UPDATING A GOOD OLD DESIGN OF A BARRIER

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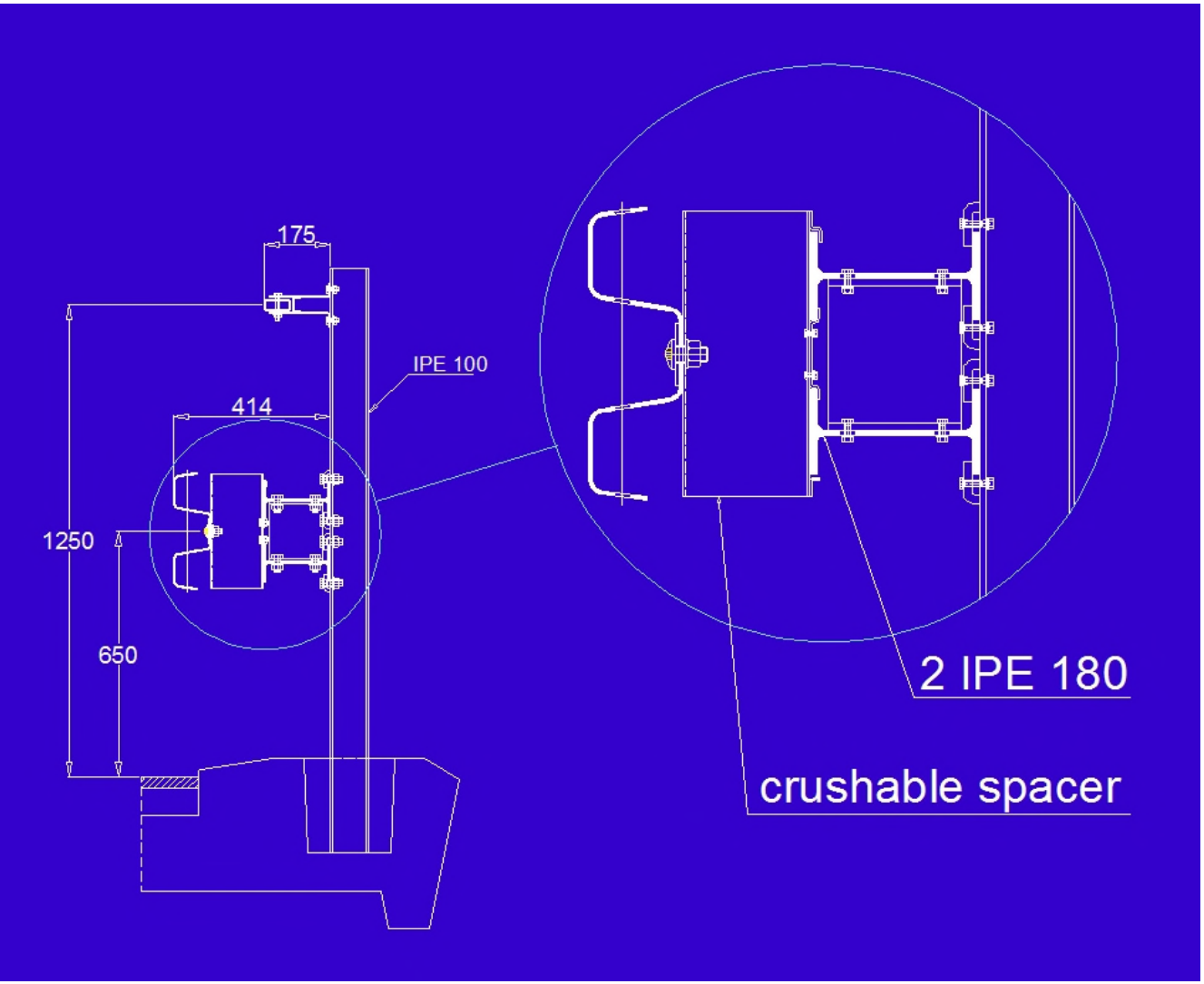
The original design

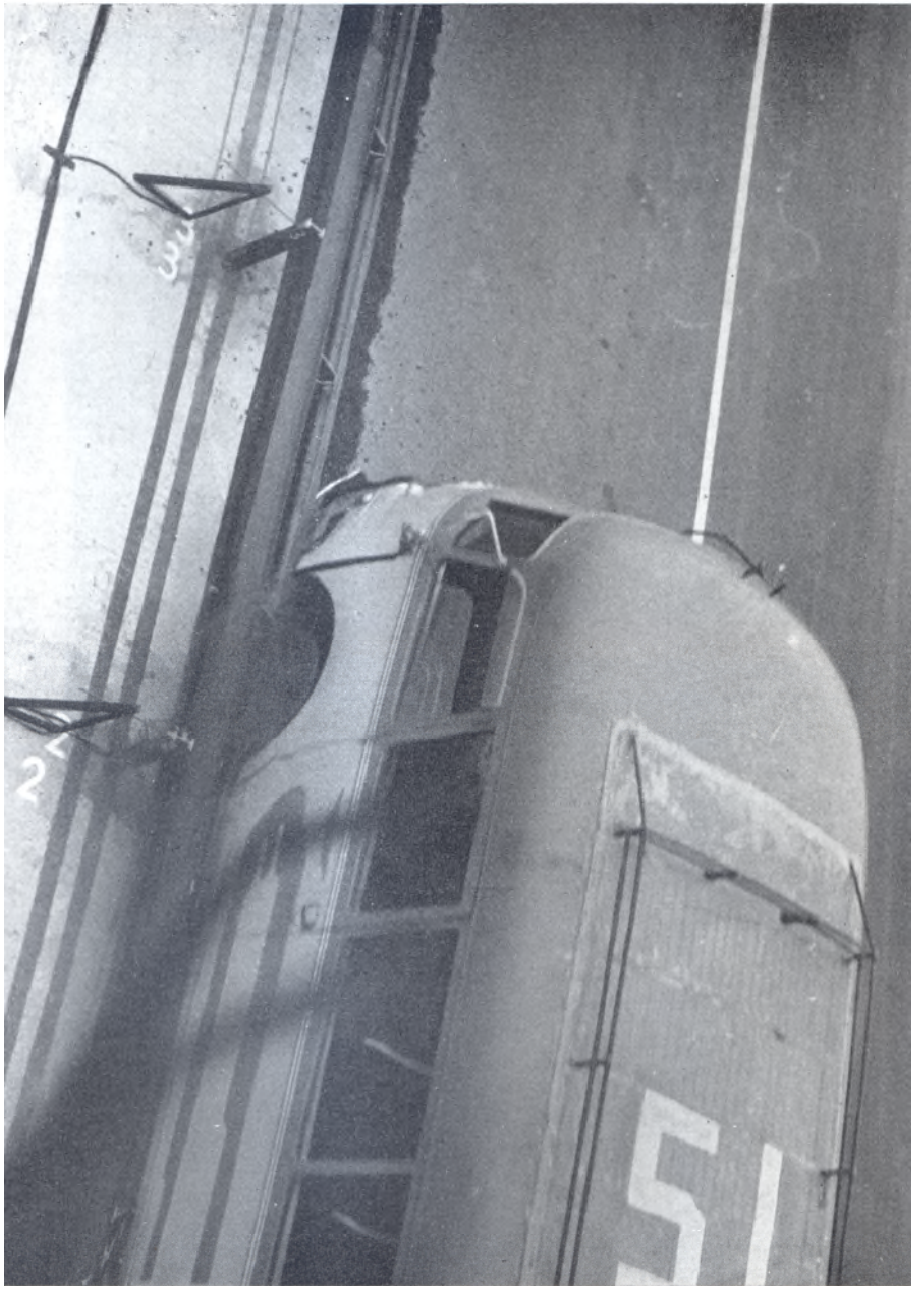
- ***The original design was a result the study published in 1967:***
  - ***V.Giavotto, C.Caprile,* Highway Safety Barriers – Theory and Applications**
- ***The basic concept was "strong beam – weak posts"***
- ***The barrier has two-stages:***
  - ***A first soft stage, with the task of mitigating the severity for light vehicles***
  - ***A stronger second stage, to contain heavy vehicles***

The original design



In the second stage, the twin strong (180 mm) longitudinal beams are supported by tiny 100 mm posts, with a spacing of 3 m

The barrier was tested in Italy, in 1966, with a FIAT 600 and a 12.5 ton bus



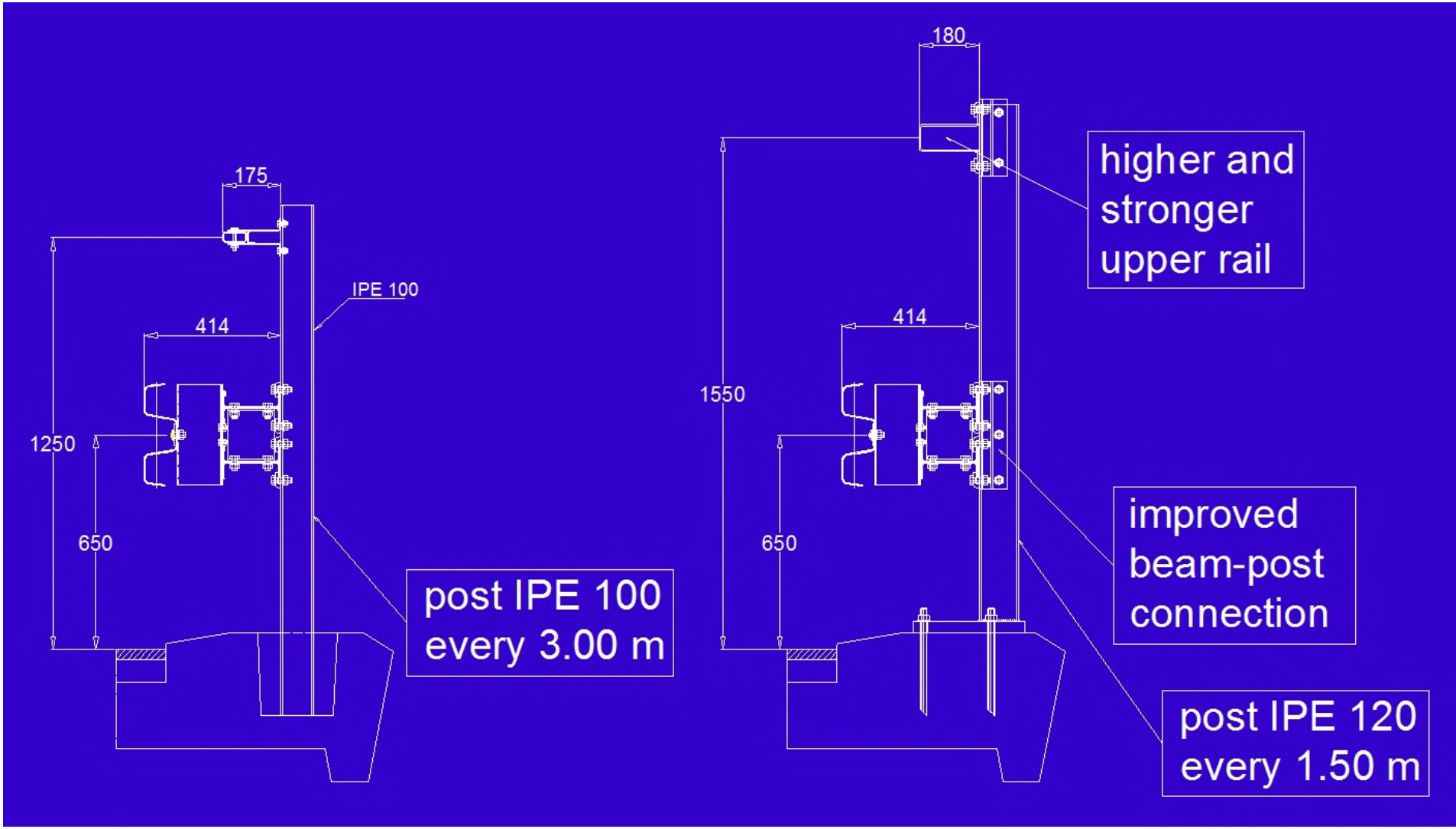
The barrier was re-tested by ONSER (the present INRETS), in 1968 in Lyon-Bron

The test level (12500 kg, 15°, 70 km/h) was a little lower than the current H2

The need of upgrading the old design

- ***The old barriers on the edge of the bridges of Motorway A5 (Torino-Aosta) must now be updated with the new H4 barriers***
- ***To allow the installation of the newest H4 barrier, the deck of the 21 bridges of A5 should be rebuilt, due to the higher anchorage loads***
- ***It was decided to upgrade the old design to H4 level, keeping the anchorage loads at a level compatible with the old decks***

The upgraded design was aimed to H4b level (38 ton, 20°, 65 km/h)



Tests were run at H4b level, in 2014

In TB11: ASI = 1.2 and THIV = 29 km/h
In TB81: the containment was successful

The face of the deformed barrier is continuous and smooth and the load is distributed over a long span (18 posts bent)

Conclusions

- ***The updated design is 40% heavier than the newest H4 barrier***
- ***But the deck loads are only 30% (70% lower)***
- ***The bending moment per unit deck length is 14 instead of 44 kNm/m***
- ***The loads from the updated design are compatible with the old deck structures***
- ***The 21 bridges of A5 will not need to be re-built***