

A River Runs Under It: Re-supporting a Sinking Mansion

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The settled southeast corner

In 2007, new settlement cracks were discovered in the masonry bearing walls of this elegant 1911 mansion on Park Avenue, serving as the Swedish Consulate General. Millwork joints filled a few years before had also re-opened, indicating active movement of brick and limestone bearing walls.



Hydraulic ram pressure testing pile (left), and a pile driven and secured in place.



One of the sensors used to monitor building movement during demolition and pile driving.

A previous investigation revealed that one corner of the building had settled about four inches, that the Park Avenue façade had curved inward almost three inches and that the settlement had stopped.

Now a stepped crack in the southeast corner was clearly worsening and indicated active movement. Working with geotechnical consultants Langan Engineering, we conducted building and subsurface analysis to determine the cause of the settlement and its potential impact on the structural elements.

The investigation concluded that building overlies a river 40 feet below the surface, which had been buried in about 1908 during construction of an adjacent railroad tunnel and that the brick foundation was settling due to slow compaction of the river bed.



East elevation after repair completion.

We analyzed the strength of the limestone and brick masonry and response of the components to various repair techniques. We recommended an innovative stabilization approach that was the least invasive: Thirty-eight 40-foot-long steel end-bearing piles connected to the existing foundation with cantilevered steel brackets and installed with a small pneumatic jack system. The goal was not to reverse the settlement, but to stabilize the building to eliminate further settlement.

Sensors continually monitored the movement of the building and the adjacent structures. Information on the monitoring was provided by daily reports which could also be monitored in real time via Web-based software.

As a result of this innovative approach no further settlement has been observed, no damage was sustained by this historic structure, delicate Georgian wood windows, and ironwork ornamentation that define the classical façades of the building.