Our Ocean Backyard

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Article No. 415

Finishing the Harbor

There were still a few remaining jobs for the extra-large crane before the new harbor was to open for business. The boat launching ramp was a big one. It is a reinforced, six-inch thick reinforced sloping concrete slab which is supported on a number of wooden pilings that were driven into the subsurface to support the slab. The crane had a long reach so could extend far out over the edge of the former lagoon to drive the piles.

The huge crane that Granite had located, disassembled and shipped from an iron mine in Minnesota did its job well. It had excavated 10,000 cubic yards of soil and sand, laid down 250,000 tons of stone for the two jetties, and placed 900 28-ton tetrapods to armor the outer end of the west jetty with no major breakdown. Granite had no future use for such a huge piece of equipment, so put it up for sale and a buyer was soon found. It was dismantled again, put on five railroad flat cars and off it went to some unknown destination.

The west bulkhead along the harbor’s edge was next constructed by driving 40-foot-long, 14-inch-wide interlocking steel sheet piles to retain the fill along the 1200-foot-long border. While this may sound relatively straightforward, it involves a big crane (although not the huge crane) and driving the sheet piles very precisely so that they are perfectly vertical and driven into the subsurface on a straight line. There is an analogy here with framing a two-story house. If the walls on the first floor are not plumb and true, things get very messy on the second floor. When the sheet piles were all driven to a depth of 34 feet with six feet above grade, a reinforced concrete cap was built on top to reinforce and tie the piles together. Material dredged from the bottom of the old lagoon was then used to fill the area behind the wall to create the parking areas and other infrastructure.

This portion of the project didn’t initially go completely has planned, however. There were steel rods that connected the cap on the sheet pile wall to concrete deadmen or anchors buried in the fill six or eight feet inland. These were engineered to keep the wall from tilting towards the harbor due to the load of the large mass of soil placed behind it. However, the sediment from the harbor bottom that was being placed was much heavier than dry sand or soil due to all of the contained water. This led to the wall starting to deform and bend towards the lagoon. The problem was soon recognized and some fill was removed to decrease the load on the wall. This halted the distortion. Engineers determined that the wall needed more structural support, so a four-foot-wide concrete sidewalk was built that was tied to the concrete wall cap with steel reinforcing rod. This increased the strength of the wall and also hid the bends that had developed along the line of the wall. Another problem solved.

The boat repair dock and public pier on the east side of the harbor came next. The repair dock was similar to the west side of the harbor and was constructed with a steel sheet pile bulkhead. The public pier was constructed with creosote impregnated timber piles which were driven with a barge-mounted crane.

One of the final steps of harbor construction was to dredge out the bottom of the former Woods Lagoon to design depths. After all, boats of all sizes were going to use the harbor and the depth had to be great enough at low tide so that boat hulls weren’t hitting the bottom. A dredge was brought in to complete this part of the job, much like the regular dredging that still takes place in the harbor entrance today where sand regularly accumulates.

A dredge works much like a giant underwater vacuum cleaner with a rotating cutting head at the end and then a large amount of water (5000 gallons per minute) that is sucked into a 12-inch diameter pipe along with the sediment. The decision was made to discharge the sediment downcoast from the shorter east jetty about 1000 to 1200 feet offshore. This site was selected by the Army Corps of Engineers as an area where it was believed to cause the least amount of environmental damage. Forty-foot sections of pipe were connected to the dredge, attached to floats and pulled offshore with a tug for disposal. The bottom of the harbor was then dredged to a design depth of 14 feet below sea level. Eventually the sand bar separating the new harbor from the ocean was removed, ocean water flowed in and the harbor was soon ready for business.

One uncertainty in the Corps of Engineers’ pre-harbor study was the annual rate of littoral drift or the amount of sand moving along the shoreline where the harbor was to be built. With very limited evaluation, they estimated that somewhere between 25,000 and 300,000 cubic yards of sand would be moving along the shoreline annually at this location. To say the least, this is a huge range.

In the first two years following harbor construction (1963-1964), the Corps’ largest estimate was reached as approximately 600,000 cubic yards of sand built up against the west jetty which significantly widened Seabright Beach. Some of that sand was soon carried around the west jetty and into the entrance channel. Dredging was required by 1965 and has been an expensive way of life for the harbor ever since. Between 1965 and 2020, over 10 million cubic yards of sediment has been dredged from the harbor entrance. This amount of sand would fill about one million standard dump trucks, or a line 3,400 miles long, which would extend from San Francisco to Houston, Texas and back again. In short, a lot of sand has been dredged from the harbor every year because of where it was built.