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## 6. Stadio San Paolo, Napoli (Italy)

<b>Owner:</b>	<i>Comune di Napoli</i>
<b>Architects:</b>	<i>F. Cocchia, P. Teresi, Studio Associate CDS</i>
<b>Engineers:</b>	<i>M. Freda, L. Corradi, Tecnosteel Ing. Ass.</i>
<b>Contractor:</b>	<i>NA.MO.N.S.c.a.r.l., Napoli</i>
<b>Works duration:</b>	<i>18 months</i>
<b>Service date:</b>	<i>May 1990</i>

### Metric Data

Piles in Foundation	40 000 m
Concrete in Foundation	28 000 m <sup>2</sup>
Reinforcing Steel	2 700 000 daN
Structural Steel Work	9 000 000 daN
Concrete Deck at 40.70 Level	13 800 m <sup>2</sup>
Polycarbonate Roof	25 200 m <sup>2</sup>

### General

San Paolo stadium in Naples badly needed a complete restyling even before the football world championship 1990.

The main difficulties for the designers came from the lack of space around it, together with the absolute necessity of avoiding interference between the new structures and the old ones.

San Paolo stadium was built of concrete in the early fifties on the outskirts of the town. Now it lies almost in the heart of the town, surrounded by a number of a permanently jammed streets. Hence the designers choice was for a very simple structure of isostatic scheme, built in separate sections, structurally independent from the existing ones, but functionally related to them.

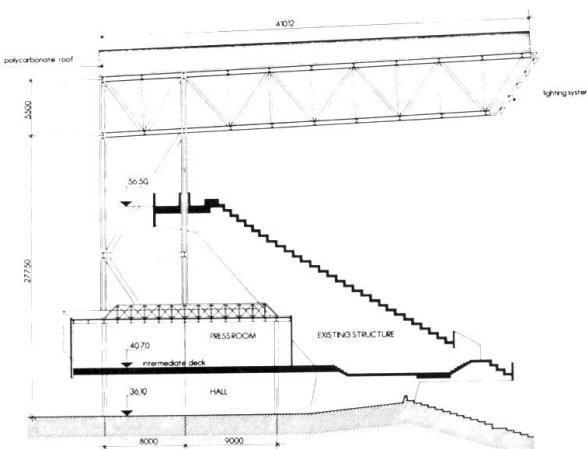
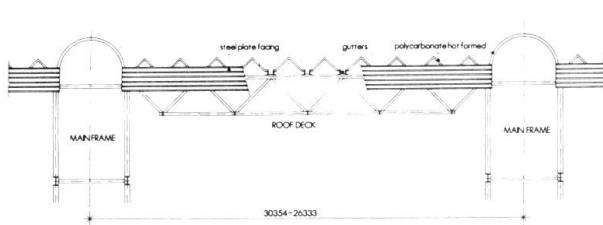
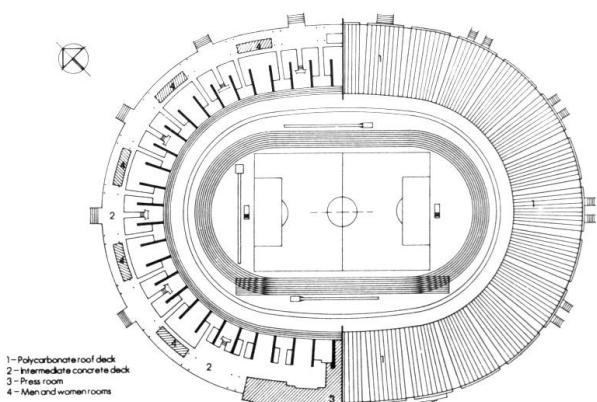
The works include the complete covering of the second ring of steps, and a new circular gangway at 40.7 meters level for an easy access of the public. They also include a press room, a reception room, new dressing rooms for the players and rest rooms for the spectators.

Accordingly, all facilities have been revised in agreement with the new safety regulations.

### Description

The main frame supporting the roof, is made of 28 cantilevers of lattice design, placed along the perimeter of the existing structure. Each cantilever, 32 meters high, has an horizontal beam of 41 m with a total weight of 120 tons. Vertical square shaped pillars are encased in a concrete foundation block, built on piles of 600 mm diameter.





Between the beams of two adjacent cantilevers, 24 m apart, lies the roof deck, made of a metallic structure with a total area of 1100 m<sup>2</sup>. The roof deck, of space frame design, weighs about 100 tons.

The deck is fixed to the cantilevers by means of elastic double-acting supports capable of absorbing horizontal shear forces of seismic origin and thermal variations.

The external cover is made by single hot-formed polycarbonate sheet of 3 to 6 mm thickness, round or square shaped, resting on longitudinal hot-rolled beams acting as purlins and encasing the longitudinal gutters. The gutters also act as a gangway for maintenance people.

At 40.70 meter level, running along the perimeter of the stadium for a total length of 600 m, there is a concrete deck 12 m wide. The concrete deck is supported by a number of independent steel columns, round shaped, and by the 4 vertical legs of the main cantilevers.

The foundation of this deck had to be adjusted to the existing underground facilities and the new ones (roads and parking areas), making the design and the construction particularly delicate.

Finally, the dressing rooms for the players have been realized under the playing ground of the stadium by a system of concrete prefabricated beams, pillars and decks, allowing construction during the summer break of the national football league. In fact, all the sports events and even the training activities took place regularly during the works.

