**Title**: **A Seismic Risk Assessment Tool for Existing Road Networks**

**Authors**:
P. Marchand (SETRA, France)
D. Davi (SETRA, France)
P. Schmitt (SNCF, France)
C. Thibault (CETE Méditerranée, LR Nice, France)
A. M. Duval (CETE Méditerranée, LR Nice, France)
D. Criado (CETE Méditerranée, LR Aix-en-Provence, France)

**Contact**:
D. Davi
Service d'Etudes Techniques des Routes et Autoroutes
46, avenue Aristide Briand – BP 100 – 92225 BAGNEUX Cedex - France
Tel : (+33) 1 46 11 32 52 ; fax : (+33) 1 45 36 83 52
Email : denis.davi@equipement.gouv.fr

**Abstract**

In comparison with some other European countries like Greece, Italy or Portugal, France seismicity is usually mentioned as low to moderate. Nevertheless, because most structures and facilities where designed and built before new seismic codes were published, the seismic risk is one of the big concerns of the state political authorities.

Initiated in 1997 under the supervision of the Directorate of Roads of the French Ministry of Public Works and Transportations, the SISMOA method was created in order to estimate the vulnerability of existing bridges under seismic actions. Based on geometrical and typological criteria, this qualitative method resulting from the vulnerability assessment of the different parts of bridge structures such as the deck, abutments, piers, foundations…, was tested with success on several seismic critical areas of the French territory, chosen to be representative of a certain type of construction as well as social and economical aspects: the county of Nice in the South of France, the city of Grenoble close to the Alps Mountains and the Caribbean French Island of La Martinique. The purpose at that time was to get a tool able to determinate which bridges should be retrofitted in priority in order to meet seismic requirements.

In 2002, the Directorate of Roads decided to extrapolate the method, from isolated bridges approach to road sections approach. This significant development supposed to perform the same kind of analysis on other structures like retaining walls and tunnels and also to deal with other types of seismic induced hazards than code accelerations, such as liquefaction hazard, site effects, landslides, rock fallings... From a purely structural engineering issue, SISMOA therefore moved to an issue gathering knowledge and experience from structural engineers, geotechnical engineers as well as seismologists and geographic information systems (GIS) experts and was renamed "SISROUTE". In addition to the establishment of retrofit priorities for bridges, the objective became the global risk assessment of a road being cut off for different earthquake scenarios including code seismic zoning as well as deterministic and probabilistic local seismicity approaches.

Currently, the methodology SISROUTE is at a stage where it is tested and calibrated on a small road section in the area of Nice. It will then be upgraded in order to be able to provide a synthetic visual representation of the risk assessment on any given road network.

**Keywords:** Seismic risk, existing road facilities, bridges, retaining walls, seismic hazards, liquefaction, site effects, landslide, rock falling, risk mapping, geographic information system, seismic scenarios, deterministic and probabilistic approaches.

**Biography of the presenting author:**

**Denis Davi** was born in 1975 in Montpellier (France). Graduated in 1999 from Ecole des Travaux Publics de l'Etat, he obtained a Master of Science in Structural Engineering in 2000 from University of California, San Diego. Joined SETRA (French Ministry of Public Works and Equipment) in 2001 in the Large Bridges Division.

SCIENTIFIC ACTIVITIES: Member of the national project team of Eurocode 8-2 (Seismic design of bridges), member of the Technical Committee of the French Association for Earthquake Engineering (AFPS), professor in seismic design of bridge at the University of Marne-la-Vallée (France).

PUBLICATIONS – CONFERENCES: Seismic Design of the Saint-Isidore Bridge: 6$^{ème}$ Colloque National AFPS, Paris 2003, Seismic retrofit project of the Trou au Diable Bridge on La Martinique Island: 6$^{ème}$ Colloque National AFPS, Paris 2003, The Sismoa Method: 6$^{ème}$ Colloque National AFPS, Paris 2003, Construction of the Puget-Theniers Bridge over the Var River: Fib Symposium, Budapest 2005.

MAIN REFERENCES: Design engineer in many bridge projects located in seismic areas: Saint-Isidore Bridge: concrete bridge of 470m length, Saint-Paul Viaduct: concrete viaduct of 756m length, Puget-Theniers Bridge: cable-stayed bridge, Seismic retrofit project of the Trou au Diable bridge in La Martinique Island.