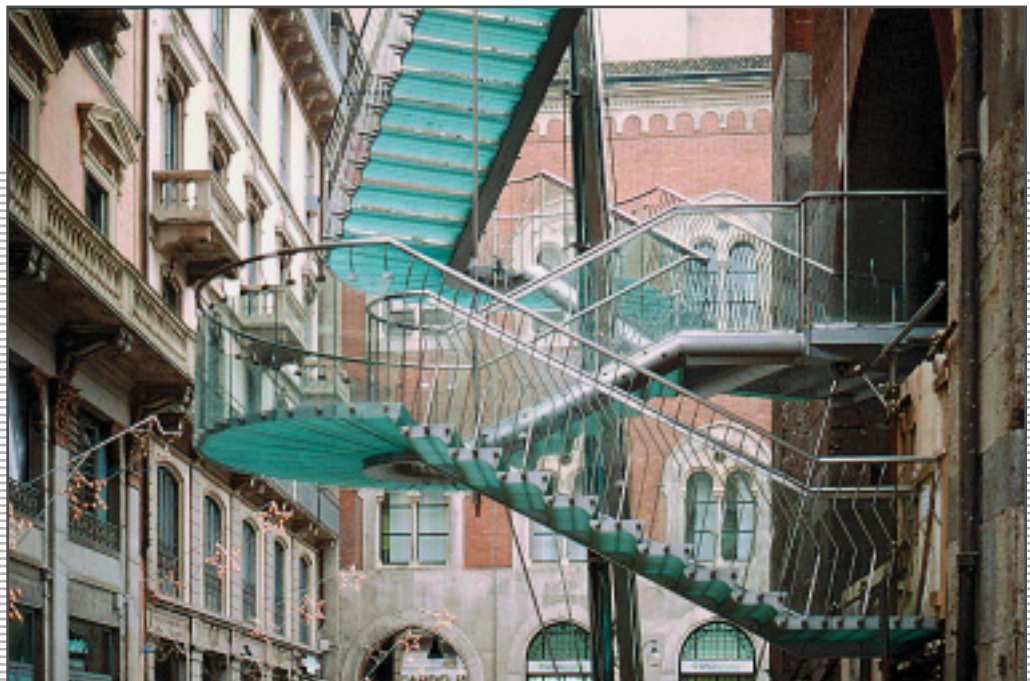


## Emergency Staircase Palazzo della Ragione, Milan, Italy

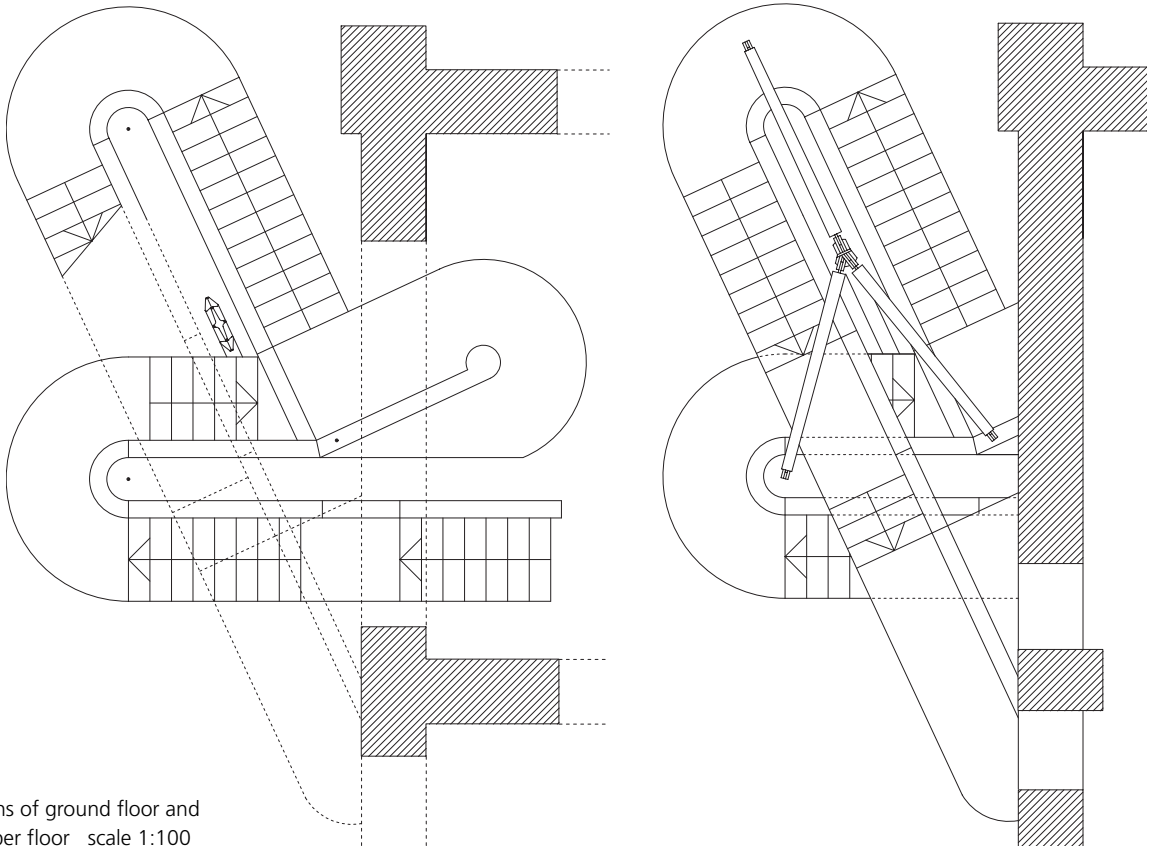


*It was important that the staircase should be light and transparent in design, and visually distinct from the historic setting.*



Following restoration work on the Palazzo della Ragione on Piazza Mercanti in the 1980s, the capacity of the former 'Salon' which is nowadays used for exhibitions, was increased and the old entrance on the side towards the Piazza Duomo re-opened. In view of the greater number of visitors to the building, fire regulations dictated the construction of an emergency staircase. Work on this fire escape was finished in 2002.

The key qualities required of the design for the staircase were maximum visual transparency and an extremely lightweight construction. It should also have a distinct and separate identity within the historic setting.

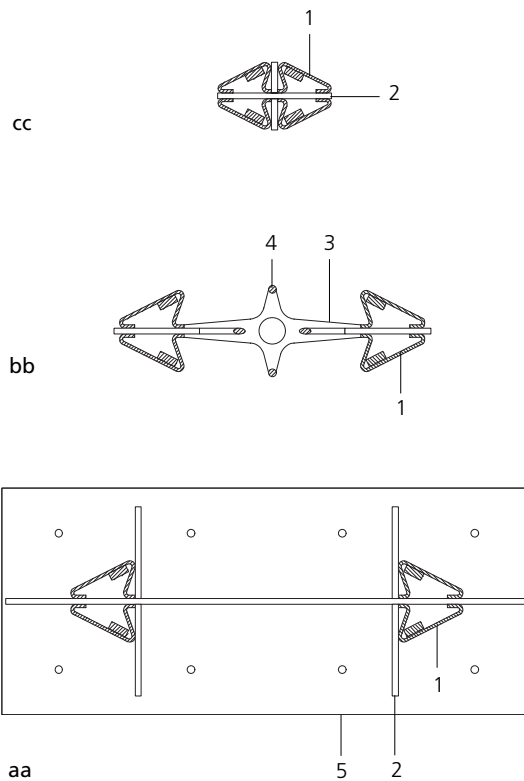


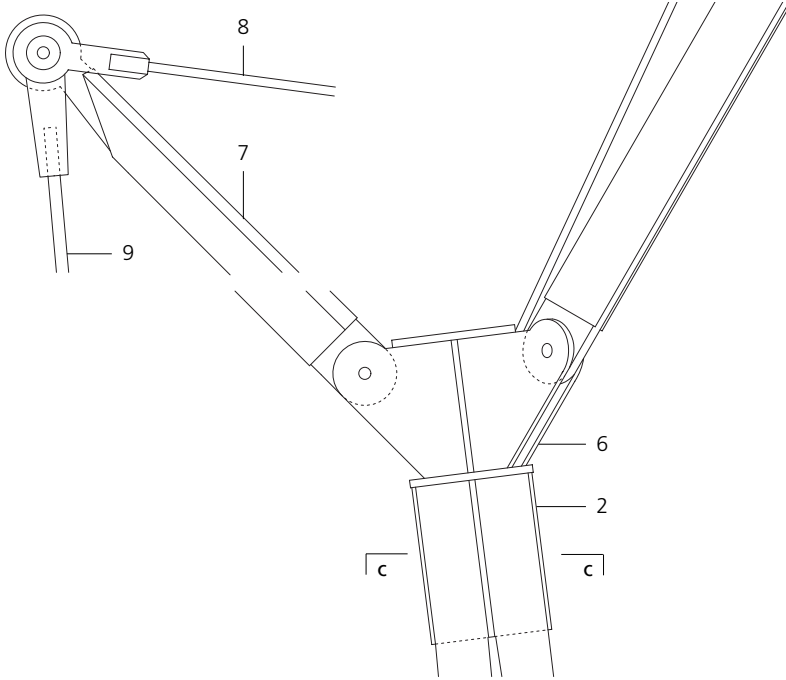
Plans of ground floor and upper floor scale 1:100

The main column in the support structure for the staircase comprises two sections of folded stainless steel plate tapering upwards towards the top, where they join. These supports are further connected to each other through a complex system of ties and bars that take buckling loads. The column axis is tilted at an angle of 12.7% from the apex, and in the vertical, twisted at

an angle of 25° to the building façade. It thus follows the raking line of the steps in relation to the street. The base point of the column is anchored to the foundations via a floor slab; at the top, to prevent tipping, the stair structure is tied into the wall of the building. At the junction of the main column, 11.50 metres above the ground, the structure divides into three 'fingers'. Stainless steel rods, 32 mm in diameter, span from the tips of these fingers down to the floor slab, thus giving stability to the whole structure. The support frame for the steps is also suspended from these rods.

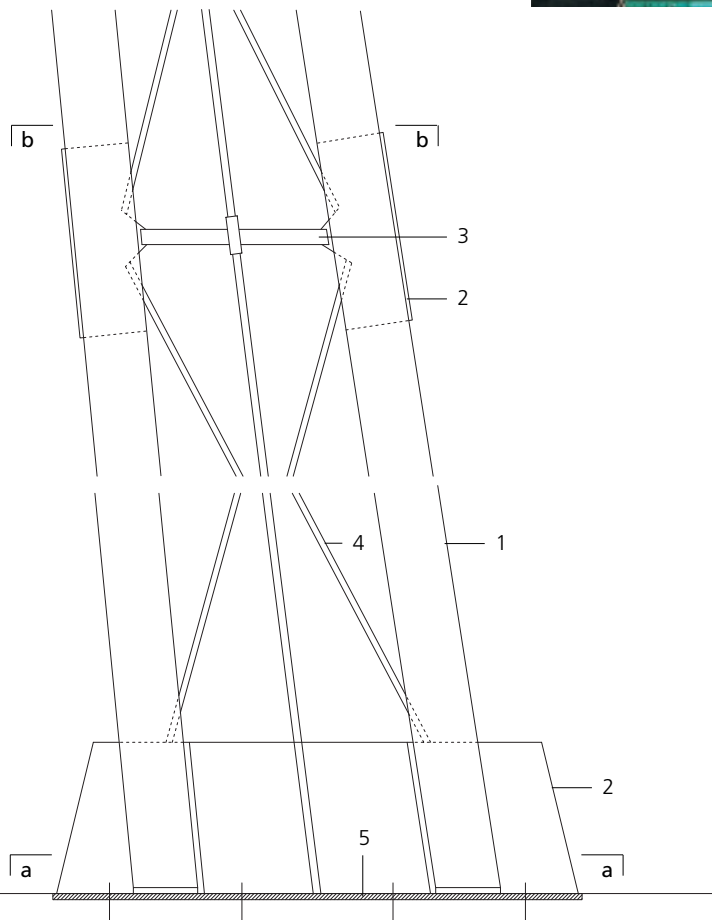
*All the components in the support structure were prefabricated and then welded or bolted together on site.*





Column details,  
Plans · Elevations  
scale 1:20

- 1 Section of 8 mm folded stainless steel
- 2 16 mm stainless steel connection plates
- 3 40 mm stainless steel crosspiece
- 4 Diagonals  
16 mm dia., 20 mm dia.
- 5 Floor slab  
16 mm stainless steel anchored to foundations
- 6 16 mm stainless steel junction plate
- 7 Section of 6 mm folded stainless steel
- 8 24 mm dia. stainless steel tie rod
- 9 32 mm dia. stainless steel suspension cable

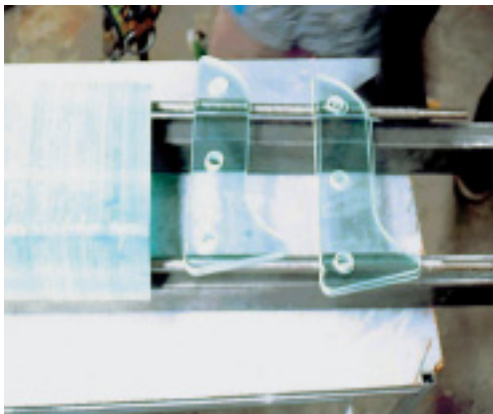


*The column divides at the junction into three 'fingers' from which the support frame for the steps is suspended.*

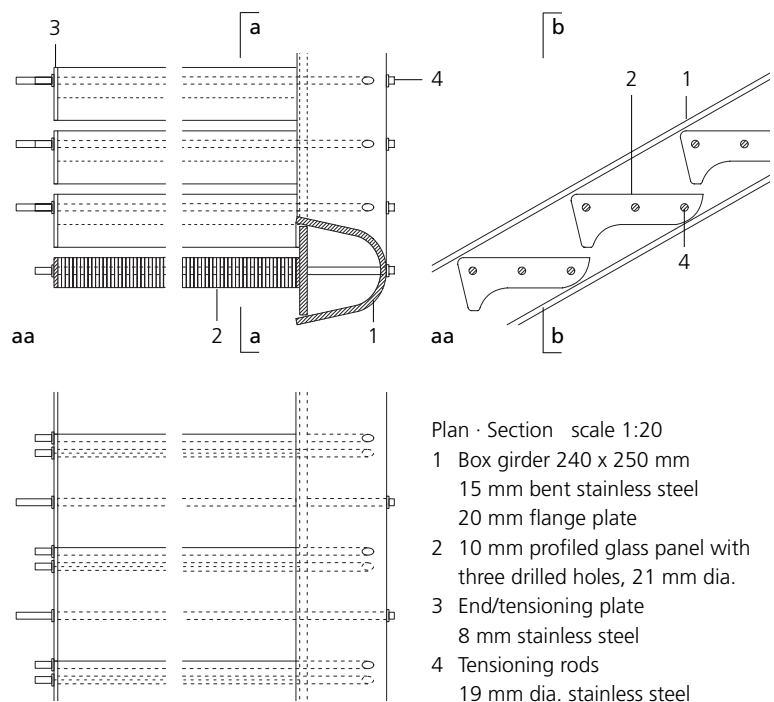
At the bottom the stairs end at the level of the arcades at a height of +1.06 m above the street. From here the staircase bridges a height difference of 8.22 metres, with an axial length of 26.50 m and a total of 49 steps.

All the steps cantilever out from a single, continuous, welded stainless steel section. In order to take the torsional loads, this support was designed as a box girder with walls 15 mm thick in the curved parts, and 20 mm thick on the flanges.

*Each step is made up of 116 glass panels, tied together by three pretensioned stainless steel rods.*



*On site, the prefabricated steps are mounted onto the support frame.*



The dead weight of around 430 kg/m and live loads are transmitted into the column via the landings and the suspension rods. The fixed bearing points at the start and end of the staircase also play a role in load transmission.

Each step is made up of 116 shaped panels of 10 mm thick glass, threaded onto three pretensioned stainless steel rods to create a monolithic structure.



*The 26.5 m long flight of steps is connected to the support frame at just three suspension points – one at each of the three landings.*

*By supporting the staircase on just a single forked column, the street below was kept largely free of fixed obstacles.*



Euro Inox  
Diamant Building, Bd. A. Reyers 80,  
1030 Brussels, Belgium  
Phone +32 2 706 82 67  
Fax +32 2 706 82 69  
E-mail info@euro-inox.org  
Internet www.euro-inox.org

Client: City of Milan/City Administration  
Architect: Marco Dezzi Bardeschi, Milan, Italy  
Assistant architect: Laura Gioeni  
Structural engineer: Alessandro Melani, Agliana, Italy  
Layout and text: Martina Helzel, circa drei, Munich, Germany  
Translation: Ingrid Taylor, Munich, Germany  
Photos: Laura Gioeni, Milan, Italy  
(Title, pp. 2, 4),  
Andrea Többen, Munich, Germany (pp. 1, 3, 5)