



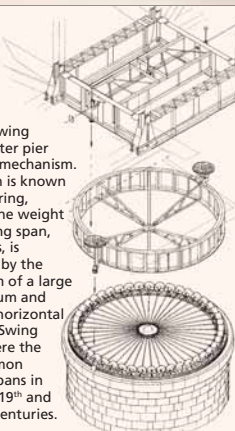
Former Willis Avenue Bridge with swing span opening for navigation.

# Swing Bridges

A swing bridge is a movable bridge that opens for navigation by rotating horizontally about a center pivot pier located in the middle of the waterway. The top section, known as the superstructure, is usually locked in position so that traffic and pedestrians can cross. When a tall ship or boat needs to pass beneath, traffic is stopped (usually by traffic signals and barriers) and electric motors then rotate the swing span of the bridge, turning it approximately 90 degrees horizontally around this central pier.

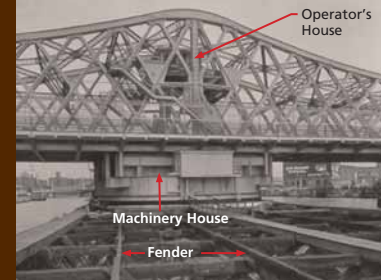
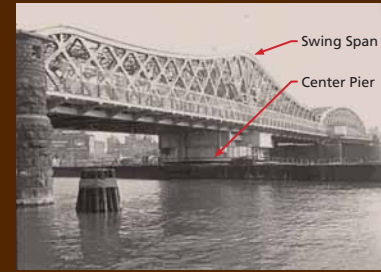
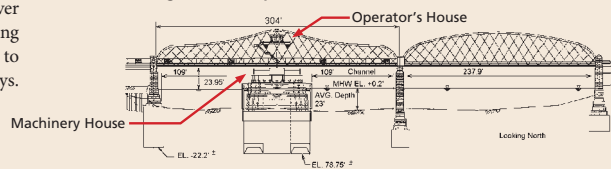
The former Willis Avenue Bridge over the Harlem River was a swing bridge that linked Manhattan and the Bronx. The lattice truss river spans included both a fixed span that did not move and the swing span that opened to allow ships and boats on the Harlem River to pass. These spans carried four lanes of traffic and two walkways. Originally steam engines and later electric motors turned the swing span.

In the early 20<sup>th</sup> century, there were 11 swing bridges over the Harlem River. Seven of these bridges were center pier swing bridges, probably the world's largest collection at that time. The original Willis Avenue swing bridge was unique in that its center pier was not positioned exactly at the center over the Harlem River. Its swing span was placed off center over the western part of the river to accommodate the rail operations in the Mott Haven Rail Yard.



A typical swing bridge center pier operating mechanism. This design is known as rim-bearing, meaning the weight of the swing span, as it moves, is supported by the outside rim of a large circular drum and girder, or horizontal ironwork. Swing bridges were the most common movable spans in use in the 19<sup>th</sup> and early 20<sup>th</sup> centuries.

Swing and Fixed spans over the Harlem River



TOP: Looking northeast from Manhattan toward the swing span and center pier. A pair of navigation channels was kept clear beneath this part of the bridge.

CENTER: Looking northwest at the swing span's center pier, the swing span superstructure, and the operator's house. The protective wooden fender is shown in the foreground.

BOTTOM: One of the two machinery sets from the 1950s which opened the old Willis Avenue Bridge. They were an upgrade to the original steam powered machinery located in the machinery house.

(From MTA Archives and Robert Stewart, Historic American Engineering Record, 2004)