Silent, Non-Explosive Demolition Agent Provides Economical Solution to Overpass Seismic Retrofit

S-Mite Compound Cracks Away Concrete to Expose Rebar

S-Mite is poured into drilled holes along one side of the footing. The crack along the left side of the footing shows the results of the S-Mite after roughly 24 hours.of expansion. The crack provides access so a backhoe bucket tooth can pull away the section.

A silent, non-explosive demolition agent is playing a key role in the retrofitting of concrete bridge footings on the I-710/Hwy. 91 interchange in Long Beach, Calif. The general contractor, a joint venture of Adams & Smith and Applegate Construction Company of Concord, Calif., is using the material, called S-Mite, to expose rebar in the existing footings so they can be structurally bonded with a larger concrete footing being poured around them. The new larger footings will strengthen the overpass against seismic damage.

Anthony Will, project manager for Adams & Smith/Applegate, JV, feels the use of the S-Mite is a cost effective alternative to the use of a concrete saw and hydraulic breaker to accomplish the same task of exposing the rebar. S-Mite, manufactured by Sumitomo Cement, is a type of inorganic lime compound. When mixed with water it generates tremendous expansive power.

Caltrans engineer Michael Dipsia explains that an added benefit of using the S-Mite is that the footings and columns are spared the vibration and possible damage resulting from the use of a hydraulic hammer. The specifications allow for a maximum of 1,000 foot pounds of impact by a hydraulic hammer if the contractor elects to use one. According to Will chipping away the edges of the footing would have been time consuming at this low power setting.

An added benefit of using the S-Mite is that the footings and columns are spared the vibration and possible damage resulting from the use of a hydraulic hammer.

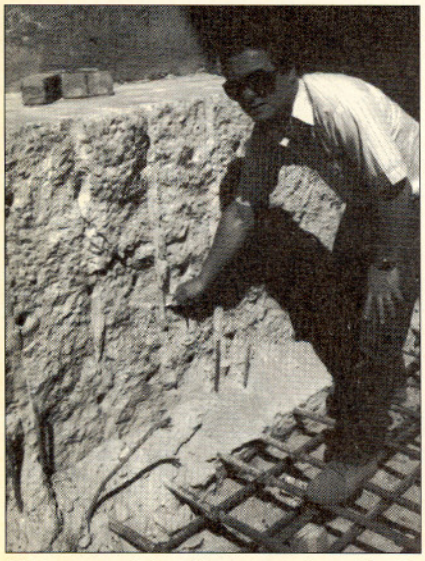
The $2 million contract involves retrofitting 14 concrete footings to prevent them from moving laterally under seismic activity and fitting 48 concrete columns with fabricated steel jackets to preserve their integrity in case they are damaged in an earthquake. The interchange is located adjacent to the Los Angeles River and has a high water table which could

continued on page 20. . .

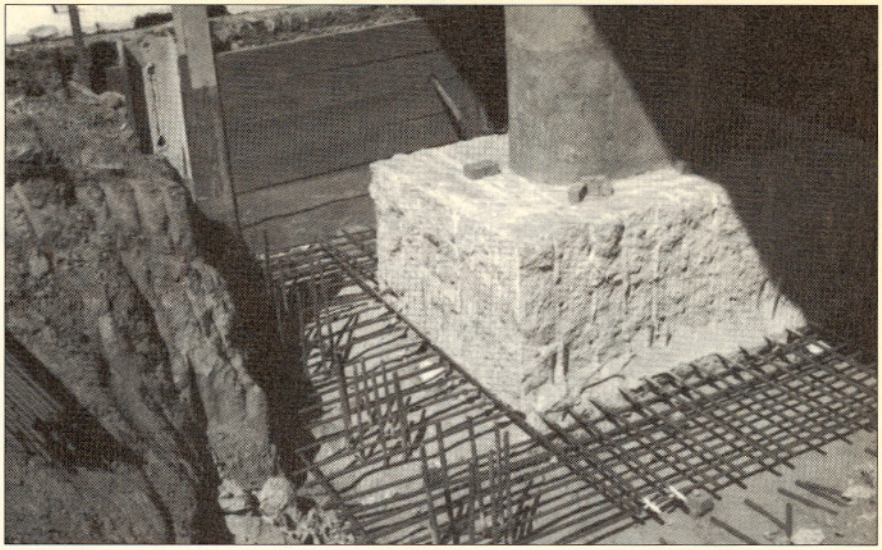
create the same damaging soil conditions as the Oakland Cypress structure.

The first step involves excavating around the footings to expose them. This work is being handled by R. J. LaLonde, the excavating subcontractor. Twenty-four inch diameter holes are drilled to a depth of 60-68 feet alongside the existing footings. The drilling process is complicated by the limited headroom while working under the elevated freeway. The drilling subcontractor, Inter American Foundation and Drilling, employed some unique techniques to bore the holes to the required depth. Fifteen-foot sections of rebar cages are joined as they are placed in the drilled holes. The holes are then filled with concrete to create piles cast in drilled holes (CIDH) to support the enlarged footings.

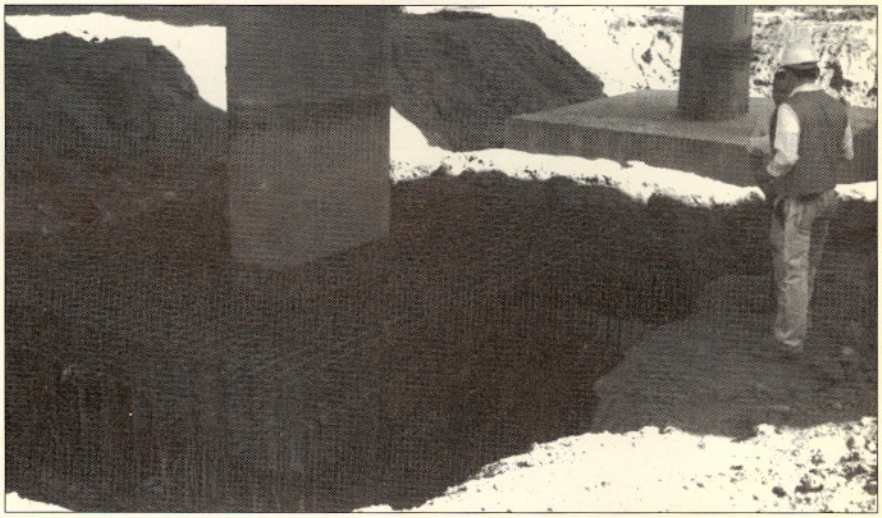
The S-Mite is being used to carve away 10 inches from each side of the footings so that the matt rebar is exposed at the base. One and 1/4-inch diameter holes are being drilled with a handheld pneumatic drill on 10 inch centers almost the complete depth of the 42-inch footings. These holes are filled with S-Mite and left for 18-30 hours. The S-Mite is a form of cement which comes in powder form. It is carefully hydrated with water to a slurry consistency and poured into the 1-1/4-inch drilled holes.



After completing its expansion, the S-Mite turns into a powder which can be brushed away, The exposed mat rebar is visible at the bottom of the photo.



A view of a footing after the outer edges have been removed and the mat rebar welded to the base of the rebar cage for the new footing. The tops of the concrete cast-in-drilled-hole pilings are visible along the left side of the footing.



The larger footing is being cast around the old footing. This photo shows the rebar cage surrounding the footing. A completed footing is visible in the rear

As the S-Mite expands in the holes it cracks the footing in a surprisingly clean plane. The expansion occurs slowly enough that the material locks itself in the hole so that it does not push out of the open top. After it has completed its expansion, it turns into a light powder that can be brushed off the exposed concrete and is not considered a toxic substance. The cracks open one-half to one inch, which allow just enough of a gap to enable the tooth of a backhoe bucket to pull away the separated slab of the footing.

In order to structurally join the existing footing and the new footing the exposed bottom mat rebar is being welded to the new rebar cage and dowels are being inserted into holes drilled into the sides of the footing and epoxied in place. Steel Burke forms are being used to form the new footing, which extends out four feet on all sides of the old footing. The encasing footing is poured with 65-70 cubic yards of concrete.

After the enlarged footings are cast and backfilled, the prefabricated steel jackets will be installed. The jackets are flat rolled plate steel fabricated to tightly fit the contour of the round and eliptical columns. The two halves of each jacket will be tilted into place against the column and welded on two vertical seams.