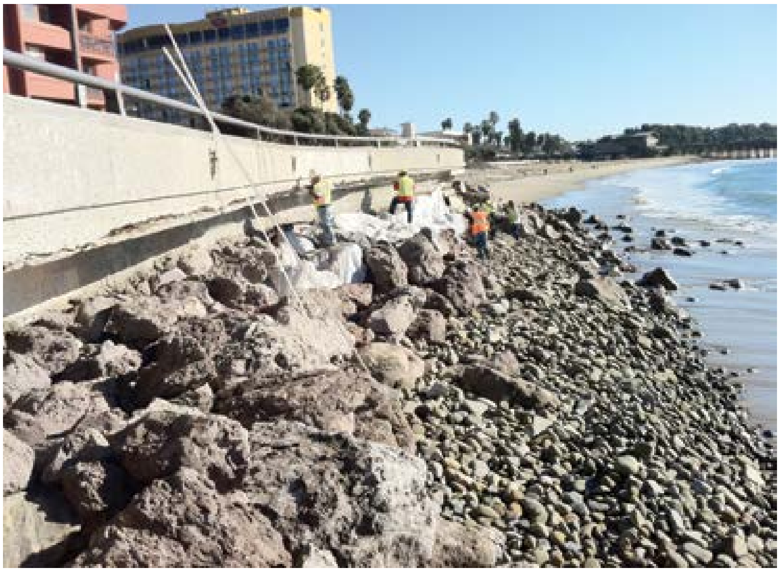

Fig. 10: Shoreline protection

Patching began by repairing the back “grade beam” wall spalls (Fig. 7) with a high-strength, polymer-modified mortar designed with special adhesive qualities for vertical applications. The repair mortar was also chemically treated with a rust inhibitor to further lengthen the life of the spall repair and remaining concrete wall. All of the repair products were approved for use and exposure to potable water and are environmentally stable products. Parapet nose spalls needed to be formed with a double chamfer detail with a similar, pourable mortar (Fig. 8).

Safety is always a primary concern on a job site; it is not worth getting seriously injured or killed for any job. On this project, tidal waves were an unpredictable hazard; occasionally, rogue waves would appear and crash against or breach the Promenade wall. Additionally, the rocks at the base of the wall became very slippery from the water, making it

Fig. 11: Applying final finish

difficult to move quickly to avoid the dangerous waves. Job-site meetings were held frequently, and workers were reminded to stay calm and maintain good footing while working.

Because of the unpredictable nature of the waves, all generators and equipment needed to stay above, and extension cords for demolition hammers and wire wheel grinders were dropped below (Fig. 9). In addition, all equipment had to be hauled topside for the 3- to 4-hour high tides every other week during the new and full moon phases. During the project, there was a storm front that moved south from the Gulf of Alaska that resulted in the evacuation of beach-front residences and closure of the Pacific Coast Highway to the south. This storm, combined with the new moon high tides, resulted in 15 ft (4.6 m) waves pounding the wall during the project repairs and gave perspective as to why the repairs were so important to the community.

In addition to the threat of waves, the other major concern during this project was maintaining a clean work area. To prevent construction debris from contaminating the area, drop cloths were placed on top of the rocks and shoreline (Fig. 10). Because of the potential inundation, all debris was constantly removed from the work area.

Once the repairs were completed, the city of Ventura required additional insurance coats of a penetrating rust inhibitor and a final protective coat of polymer-modified, cementitious, waterproof, protective slurry mortar to give the wall a uniform cementitious, waterproof finish (Fig. 11). This final coating was applied with an air compressor using a stucco hopper, and the coating was back-rolled or brushed for the final finish. Work was conducted around the high tides and work areas were protected with plastic.

The completed project (Fig. 12) restored the beauty of the city's centerpiece and extended the life of this structure for future generations.

George LePorte *is the President and General Manager of Eco Construction and has more than 25 years of experience in the concrete construction, concrete restoration, and specialty coatings business. He is a current LA Board of Directors member of the ICRI Southern California Chapter. LePorte graduated from UCLA with degrees in business economics and psychology.*

Fig. 12: Completed project