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## “PASSERELLE DU MILLÉNAIRE”, PARIS

### Yves PAGÈS

Partner  
Explorations architecture  
Paris, France

[yves.pages@explorations-architecture.com](mailto:yves.pages@explorations-architecture.com)

### Marie FERRARI

Project architect  
Explorations architecture  
Paris, France

[marie.ferrari@explorations-architecture.com](mailto:marie.ferrari@explorations-architecture.com)

### Michel CASSAGNES

Project engineer  
Terrell consulting engineers  
Boulogne-Billancourt, France

[m.cassagnes@terrellgroup.net](mailto:m.cassagnes@terrellgroup.net)

### Summary

The “passerelle du Millénaire” is a collaborative design between Explorations architecture and Terrell consulting engineers. The footbridge is located in the 19<sup>th</sup> arrondissement of Paris. It crosses a former industrial dock that was recently transformed into a mixed used neighbourhood. The footbridge relates to both the industrial history of the site as well as more recent urban developments such as the iconic Parc de la Villette. Because the crossing is located right on the boundary between two cities (Paris and Aubervilliers), Explorations architecture proposed that the bridge be the combination of two “intertwined arms”, ie two separate structures joining above the waterway. The entire footbridge is painted a bright red in order to make it iconic in the cityscape. The structure is fully accessible to handicapped users without the use of elevators resulting in very long approach ramps. It demonstrates how bold architectural design and slender bridge engineering can be combined to deliver an elegant piece of urban infrastructure. The footbridge is more than a simple crossing, it is a place for many to sit and enjoy along a regenerated canal. It cultivates a debate about how visible and long a city footbridge should be.

**Keywords:** Paris; dockland; former industrial site; public realm; accessibility; color; slenderness

### 1. Introduction

The “passerelle du Millénaire” is a collaborative design between Explorations architecture and Terrell consulting engineers. It was opened in the fall of 2016. The footbridge is located in the 19<sup>th</sup> arrondissement of Paris close to the northern city limit. It crosses a former industrial dock that was recently transformed into a mixed used neighborhood including a shopping mall, office buildings and new public spaces.

### 2. Genius loci

Far from the banks of the majestic river Seine, canals in the North-East section of Paris have been key to the city's industrial development since the early 19<sup>th</sup> century. Initiated by Napoléon, they were initially built and operated by private investors. Over the course of the 20<sup>th</sup> century, they slowly became run down parts of the city. Since the 1980's, they have been progressively regenerated and given back to the city's public realm. The “darse du Millénaire” is a former industrial dock connected to one of Paris' main waterways, the Canal Saint-Denis. The dock was previously lined up with brick warehouses and factories. It was bought and transformed in the 2000's by developer Icade to create a new link between Paris and Aubervilliers. The dock was formerly crossed by a derelict truss bridge which was taken down during construction of the new footbridge. The Canal Saint-Denis connects to the Parc de la Villette, which was designed in 1982 by architect Bernard Tschumi on the site of a former slaughterhouse. His design is infamous for its red pavilions called “Folies”. The Folies house many different programs (café, retail, exhibition etc) and were a major inspiration for the “passerelle du Millénaire” as they embody a sense of joy and place making in a former industrial environment.

### 3. Design requirements

The footbridge was awarded through a shortlist design competition run by SEMAVIP (a developer affiliated with the City) in the summer of 2012. The competition brief required the bridge to be fully accessible for disabled people without the use of an elevator and to be as unobtrusive as possible in the new public realm. In France, public clients generally prefer to increase the length of a bridge and its capital cost rather than implement elevators because of long term maintenance issues. This approach often results in very long approach ramps and difficult urban integration. In order to cross a 33m obstacle, the total length of the “passerelle du Millénaire” bridge is close to 250m!

### 4. Architectural design

Because the crossing is located right on the boundary between two cities (Paris and Aubervilliers), Explorations architecture proposed that the bridge be the combination of two “intertwined arms”, ie two separate structures joining above the dock. Each “arm” includes: a solid concrete ramp at one end, a multi span approach (11.4m typical), a 42,2m main span, a steel staircase at the other end. The two decks join to form a 6m wide viewing platform where a long bench is provided. The crossing is fully accessible to disabled people. The maximum gradient is 5% with 1.5m long landings provided every 10m. The insertion of landings was preferred to a continuous 4% gradient which is also acceptable in the French code. The entire footbridge (concrete and steel structures) is painted a bright red in order to create a visual landmark. While many recent urban bridges favor white or grey tones, bright coloured bridges have been built for a very long time in magnificent natural settings. The colour emphasizes the presence of a structure which is very slender and somehow invisible in the cityscape.

### 5. Structural design

The bridge structure was engineered to provide maximum slenderness as well as visual dynamics in elevation. The substructures consist of inclined minipiles in order to avoid existing underground utilities. Approach ramps at each end of the bridge are built in reinforced concrete. Each of the two separate decks is a 130m continuous steel structure supported on 30° inclined pinned box columns. The decks are formed with 2.5m wide steel boxes with profiled edges. Their depth is constant for the approach spans and variable for the main span with a mere 35cm depth at midspan. The two decks are assembled by pinned connections along the main span underneath a stainless steel grille. Despite their slenderness, the steel decks include built in conduits for city utilities (high voltage and data) as well as tuned mass dampers for dynamics.



Fig. 1. General view of the footbridge along the canal Saint-Denis (photo by Michel Denancé)