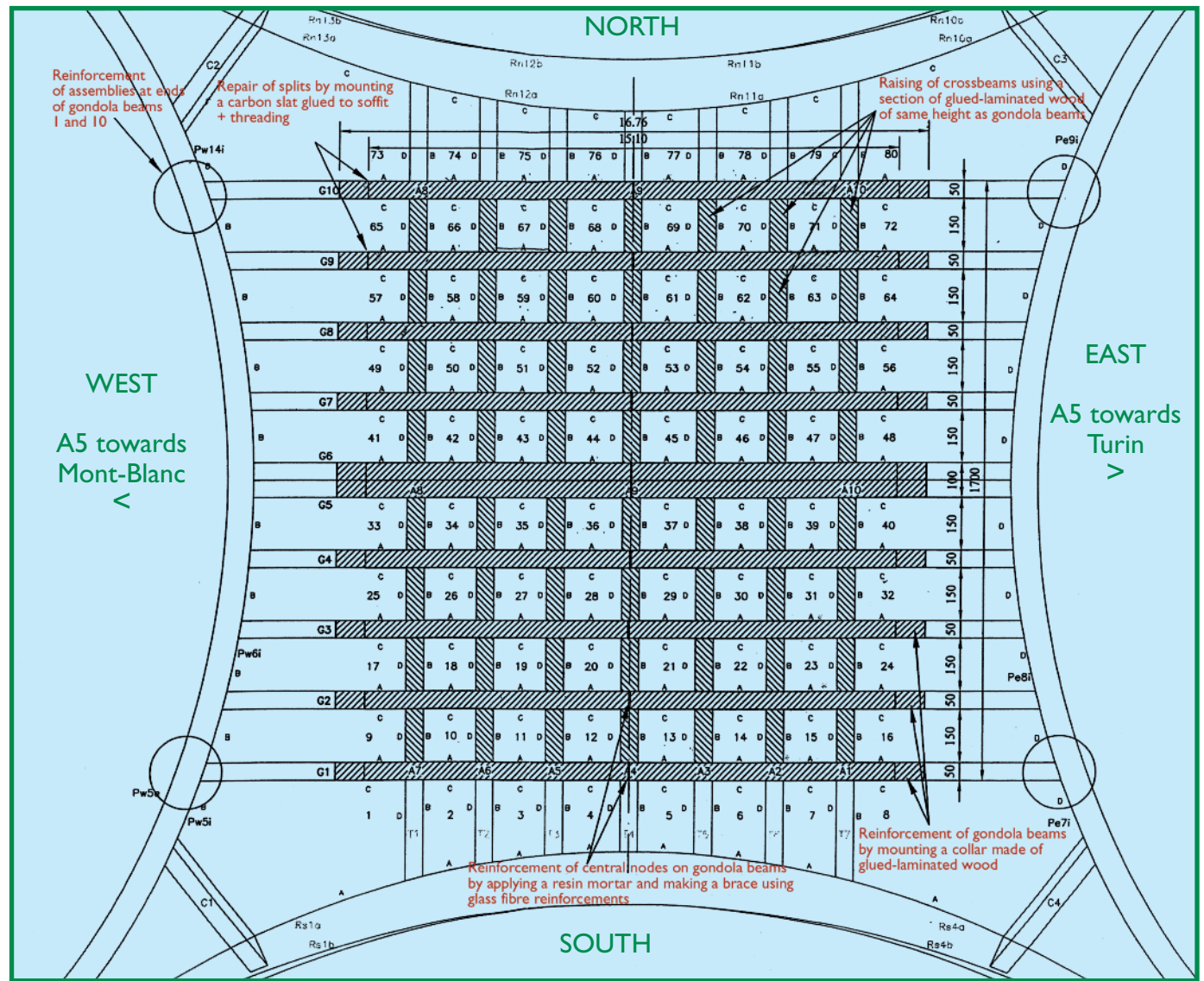


DIAGNOSIS

After performing a detailed condition-of-premises report required to understand the disorders, reinforcement methods were defined. All of this data was introduced into a computer program, which made it possible to precisely determine the weak points of the structure. Once mathematical verifications of the reinforcement solution considered had been performed, and more specifically the calculation of loads and stresses (straining, compression, bending, shearing) through modelling of the bar elements, a revamping proposal was established (repair and reinforcement).



Work definition

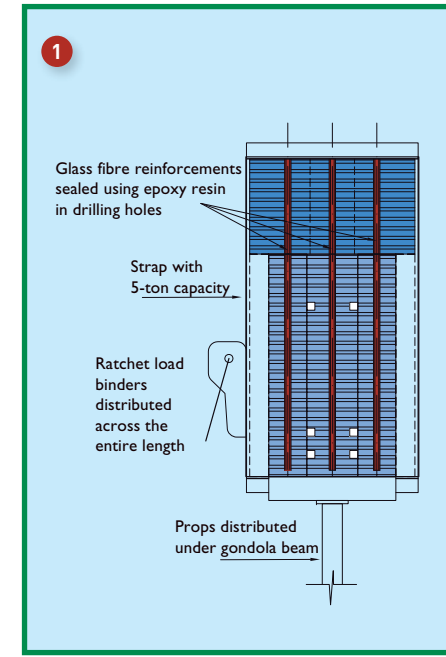
GOAL OF INTERVENTION

RENOFORS' intervention consisted in:

- Reinforcing the gondola beams by mounting a glued-laminated wood collar connected by bonding and threading with carbon slats mounted to the soffit
- Repairing the deteriorated wood of the gondola beams' central nodes by applying a resin mortar and pinning together with glass fibre reinforcements
- Reinforcing the assemblies at ends of peripheral gondola beams
- Raising the cross struts after restoration and treatments using a section of glued-laminated wood of the same height as the gondola beams in order to preserve identical extrados levels



REINFORCEMENT OF GONDOLA BEAMS



After strutting the gondola beam at soffit and removal of lateral wood siding:

- Condition of wooden parts are inspected
- Deteriorated parts are removed and treatments are applied

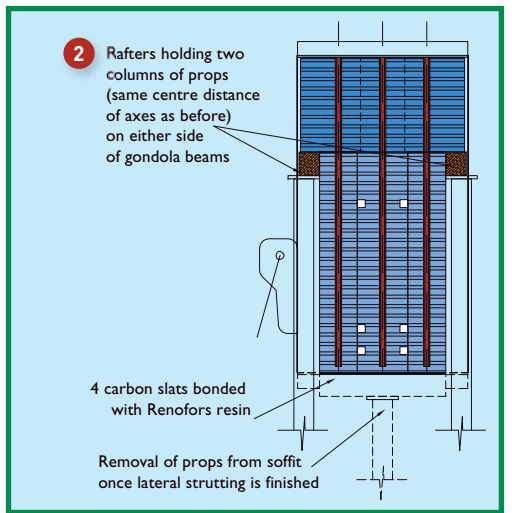
After loosening the bolts of the central iron work, the prosthesis made of glued-laminated wood is set in place perpendicularly under the corresponding gondola beam:

- Prior to setting in place, surfaces are sanded and RENOFORS resin is applied
- Elements are adjusted and compressed by tightening straps distributed across the entire length of the gondola beam
- Prosthesis is pinned together by drilling holes and mounting glass fibre rods sealed with RENOFORS resin



Once these elements have been made interdependent, lateral props are put in place in order to allow the removal of the initial props at soffit:

- Carbon slats are mounted by bonding with RENOFORS resin and compressing the whole
- Finally, bolts of central iron work are tightened again, central node is treated with resin concrete and siding flanges are mounted back in place.



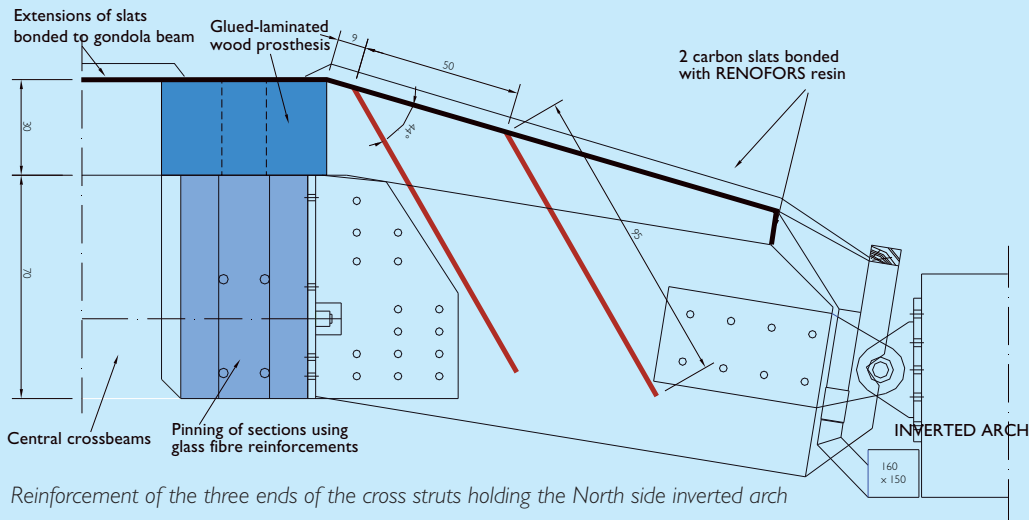
REINFORCEMENT OF CROSS STRUTS

After the cross struts have been treated and partially restored, the prosthesis of glued-laminated wood is pinned together by inserting glass fibre reinforcements sealed with RENOFORS resin in the drilling holes.





Moreover, the North side inverted arch of the structure was showing signs of significant sagging causing a transfer of the loads to the first gondola beam with a twisting and punching effect on the base of the beam. It therefore was necessary to mount two resin-glued carbon slats to the initial prosthesis.



Identification sheet

Client:

Strade Costruzioni Generali SPA

Project Manager:

Dott. Ing. Innocente Porrone

Structure Engineering and Design:

UBC Ingénierie

Cost of RENOFORS

intervention:

375,000 €

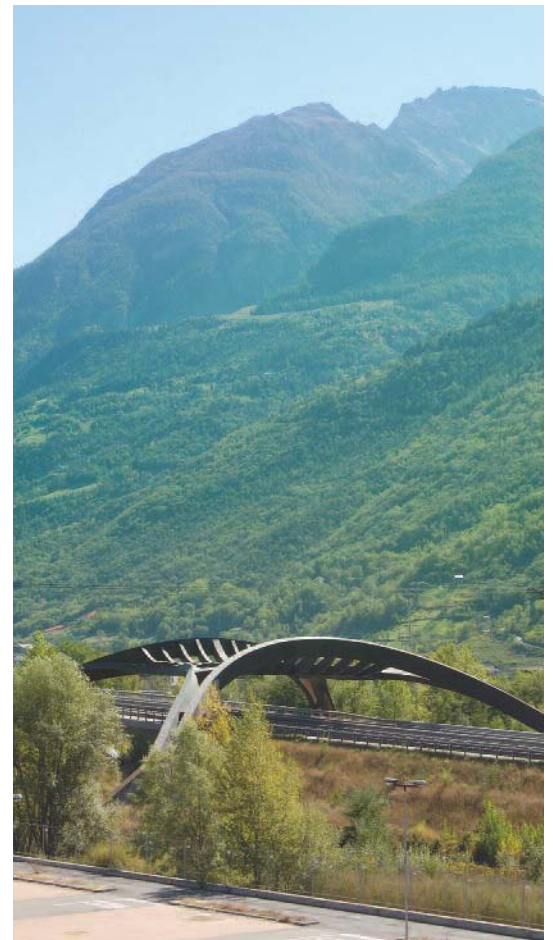
Completion time:

3 months – 2007

MESSAGE FROM THE PROJECT MANAGER

Under the influence of pathogens, the wood was deteriorating at an astonishing rate. On this structure built more than thirteen years ago, the deterioration took place within one month and led to the complete decay of the wood in places subject to rainfall infiltration. Since the stability of the structure was compromised, it was necessary to prop it up to prevent it from collapsing and causing an interruption of the highway traffic. The decision to attempt avoiding demolition and salvage the structure could only be materialized thanks to the intervention of a company with a solid experience in similar construction sites, implementing specific technologies and innovative materials. Moreover, the company offered a complete diagnosis and fast completion times. From the outset, relations with RENOFORS' technicians were the most auspicious (proposals accepted by both parts, exhaustiveness of diagnosis, confirmation of completion times) despite the inherent difficulties of the project: complexity of the shape and behaviour of the structure, closeness to a trunk road on which traffic is uninterrupted, among others. The work performed made it possible to preserve the original shape and functionality of the structure, as well as the efforts of the initial architect and project manager, while adding protection against wood pathogens, guaranteeing the durability of the structure.

Innocente Porrone



— **Surgery for construction** —

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