

# Survey and structural modeling for the reliability assessment of the world's largest elliptical dome at Vicoforte

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**Abstract** The Basilica “Regina Montis Regalis” at Vicoforte, a small town in Northern Italy, is a monument of great historical, architectural and structural significance, owing its fame to its big masonry elliptical dome, the largest of this shape the world over. The dome-drum system has suffered over the years from significant structural problems, due to its bold structural configuration and to progressive soil settlements affecting the entire building. After a first investigation campaign and a strengthening intervention performed in 1985 with active steel ties at top of the drum, followed by extended monitoring, in the last decade an intense survey, investigation and research program was established on the geometry of the construction, its constitutive aspects, the physico-mechanical characteristics of the materials, and, especially, the structural responses in the static and dynamical domains, eventually aiming at a reliability assessment of the monument under gravity loads and the evaluation of its seismic risk. The paper presents the results, at the date, of this investigation and research program, intended to propose the case study of Vicoforte as a reference case at national and international level for the conservation of monuments of large cultural and structural significance.

**Keywords** masonry domes, modeling, monitoring, numerical analysis, seismic risk