

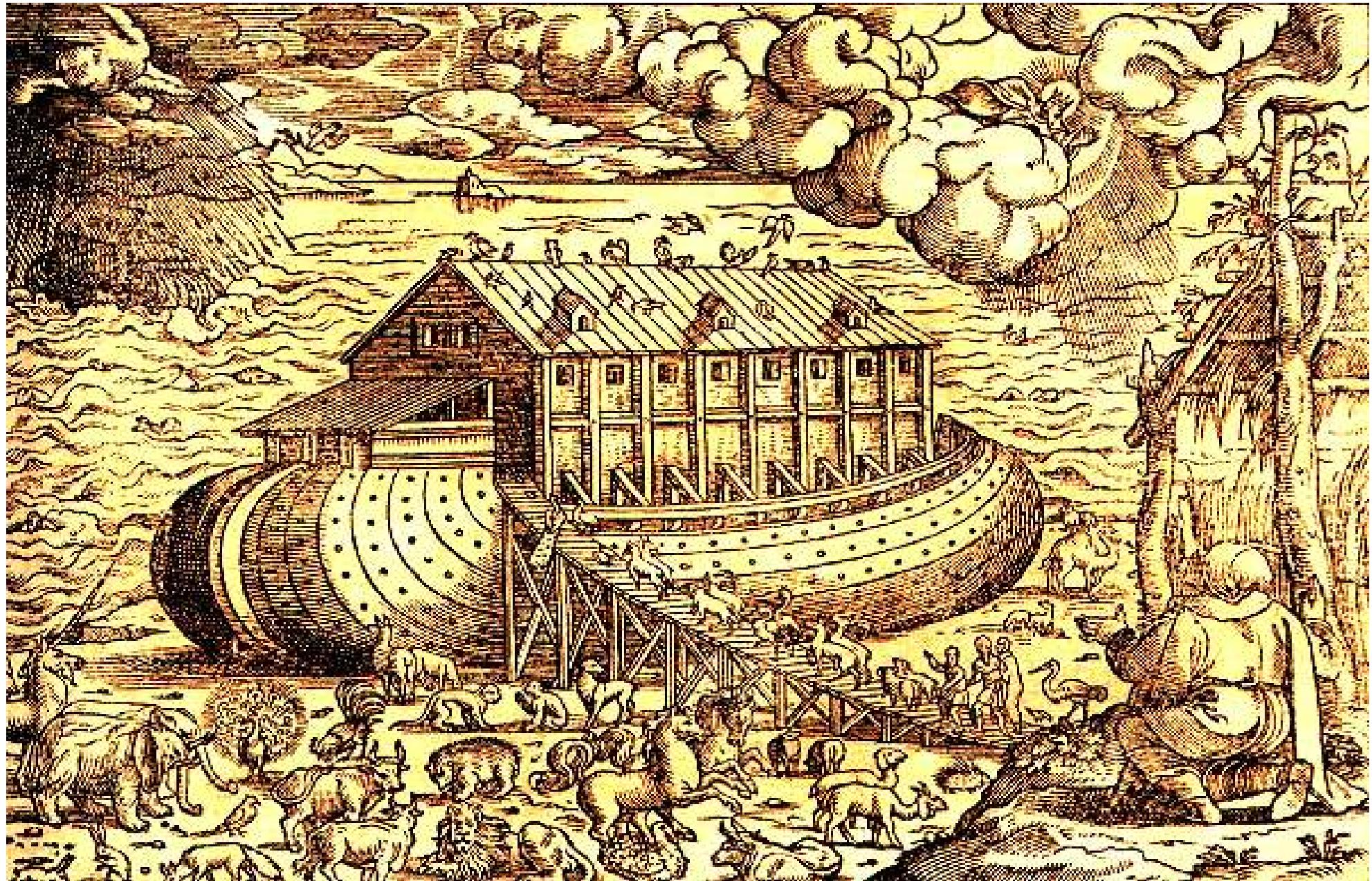


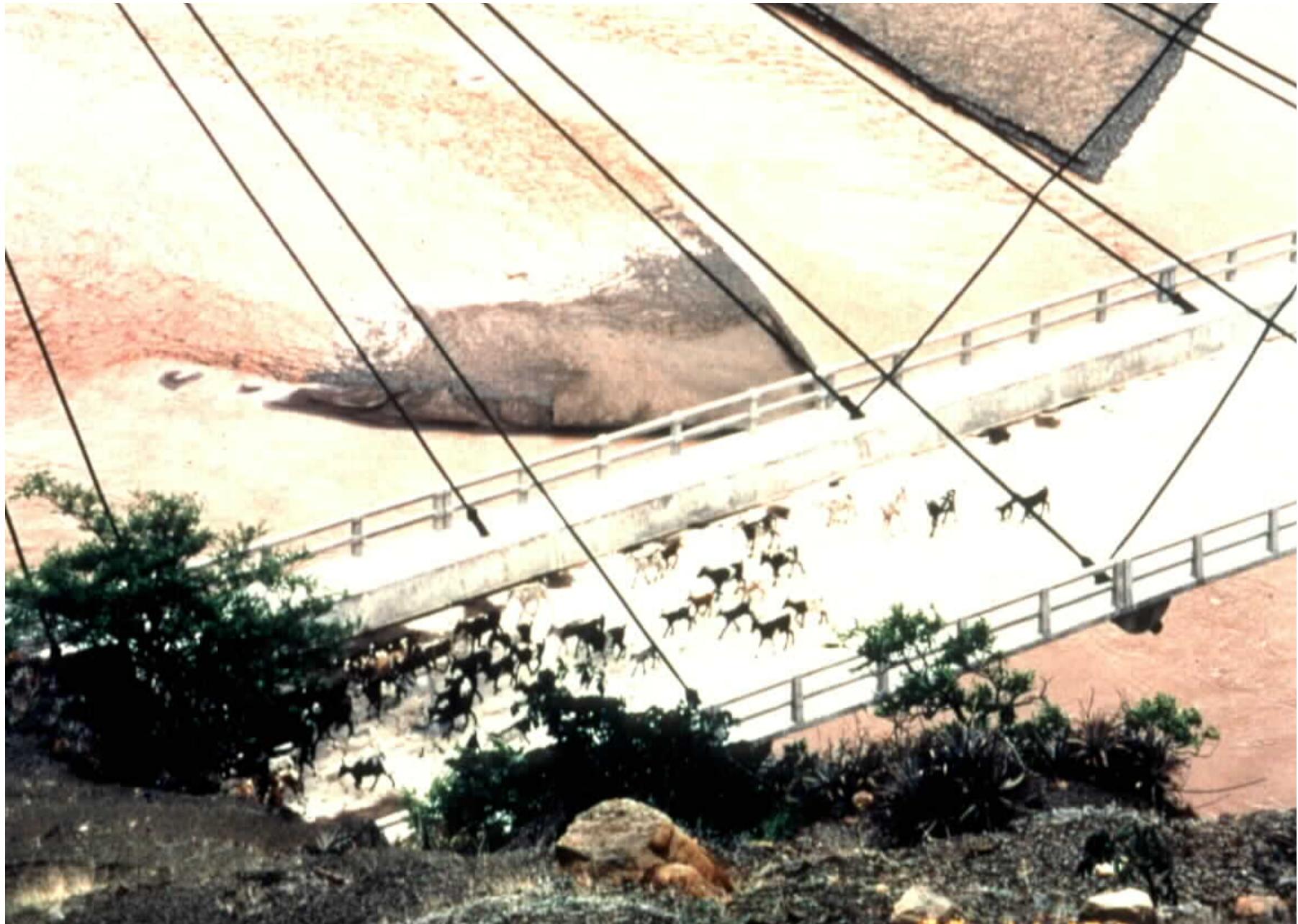
The design of bridges with the EN Eurocodes

Jean-Armand CALGARO
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Conseil Général des Ponts et Chaussées
Ecole Nationale des Ponts et Chaussées, France



Noah's Ark



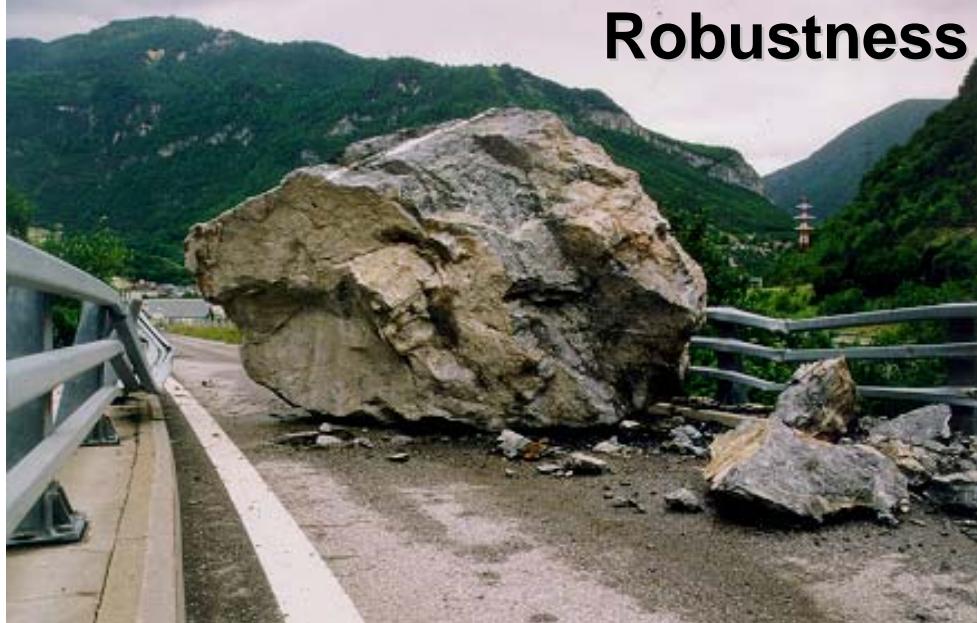


The « Bird-bridge ». France ...



Wahooooo ...!







Design of Bridges with EN Eurocodes

EN1990 + Annex A2

EN 1991-1-X : X=1, 3, 4, 5, 6, 7

EN 1991-2 : Traffic loads

EN 1992-1+2 : concrete bridges

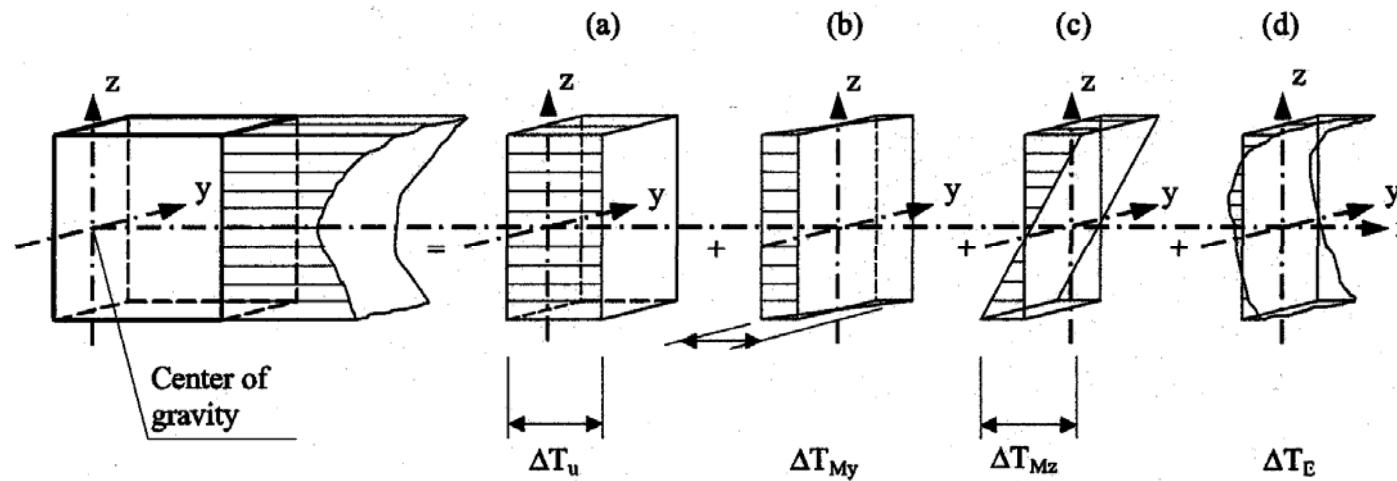
EN 1993-1+2 : steel bridges

EN 1994-1+2 : composite steel and concrete bridges

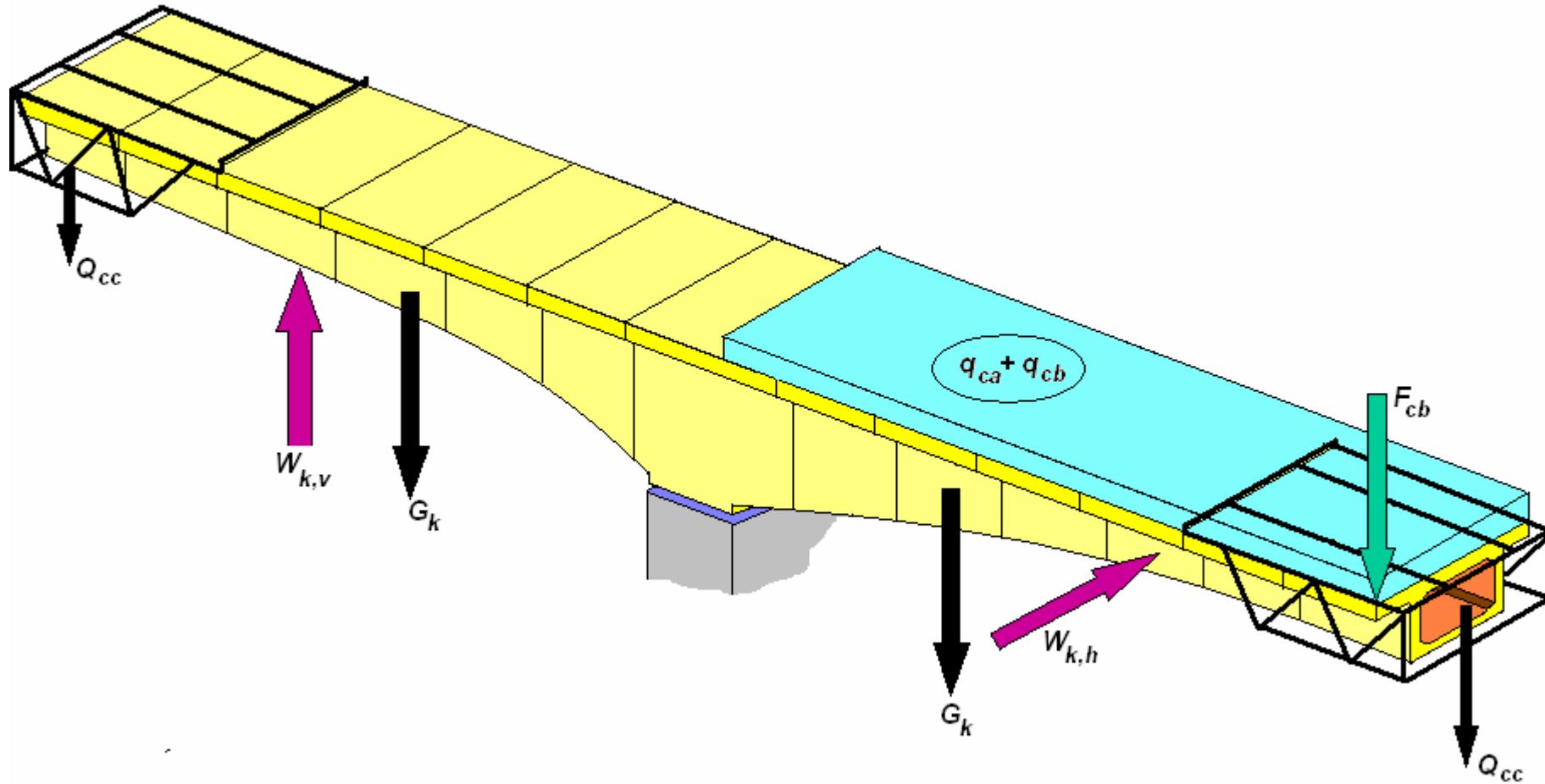
EN 1995-1+2 : timber bridges

EN 1997-1 : foundations

EN 1998-1+2+5 : bridges in seismic zones



EC1-1-5



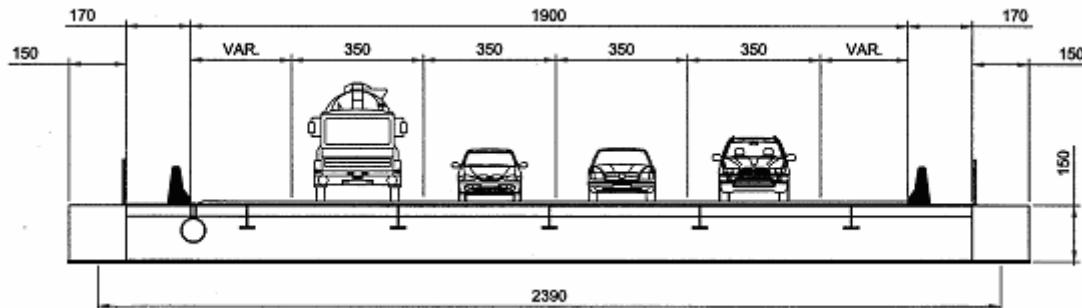


ACCIDENTAL ACTIONS – EN 1991-1-7

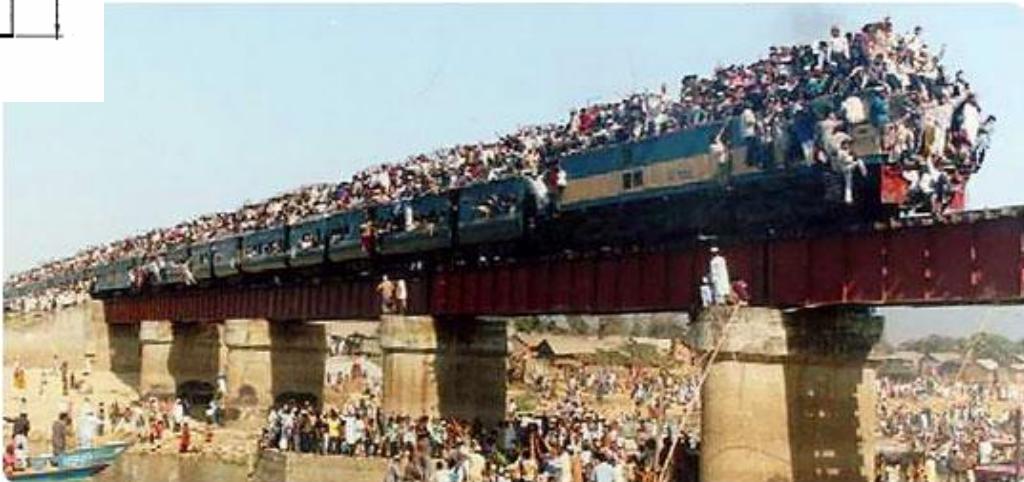




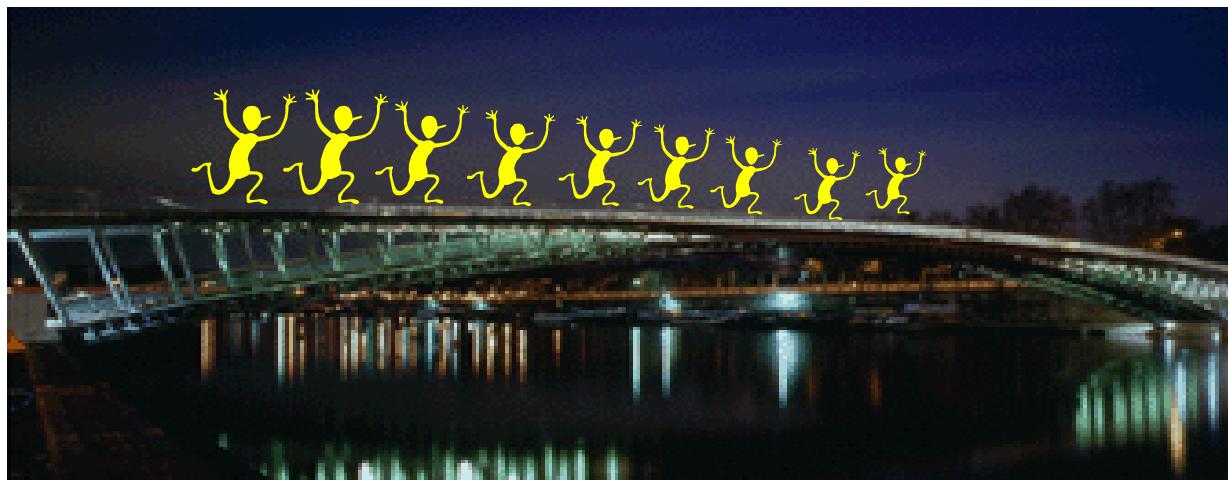
TRAFFIC LOADS ON BRIDGES – EN 1991-2



Traffic actions on road bridges



Traffic actions on railway bridges



Traffic actions due to pedestrians

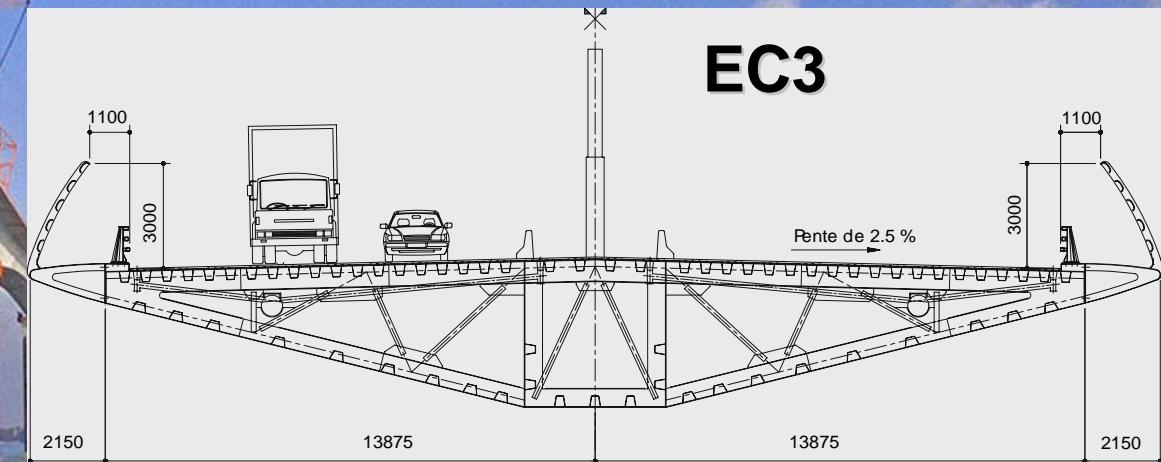


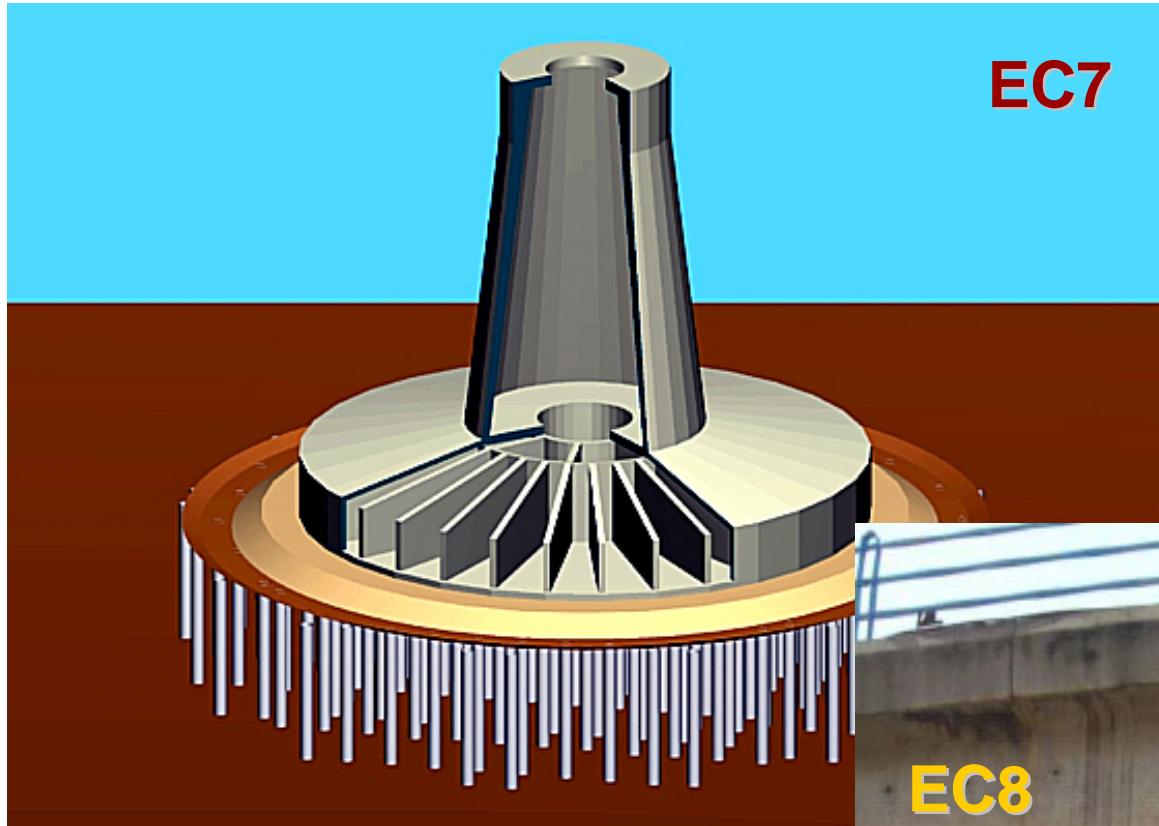
$$\left\{ \sum_{j \geq 1} (1,35G_{kj,sup} + 1,00G_{kj,inf}) \right\} + \gamma_p P + \begin{cases} 1,35(TS + UDL + q_{fk}^*) + 0,9F_{Wk} \\ 1,35gri_{i=1b,2,3,4,5} \\ 1,5T_k + 1,35(0,75TS + 0,4UDL + 0,4q_{fk}^*) \\ 1,5F_{Wk} \end{cases}$$

Fundamental combination of actions

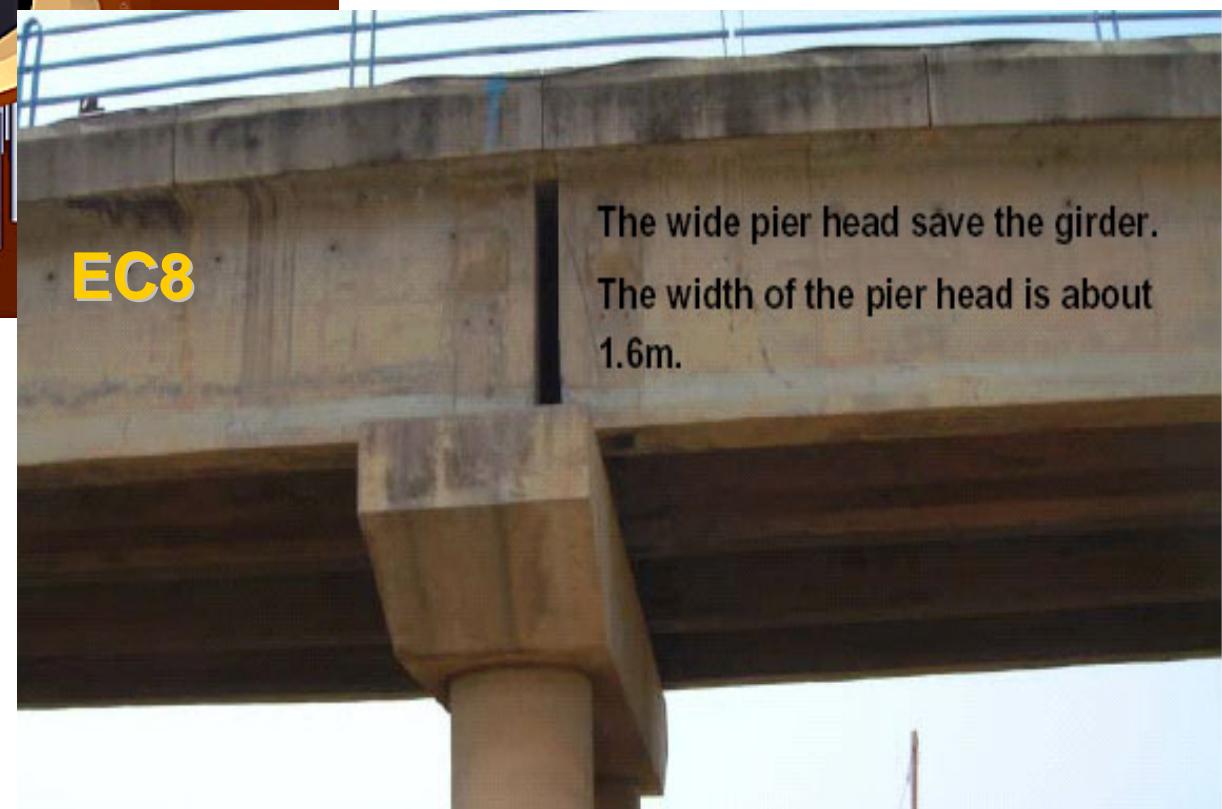
$$\left\{ \sum_{j \geq 1} (G_{kj,sup} + G_{kj,inf}) \right\} + P_k + \begin{cases} (TS + UDL + q_{fk}^*) + 0,6F_{Wk} \\ gri_{i=1a,2,3,4,5} + 0,6T_k \\ gr1b \\ T_k + (0,75TS + 0,4UDL + 0,4q_{fk}^*) \\ F_{Wk} \end{cases}$$

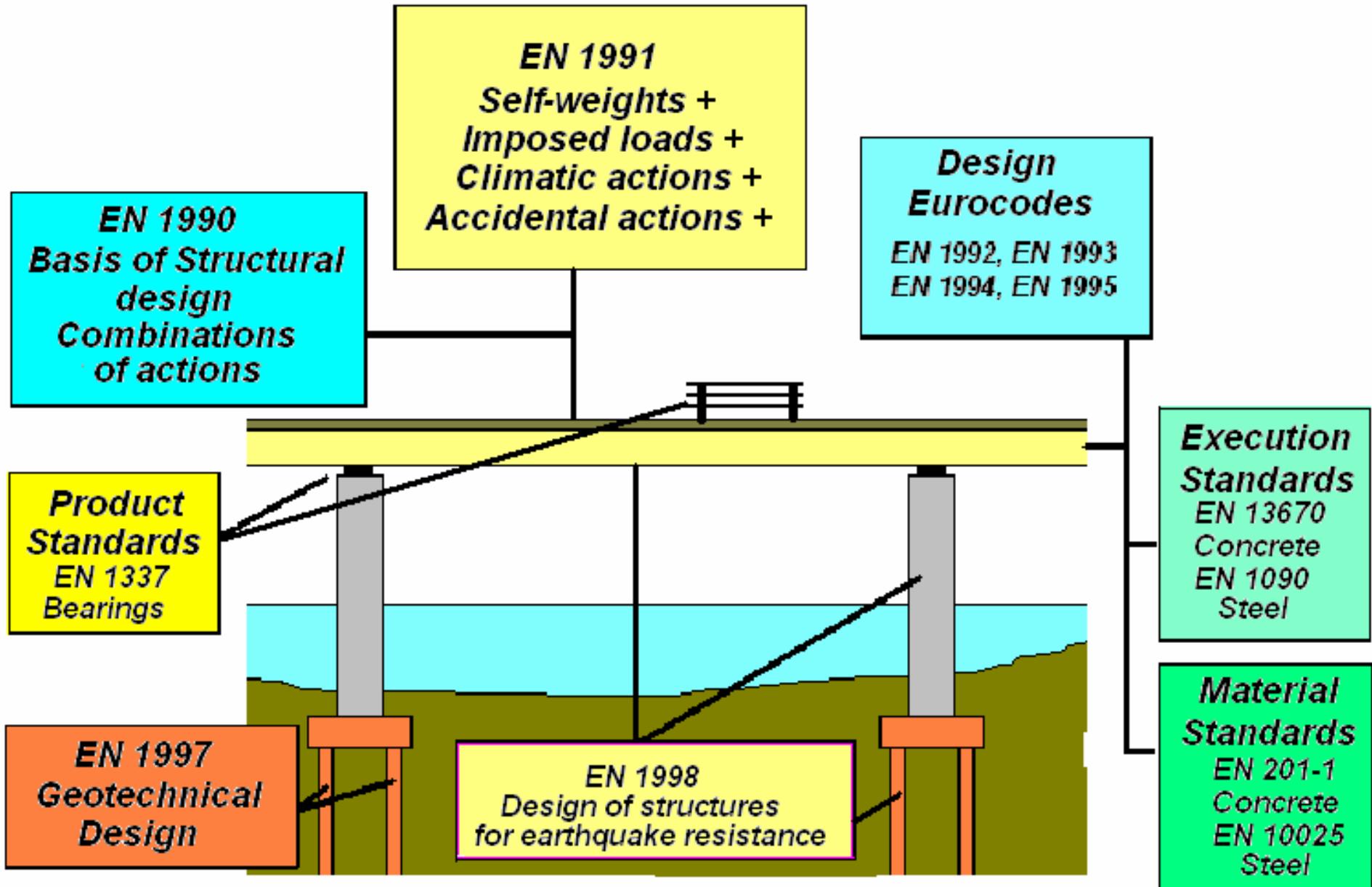
Characteristic combination of actions





Design of foundations and design for earthquake resistance







**The « Lion d'Angers »
bridge, 2001**



The Millau viaduct



A bridge linking planets ...

