

5. Improvement Alternatives

As mentioned in the introduction, the goal of this study is to look at improvements that can be made that allow for the most flexibility, safety, and land lease compliance with respect to the location of the ships utilizing the berth. To this end, there are several proposed improvements to the T-pier that have been developed. These improvements include widening and extending the deck of the T-pier, as well as raising the deck in certain areas. Furthermore, the approach trestle to the T-pier should be replaced. In addition to these improvements, operational improvements may include catwalks upgrades to the remote mooring dolphins.

The improvements begin with selective demolition. As the T-pier and approach trestle are nearing the end of their useful lives, it is recommended that the original structures be demolished as opposed to retrofitted. The proposed demolition is shown in Figure 4. The existing approach trestle and the T-Pier with the exception of the integral dolphin section on the northern end of the structure will be demolished. It is possible that the existing T-pier could be widened and extended; however, the existing pier and concrete pile supported dolphin are likely to have structural issues due to age and usage by vessels larger than the original design vessels. Integrating a long-life structure with it would not be cost-efficient and may exacerbate any hidden structural damage; therefore, we do not recommend that approach. Demolition of these concrete pile support sections is therefore recommended as shown in Figure 4. All of the existing dolphins will remain except for the southern inner dolphin.

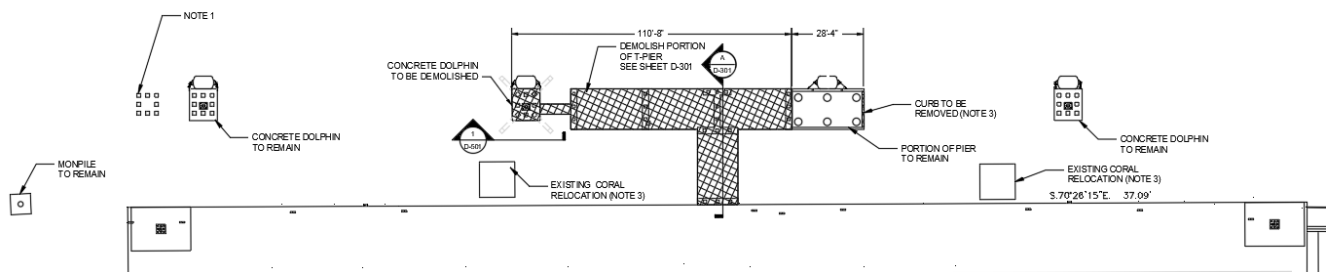


Figure 4: Proposed Demolition

The proposed improvements are shown in Figure 5. The improvements include a new T-Pier and approach trestle ~~as well as a new mooring dolphin~~. The new T-Pier surrounds the one remaining existing dolphin area providing a wider and longer berth and includes a wider approach trestle.

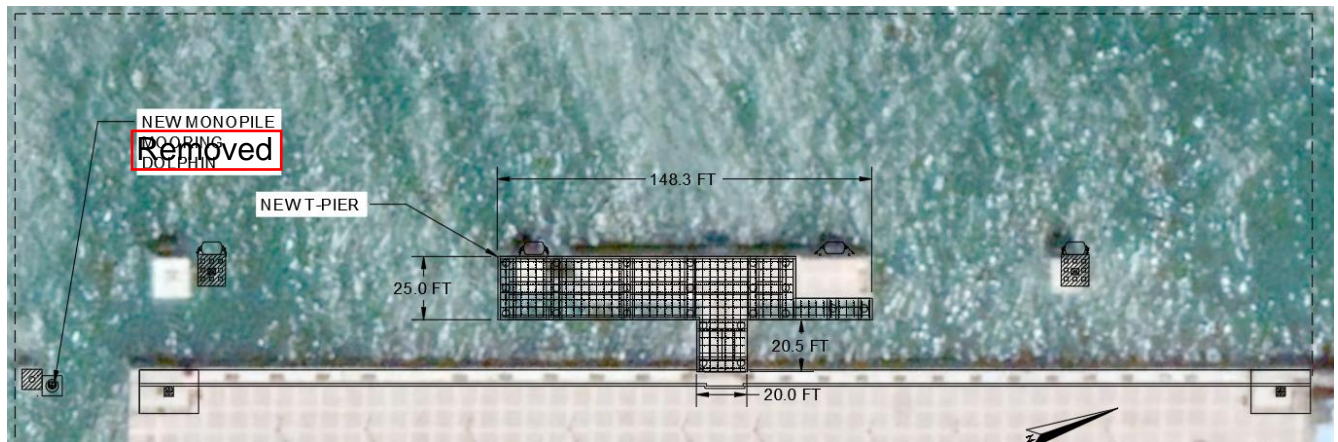


Figure 5: Proposed improvements

5.1 Dock Widening and Extension

The operational limitations discovered during the data collection exercise showed that lengthening the pier would allow for safer and more optimal access to a majority of the vessels. Lengthening the pier to the south will be the most effective in allowing for better positioning of the ships along the pier and to match with the location of most passenger doors. The new length of the pier will be 148'-3". The lengthening will be in the southern direction.

The pier is proposed to be widened from 16 feet to 25 feet. The additional width will improve accessibility and safety so that the conditions as shown in Figure 3 no longer occur.

The pier would require a new 100-ton bollard as well as four 30-ton cleats (two at each end) to accommodate the smaller vessels. In addition, the southern end of the pier would be outfitted with a new foam filled fender.

With the removal of the inner southern dolphin, the height of the new T-Pier would remain at 6.5 feet as shown in Figure 6.

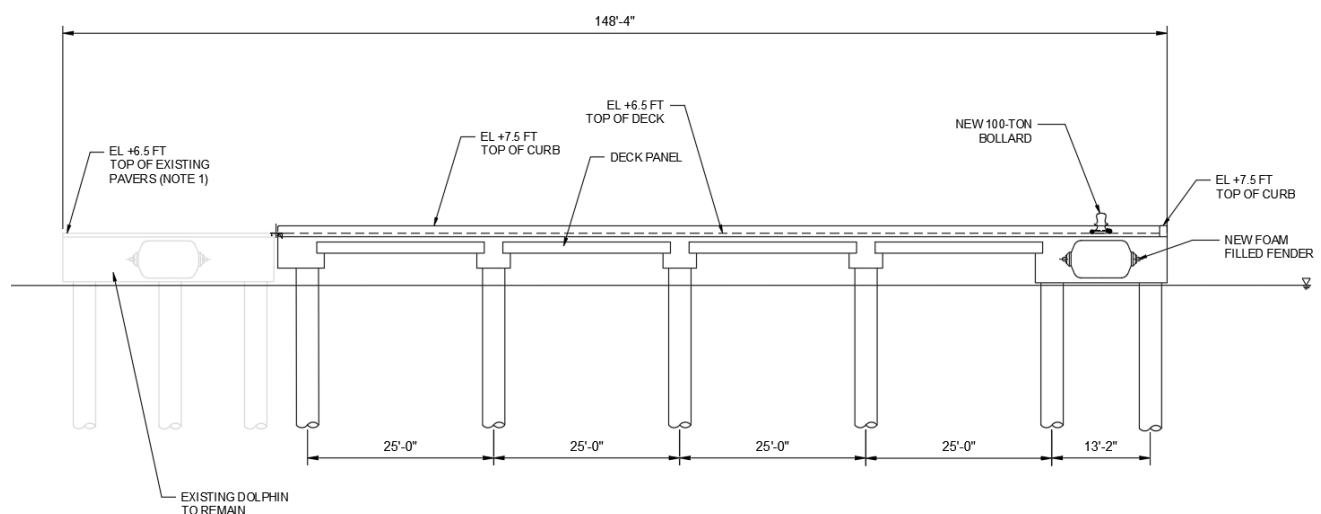


Figure 6: Elevation View of Proposed T-Pier

5.2 Additional Monopile Dolphin

~~To increase the safety and flexibility of the vessel moorings at the Mallory Square Berth, an additional monopile dolphin should be constructed at the southern end of Mallory to allow for additional mooring points for more efficient line angles for the breast lines. The monopile dolphin would be fitted with a 150 metric ton bollard. This monopile would be required only by the larger vessels. This monopile is recommended as newer vessels tend to user higher strength mooring lines to reduce the number of lines required to safely moor.~~

5.3 Approach Trestle Replacement

The original study recommended widening the approach trestle from 16 feet to 20 feet to improve operations due to a proposed tender drop-off along the trestle. As that option has been removed from consideration, the current width of the trestle is sufficient; however, a 20-foot-wide trestle would provide a safer and more dynamic area which could accommodate utility vehicles.

As with the original T-pier, the structure is 39 years old and nearing the end of its useful life. It also had repair work completed in 2018 to repair spalls and large areas of delamination. It is recommended to replace the existing trestle. Although not presented in this report, a potable waterline extension on to the pier can be included with the proposed improvements as an additive alternate during bidding and construction.