

# First reinforced concrete building in Rijeka Port – Ferenc Pfaff's Warehouse no. 17

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## ABSTRACT

As the main port of the Kingdom of Hungary the city of Rijeka experienced significant growth at the end of the 19<sup>th</sup> and in the beginning of the 20<sup>th</sup> century. The largest construction works took place during the port construction with grand extension of the coast (with coastline shifts up to 200 m) and construction of numerous port warehouses (around 40).

This paper will explore in depth the Warehouse no. 17 (former XIV), constructed from 1906 till 1909, which is the largest and the most impressive building in the Port of Rijeka, with ground plan dimensions equal to 50x100 m, consisting of a basement, high ground floor and three storeys, with high load capacity of 1500 kg/m<sup>2</sup>. Although reinforced concrete has already been used in the Port from 1893, as part of the Monier's floors in several warehouses (two of which still exist), this is the first building in the port constructed entirely as a reinforced concrete structure. The warehouse was designed by Hungarian architect Ferenc Pfaff for the Hungarian State Railways, structural design was made by Kálmán Balogh, while the building contractor was Grünwald Testvérek, all from Budapest.

It should be mentioned that at the same time another monumental building made entirely of reinforced concrete was being constructed in Rijeka: the Emigrant Hotel, designed by Szilárd Zielinski. These two buildings place Rijeka side by side with other European cities in terms of introducing new materials and construction techniques.

Warehouse no. 17 is a frame structure constructed according to the E. Coignet and N. de Tedesco patent consisting of: columns with square cross-section of variable size per floor (from 77 cm in the basement up to only 32 cm on the top floor), haunched beams (primary beams 58 cm, secondary beams 33 cm), slab depth 12 cm and exterior/interior 10 cm thick walls (added afterwards).

This warehouse is protected as a heritage monument inscribed in the Croatian registry of cultural objects. It is still part of the port, but it is no longer in use.

In this work emphasis will be given to: (I) review of the patented system in order to obtain information about the design of early reinforced concrete structures; (II) better understanding of early 20<sup>th</sup> century construction techniques and local peculiarities (reinforced concrete structures before WWI were constructed according to systems based on the original patents but were frequently adopted to the individual building as well as to the work of local builders); (III) since original plans and construction drawings are preserved with detailed information about the reinforcement provided (size and spacing of reinforcement as well as joint detailing) the next goal will be to detect the potential weak points (regarding the reinforcement) which will require more attention in the future assessment.

## REFERENCES

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