
CALIFORNIA AWARD SUCCESS FOR HOLMES CULLEY

Holmes Culley have been awarded the Structural Engineers Association of Northern California (SEAONC) Award for Best Retrofit Project Using Conventional Technology for the San Francisco Piers 1½, 3 and 5 strengthening (Figure 1).

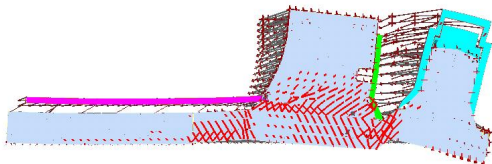
Figure 1 SF Piers



The project was headed by Zander Sivyer of the Holmes Culley San Francisco office with the analysis performed in New Zealand under the supervision of Holmes Technical Director Trevor Kelly.

The analysis was based on the NSP (pushover) procedure which identified the failure mode due to excessive deformations at the ends of the piers (Figure 2).

Figure 2 Pushover at Failure



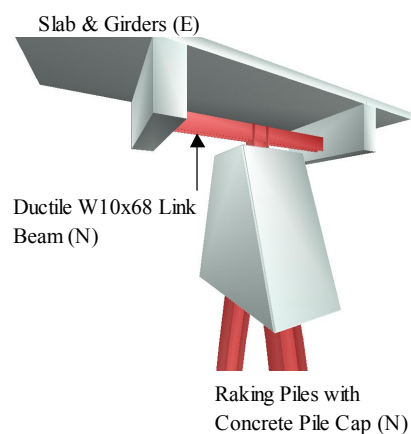
The solution adopted was to restore the corroded condition of the piles and beams using FRP. The overlays also served to increase the curvature ductility capacity of the piles tops.

To reduce plastic rotations in the piles, 7 bracing units as shown in Figure 3 were installed at the ends of the piers. These

units used raked piles to provide the strength, connected by a yielding link beam to introduce flexibility so that the bracing unit deformations were compatible with the existing cantilever piles.

Any operations within SF Bay are subject to intense scrutiny, peer review and regulation so this project represents a major achievement for Holmes Culley.

Figure 3 Bracing Units



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