

# STATICS

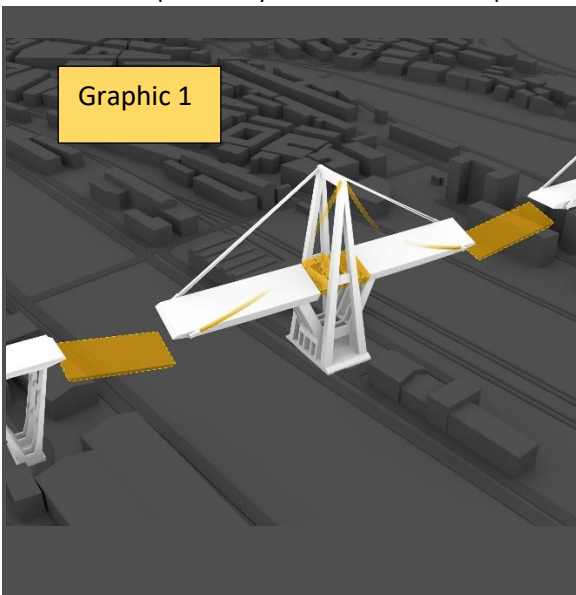
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& New York Times, Sept. 6, 2018 by James Glanz, Gaia Pianigiani, Jeremy Whitey, Karthik Patanjali

## Genoa Bridge Collapse: The Road to Tragedy

GENOA, Italy — An off-duty firefighter, Davide Capello, had just driven out of a tunnel and onto the main bridge over Genoa in a heavy summer rain, when he heard a low, dull rumble all around his car. It was not thunder.

Mr. Capello, 33, glanced upward and saw a huge cloud of white dust rising up in the fog and rain. A white sedan 20 or 30 yards ahead of him seemed to disappear into a void. He hit the brakes. But the emptiness advanced toward him as the road fell away, section by section, like a staircase to oblivion. In a split second, his car was plummeting, nose down, the windshield darkened by dust and concrete blocks flying past him. "I am dead! I am dead!" he cried. He was in free fall. The bridge he was driving across, a viaduct designed by Riccardo Morandi, [collapsed that day](#), Aug. 14, [leaving 43 people dead](#) as dozens of cars fell some 150 feet onto the riverbed, railroad tracks and gritty streets below. The collapse of the bridge — a signature of the port city, a source of deep civic pride, and an [indispensable daily transportation link](#) for thousands — has scarred Genoa and set off a bitter debate in Italy about who bears responsibility for the disaster and precisely what caused it.



**INTRODUCTION:** In graphic 1: This is called a Morandi style bridge. Cable stay Bridge is shown in Graphic 3 in lower left graphic. To be in equilibrium the sum of forces in X & Y direction must equal zero. You can use this concept to solve for two unknowns by setting up two equations.

**QUESTION:** In Graphic 2 If central pillar (red) exerts a force up of 100 tons (200,000 lb.) find magnitude of each of the two blue forces.

**HINTS:** To be in static equilibrium:  $\Sigma F_x = 0$  &  $\Sigma F_y = 0$   
Thus, set up two equations to solve for two unknowns.  
You must show these two equations set up.

**ANSWERS:** Each blue force is  $\sim 83.33$  tons or 166,667 lb.

By the late 1970s, concrete on the bridge had already begun visibly deteriorating, forcing Mr. Morandi, who died in 1989, to defend his creation. In 1979 and in 1981, Mr. Morandi himself conducted surveys of the bridge and concluded that the roadway and elements of the towers were already degraded. The findings raised alarms about similar Morandi structures around the world.

