

Road Surface Rehabilitation Ayrton Senna Highway (SP-070) — São Paolo, Brazil



Simpson Strong-Tie worked closely with the client to devise a sustainable solution despite the challenging conditions.

BACKGROUND Cracking from heavy traffic loads caused popular freeway to require costly, inconvenient resurfacing every six months.

The Ayrton Senna Highway, SP-070, is a major link connecting São Paulo to other cities and regions in Brazil, including Campos do Jordão, Vale do Paraíba and Rio de Janeiro. It also serves as the primary access route to Guarulhos International Airport.

Such indispensability, however, can come with a cost over time. By 2010, the freeway's 10" (25 cm)-thick cement-stabilized base course was severely cracked because of the high traffic volume (approximately 90,000 vehicles daily each way) and the unstable subsoil on which the road rests. Damage in the base course created reflective cracking in the asphalt wearing course, which had to be resurfaced almost every six months at substantial recurring costs, not to mention frequent disruptions to the freeway's use.

Given the insufficiency of the maintenance that had been employed in the past, government planners and experts were looking for a more durable solution to the highway's surface deterioration.

PROJECT INFORMATION

Project Ayrton Senna Highway, SP-070, outside São Paulo, Brazil

Project Category Road Surface Rehabilitation

Date 2011

Simpson Strong-Tie Products Carbophalt[™] G pre-bituminized asphalt pavement reinforcement grid

CHALLENGE

Resurface highly trafficked highway in a durable way to save repeated and costly repairs and resurfacings over time.

SOLUTION

Apply pre-bituminized asphalt pavement reinforcement grids to the most heavily trafficked lane.

RESULTS

The reinforced surface outlasted the control lane by more than three to one.

THE CHALLENGE Double the durability of the wearing course, despite the high traffic volume and the unstable subsoil base.

The government was looking to try something different. But in light of the continual heavy traffic use and the unstable base soil, expectations weren't high. At the time, asphalt resurfacing projects typically had a low rate of lasting success under these extreme conditions.

It was decided to use the highway as a test project. A single lane would be treated with an innovative reinforcement solution, while another lane would be used as a test control and simply have its asphalt resurfaced without the reinforcement product. As things happened, engineering interest in this particular project ran so high that the University of São Paulo volunteered to assist in tracking the project, in conducting jobsite tests and observations, and in performing analyses.

The goal was simply to achieve a significant extension of the maintenance intervals by at least doubling the previous six-month lifespan of the wearing course.

THE SOLUTION Apply pre-bituminized glass- and carbon-fiber asphalt reinforcement grids to the busiest lane; track and compare condition at least annually thereafter.

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In April of 2011, Simpson Strong-Tie Carbophalt[™] G asphalt reinforcement grids were installed on various sections of the highway's busiest lane, lane four.

In order to gauge the efficacy of the Simpson Strong-Tie asphalt reinforcement products, a month later, in May 2011, lane three was also resurfaced, only without any reinforcement grids. Five follow-up reviews of the highway's surface were undertaken in February 2012, September 2012, May 2013, June 2014, and January 2015.

THE RESULTS The reinforced lane had a repair-free lifetime more than three times as long as that of the unreinforced lane that was resurfaced a month later.

Results for the Simpson Strong-Tie asphalt reinforcement easily exceeded the project owners' initial expectations. The goal had been to extend the maintenance intervals from six months to a year. But while the unreinforced resurfacing had to be repaired or completely repaved three times in the next three years (by June 2014) because of excessive cracking, the grid-reinforced lane four remained in good condition for better than two full years (through May 2013). By June 2014, light cracks were appearing, but they weren't extensive enough for the lane to be deemed unsafe or in need of resurfacing, and it passed the external inspection by the government transportation agency ARTESP.

Almost four years after installation of the reinforcement grids, no further degradation of lane four had been observed in the January 2015 inspection and at least another year of service life was predicted without the need for resurfacing. In August of that year, however, it was decided to alter the road profile to incorporate needed new exits for the airport. The road structure was completely renovated at that time, which included finally replacing the unstable subsoil base. Further project monitoring was therefore no longer possible.

As long as the original freeway continued, however, so did the Carbophalt G grid-reinforced surface of lane four — close to four times as long as originally desired. Despite being installed on the road's busiest lane, the reinforcement spared the highway's owners three costly and disruptive repairs or resurfacings compared to lane three.



March 2011 — Highway inspection. The highway inspection revealed that there was severe cracking on the road surface prior to the installation of reinforcement grid.

THE RESULTS (cont.)



April 2011 — Lane four repaved with asphalt reinforcement grid. The road surface was milled and the asphalt reinforcement grids were laid onto tack coat.



May 2011 — Lane three repaved without asphalt grid reinforcement for comparison. Lane four repaved with S&P asphalt reinforcement grids in April 2011, Lane three repaved without grids in May 2011.



February 2012 — 10 months elapsed. Lane four remained in very good condition. Lane three, however, was already showing signs of degradation and punctual repairs were carried out.



September 2012 — 17 months elapsed. Again, lane four remained in very good condition, but lane three was already completely repaved for a second time.



May 2013 – 25 months elapsed. While lane four remained in good condition, lane three was yet again showing signs of heavy damage and in need of repaving for a third time.



June 2014 — 37 months elapsed. Although light cracking appeared on lane four, it passed the inspection from ARTESP and was deemed safe. Lane three was repaved for the third time.



January 2015 — 45 months elapsed. No further degradation of lane four was observed and at least another year of service life was expected.



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