Title : Assessment of Loading Capacity Fire-Fighting-Platform

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During construction of a Fire-Fighting-Platform, before final concrete casting phase, the incomplete installation of the reinforcement near the pile heads was discovered. As a result, the stirrups would have too little welding length to be fully functional. The loading capacity of the platform would be insufficient to comply with building codes, therefore the platform would either have to be dismantled and rebuilt, or it would have to be strengthened. Dismantling would most likely result in a delayed project completion, financial consequences and legal procedures. Strengthening the platform would be the least disadvantageous option, but only if an underpinned decision could be made rapidly.

The platform is situated off shore in the Mediterranean Sea near Cyprus. It is founded on 38 meter long steel piles which are loaded horizontally by waves and berthed vessels. These horizontal loads generate large pile reactions in opposite directions at their joint. This joint is formed by a small portion of the slab, where large shear and punching forces are introduced into the platform. Due to the incompleteness of the stirrups, a secure connection could not be established. A detailed analysis of the joint was performed to assess the feasibility of repair measures, aiming at preserving the nearly completed platform and avoiding dismantling and project delay.

Using Diana, the effect of the redesign on the ultimate loading capacity of the platform was evaluated, by applying the normative loading schemes from the design calculations. The redesign, consisting of a grid of steel members and adjustments to the upper reinforcement cage, showed to be an effective strengthening measure. The measures have been implemented, preserving the platform and preventing costly delays.

Figure 1: cross-section of platform corner, showing crack developement