You’ve heard the old saying: “If it ain’t broke, don’t fix it.” Well, here’s a follow-up: “If it is broke, do fix it—don’t destroy it!” That’s the philosophy Sedki & Russ Structural Engineers embraced when confronted with a rapidly deteriorating parking deck at the Cornerstone Village condominium building in Atlanta.

The original analysis called for the garage to be demolished and rebuilt. However, the homeowners association for the building did not have the funds to build a new parking deck. So, Sedki & Russ found a way to renovate the structure.

Critical Cracking

Cornerstone Village’s original parking deck consisted of concrete slab on steel joists. Almost immediately after the six-story deck was completed in 1999, problems such as cracking in the slab, corrosion of the steel frame (due to water seepage through the cracks), and vibrations and deflection in the deck, began to appear. The cracking got worse with time, and in some locations the slab even punched through the metal deck. Areas where the slab was badly cracked had to be barricaded, and in other locations steel plates and angles were placed under the slab.

The homeowners association hired a testing lab to analyze the situation. The lab’s report stated that the design of the concrete slab did not meet load requirements at mid-span between the joists (per the 1994 Standard Building Code, the slab must support 50 psf live load or a concentrated load of 2,000 lb acting on an area of 20 sq. in.), and it recommended removing the slab and replacing it with a new, lightweight composite floor slab.

The original floor slab specified was 3½ in. thick at the high point and 2½ in. thick at the drains. The slab was on 28-gauge corrugated metal form reinforced with welded wire fabric. The deck was bearing on steel joists at 2 ft 8 in. on center in the driving lanes and 2 ft 6 7⁄8 in. in the parking lanes only. Wood planks, 2 × 6, were cut to fit and added to fill in the valleys of the deck. The wood planks and decking were connected to the slab with ½-in.-diameter carriage bolts at close spacings.

The repairs were inspected monthly and performed satisfactorily for a while, but after approximately two years, the wood started to splinter and the bolts started to loosen. At this point, Sedki & Russ was hired to design the permanent repairs.

Driving Forward

The project had to be completed quickly because of the inconvenience to
The original concrete slab was so badly cracked that it had punched through the deck in some places. Portions of the slab were barricaded.

Throughout the garage, new joists were added in between the original joists to decrease the slab’s span.

The only drawback is that residents don’t get as much exercise walking to their cars anymore.

Marlo Sedki is vice president of marketing with Sedki & Russ Structural Engineers, Inc.