

The carefully planned, combined use of concrete wire sawing, epoxy anchors and specialized rigging was responsible for savings of \$1,330,000 and 2 months of labor required to demolish a major concrete structure. All technologies used on this job were existing but were employed in unique ways to yield significant savings.

Decommissioning and removal of the 50 year old General Electric Turbine/Generator #7 at Detroit Edison's Trenton Channel Power Plant to allow installation of a new, smaller, yet more powerful and efficient turbine/generator required extensive modification of the existing foundation pedestal. The significantly smaller size of the new equipment meant several options would have to be considered: (1) construct an immense structural steel skid directly on top of the existing tabletop to mount the equipment, (2) modify the existing tabletop to build out into the existing openings enough to hold the new equipment, (3) construct a new concrete tabletop directly above the existing, (4) remove the existing tabletop and construct a new one on the existing piers. Working with Sargent & Lundy Engineers of Chicago, IL, careful functional, economic and structural analysis of all options, and consideration of the tight schedule for this phase of the work, showed us that option (4) was the best approach.

Demolition of the existing 30'x 75'x 8' thick concrete pedestal (approx. 710 tons) would need to be carried out in the interior, third floor area of an operating power house with Unit 7's sister, Unit 8, operating only 30' away. Due to Unit 8's proximity, the elevation of the tabletop and presence of other plant equipment below the third floor level, demolition with jackhammers and the like would be expensive and impractical, if not impossible. We decided to cut the concrete apart into the largest practical pieces and remove them with the turbine house bridge crane. Sargent & Lundy prepared specifications, procedures, and detailed drawings for removal of the tabletop showing the various horizontal and vertical cuts. Concrete Cutting and Breaking of Grand Rapids, MI was contracted to perform the cutting operation. Detroit Edison prepared a scheme for lifting and removing cut pieces. Threaded rod anchors were set with epoxy to hold specially fabricated lifting plates, and the pieces of concrete (the largest being 130 tons) were lifted and set on a specially fitted transformer rail car, rolled out of the building, and moved off the rail car with a mobile crane.

Wire sawing technology has been available for years. However, we believe that this application was unique, because it required (1) numerous cuts to make the pieces small enough to be lifted with the available crane, (2) careful placement of cuts to allow pieces to remain in place until all cuts were made, and (3) accurate tapering of the cuts to allow the resultant jigsaw of pieces to be disassembled by handling each piece only one time to get it to the rail car. And when all the cutting was done, the only cleanup necessary was to sweep the floor!

Epoxies have also been available for years. And most engineers have specified them for holding equipment in place. However, we believe that this application was unique because this was the first time anyone involved with the project knew of epoxy set anchors being used for lifting of massive concrete pieces. Most of the pieces weighed over 100 tons and required 4 specially fabricated lifting plates (base plate and padeye, welded, annealed and NDT tested), each fastened to the top surface of the concrete with 4 ½" diameter x 24" long (18" embedment) threaded B7 rods, set with high strength epoxy. All anchor bolts were set ahead of time, and the single set of lifting plates was used successively for all lifts.

Detroit Edison uses a 12 axle depressed flat car (aka transformer rail car or Schnaubul car) for transport of spare transformers. For this job, the rail car was fitted with special structural steel framework that allowed all the different sizes and shapes of concrete pieces to be carried on the car. Once on the car and rolled out of the building, the pieces were offloaded from the car to a field on the plant grounds with a 500 ton capacity mobile hydraulic crane, the largest available in the Detroit Area. Further demolition of the waste concrete was carried out in the field after the new turbine/generator was operational.

Retrofit of Turbine/Generator Foundation in Operating Power Plant

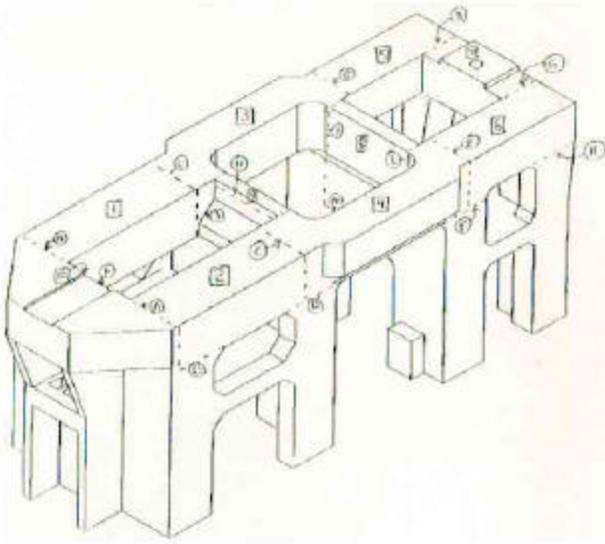


Figure 1 (left). Isometric view of turbine/generator foundation (above ground level) showing cut lines and piece marks. Tabletop is 8' thick.



Figure 2 (right). Wire sawing underway. Note small segment of concrete, already removed, left of the operator.



Figure 3 (left). Lifting of last segment, piece #1 on figure 1 (130 tons). Note clean surfaces on top of remaining piers, facilitating new construction.

Figure 4 (right). Pieces at rest in field, awaiting further demolition. Construction of new tabletop began the day the last piece was removed from the building.

