



RABAT-SALÉ URBAN INFRASTRUCTURE PROJECT

Rabat and Salé, Morocco

Standing side by side on the shores of the Atlantic Ocean, which forms Morocco's western border, the two cities of Rabat and Salé, increasingly dependent on one another, are separated by the Bouregreg River, which creates the 6000-hectare, 15-kilometre-wide valley comprising their hinterlands as it penetrates further into the country. In 2003, a special commission was formed to study the area with a view to large-scale regeneration and its far-reaching conclusions signalled a new stage in the history of the valley, socially, economically and urbanistically. The Hassan II Bridge, with its provision for vehicular, tram and pedestrian links between the two cities, was born out of this new vision, since improved transportation and mobility were to be priority components of the larger urban plan, generating the specific infrastructure projects that would have the most significant and immediate impact on the populations of Rabat-Salé.

The two cities meet the river at different levels. The medina of Rabat hangs over the cliff at about 60 metres above water level on the south-western side and the Kasbah des Oudayas district rises up and then descends to meet the seashore at its tip. Other significant historic sites on this bank include the prominently visible Hassan Tower and the Mohammed V Mausoleum, as well as the ancient site of Chellah, which contains ruins of a Roman town. The Salé medina, with ruins dating back to Phoenician times and still to be excavated, rises only 10 metres or so above the level of the north-eastern bank, where the historic monuments of Sidi Ben Achir's Tomb and an aqueduct are located.

Rabat, already declared the civic/administrative capital of Morocco in 1913 under French occupation, is, today, home to the ministries, luxury hotels and residences that befit a capital city, far removed from its 17th-century image of a corsairs' base for waging war against Christians from Spain and Portugal. It covers almost 9530 hectares, and 75% of its population is employed in government administration and support functions. On the other hand, Salé serves as a dormitory town, with the vast majority of its population commuting to Rabat: over 50% of the 400,000 people who travel daily between the two cities were using the old Moulay Hassan Bridge, nearing the end of its design life. It was vital to overcome the physical and socio-economic rift between the cities created by the river and paucity of traffic links and to improve urban well-being by relieving this commuter congestion and pollution. To this end, several new projects were identified and many are now underway (for example, the new Bouregreg Marina, operational since March 2008, and a mixed-use

real-estate project of 512,000 square metres called Bab al-Bahr, both on the Salé bank, in the vicinity of the new bridge).

Foremost amongst these projects is the Hassan II Bridge and its associated access structures, designed by French architect Marc Mimram after an invited competition, and built to replace the old Moulay Hassan Bridge, which was kept operative during construction before being demolished. The 46-metre-wide, 330-metre-long Hassan II Bridge, providing vehicular, tram and pedestrian routes, also includes the 600-metre-long Salé viaduct and a tramway access ramp and slip roads at one end, before curving into the 100-metre-long nautical base bridge on the Rabat side at the other, as it extends well into the urban fabric on both sides of the river for a total of 1200 metres. Efficiently linking Carrefour de Kardona in Salé to Place Sidi Makhoulouf in Rabat, the Bridge creates covered and open spaces for future public activities at either end of it, thus embracing wider-scale notions of urban planning.

Designed attentively to be "of the place" and "connected to the social landscape and to the people" – in the words of the architect – and so going well beyond the merely engineering aspects of the construction, the Bridge lies low over the river, fully respecting its markedly horizontal context and allowing the historic Hassan Tower to stand proud while impacting as an elegant eye-catching landmark in its own right, with its subtly varied, delicately arched spans and fluid geometry. Designed as three different structural systems in response to the site, the longest 76-metre-clear span of the central portion is formed by an arch section that supports the deck. The Bridge is divided into three separate carriageways on the same level, each supported by structural arches: one for the tramway, and the other two for vehicular traffic. Separate decks are maintained over the regular, shorter spans of the Salé viaduct but united as the asymmetrical structure curves into the nautical base bridge on the Rabat side. The construction solution combined both post-tensioned and prestressed, precast elements and required high technology. The construction system was the first to use very strong prestressed concrete to cope with the forces predicted, and was handled by the local labour force with exemplary skill. The concrete and formwork were also sourced locally.

Opened in 2011, the two tram lines are much appreciated by the community; vehicular flow is much improved; and the walkways offering marvellous views have become a popular destination in their own right: overall quality of life is consequently much enhanced. A successful outcome of the combination of exemplary bridge design, infrastructure improvement and urban planning, the Hassan II Bridge has already become a new iconic symbol of Rabat-Salé, reinforcing their modern, progressive, twin-city identity and laying a sound basis for future infrastructure development.



JURY CITATION

The promise generated by the new Hassan II Bridge anticipates a long-term vision of the cities of Rabat and Salé. Its planning provides opportunities for future development and successfully combines a bridge design with urban planning, landscape and infrastructure improvements. The dynamic complexity of time-based planning is coordinated in multiple layers, providing immediate improvements as well as incremental developments and future opportunities. The ambition of the designer challenges the ordinary boundary of transportation infrastructure and engineering by extending the Bridge beyond the river banks and creating a space for future public activity. The project is a sophisticated and cohesive model for future infrastructure projects, especially in places of rapid urbanisation.

The Bridge profile is low, acting as an impressive horizontal extension of an existing flat plateau, presenting respectful views of the Hassan Tower. Built with great care and high quality of detailing and construction precision, the Bridge has a thin profile and elegant, fluid geometry. It is a pivotal icon, reinforcing the identity of the place, and symbolises a new progressive future for the twin cities.











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CLIENT

Agence pour l'Aménagement de la Vallée du Bouregreg, Rabat, Morocco:
Lemghari Essaki, director general
Saïd Zarrou, former director of infrastructures
Nada El Kasmi, director of infrastructures
Hassan Mahfoudi, chief engineer of bridge project
Tarik El Idrissi, chief engineer of viaduct project
Mehdi Ouguerd, chief engineer of roadway projects

ARCHITECT

Marc Mimram Architectes, Paris, France:
Marc Mimram, project manager
Nathalie Kreib, Aldo Turchetti, Sergio Pauletto, Nicolas Videgrain, Fabien Mauduit, project team

ENGINEER

Marc Mimram Ingénierie, Paris, France:
Marc Mimram, project manager
Jacques Durst, Razvan Ionica, Arnaud Delugeard, Laurent Becker, project team

ASSOCIATE PROJECT MANAGER

CID (Conseil Ingénierie Développement), Rabat, Morocco:
Moncef Ziani, Fouad Bouklou, Taib Bensied, Chakib Lahjomri

CONTRACTORS

SGTM, Casablanca, Morocco:
Ahmed Kabbaj, director
Serge Bisson, project director
Youssef Kriem, assistant project director

SOGEA Maroc, Rabat, Morocco

DETAILED DESIGN

Hassan II Bridge:
Egis JMI, Saint Quentin en Yvelines, France:
Michel Duviard

Nautical Base Bridge:
T-Ingénierie, Geneva, Switzerland:
Jean-François Klein

Freyssinet International, Velizy Villacoublay, France: Jean Pierre Buys

Salé Viaduct and Tram Platform under Rabat's Cliff:
SOGEA, Rabat, Morocco: François Panafieu, Arnaud Warcholak

Tramway Platform and Rabat Bridge Abutment:
TEAM MAROC, Rabat, Morocco: Hicham Hidsi

SECOA, Nanterre, France: Bertrand Lenoir

CONSULTANT

Corrosion Engineering, Annecy, France

PROJECT DATA

Total length: 1030 m
Hassan II Bridge global length: 330 m
Nautical Base Bridge global length: 100 m
Cost: 130,680,000 USD
Commission: May 2006
Design: January 2007–December 2007
Construction: January 2008–May 2011
Occupancy: May 2011

MARC MIMRAM

Born in Paris, France, in 1955, Marc Mimram holds a Master's Degree in Mathematics and graduated as an engineer from the École Nationale des Ponts et Chaussées. He is also an architect (DPLG) and holds a Master's Degree in Civil Engineering from the University of Berkeley in California, in addition to a post-graduate degree in Philosophy. He founded his own consultancy and architecture-engineering firm in 1981 and has completed a large number of civil engineering structures and architectural projects in France and abroad. Marc Mimram taught at the École Nationale des Ponts et Chaussées, at the École Polytechnique Fédérale de Lausanne, and at Princeton University (USA). He was appointed as Professor of Architectural Schools and currently teaches at the École d'Architecture de Marne-la-Vallée near Paris.

WEBSITES

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