

## Signature Bridge Design for the Port of Montreal

**Authors :** Juan Manuel Macia

**Abstract :** The Montreal Port Authority (MPA) wanted to build a new road link via Souigny Avenue to increase the fluidity of goods transported by truck in the Viau Street area of Montreal and to mitigate the current traffic problems on Notre-Dame Street. With the purpose of having a better integration and acceptance of this project with the neighboring residential surroundings, this project needed to include an architectural integration, bringing some artistic components to the bridge design along with some landscaping components. The MPA is required primarily to provide direct truck access to Port of Montreal with a direct connection to the future Assomption Boulevard planned by the City of Montreal and, thus, direct access to Souigny Avenue. The MPA also required other key aspects to be considered for the proposal and development of the project, such as the layout of road and rail configurations, the reconstruction of underground structures, the relocation of power lines, the installation of lighting systems, the traffic signage and communication systems improvement, the construction of new access ramps, the pavement reconstruction and a summary assessment of the structural capacity of an existing service tunnel. The identification of the various possible scenarios began by identifying all the constraints related to the numerous infrastructures located in the area of the future link between the port and the future extension of Souigny Avenue, involving interaction with several disciplines and technical specialties. Several viaduct- and tunnel-type geometries were studied to link the port road to the right-of-way north of Notre-Dame Street and to improve traffic flow at the railway corridor. The proposed design took into account the existing access points to Port of Montreal, the built environment of the MPA site, the provincial and municipal rights-of-way, and the future Notre-Dame Street layout planned by the City of Montreal. These considerations required the installation of an engineering structure with a span of over 60 m to free up a corridor for the future urban fabric of Notre-Dame Street. The best option for crossing this span length was identified by the design and construction of a curved bridge over Notre-Dame Street, which is essentially a structure with a deck formed by a reinforced concrete slab on steel box girders with a single span of 63.5m. The foundation units were defined as pier-cap type abutments on drilled shafts to bedrock with rock sockets, with MSE-type walls at the approaches. The configuration of a single-span curved structure posed significant design and construction challenges, considering the major constraints of the project site, a design for durability approach, and the need to guarantee optimum performance over a 75-year service life in accordance with the client's needs and the recommendations and requirements defined by the standards used for the project. These aspects and the need to include architectural and artistic components in this project made it possible to design, build, and integrate a signature infrastructure project with a sustainable approach, from which the MPA, the commuters, and the city of Montreal and its residents will benefit.

**Keywords :** curved bridge, steel box girder, medium span, simply supported, industrial and urban environment, architectural integration, design for durability

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