



Central Artery Tunnel Project: Boston, MA



- **Objectives:** Accurately measure structural stress
- **Solution:** Jewell Instruments Electrolytic 700 Series
- **Benefits:** High-precision and exceptional repeatability
- **Results:** Reliable and precise measurements

Overview

Two important structures in Boston's Financial District in Dewey Square, with different structural foundation supports, had similar concerns as a result of the Big Dig's 10-year cut-and-cover construction that included underpinning of the adjacent MTA Red Line, extensive dewatering operations, and adjacent slurry wall construction. The construction of the eight-lane highway tunnel took place inches from the plaza foun-

ation of both buildings. As a result, an extensive geotechnical and structural monitoring program was initiated to monitor in real-time the buildings' performance as a result of adjacent construction activity

The Federal Reserve Plaza in Boston is a critical regional bank processing center for the North-eastern U.S. The facility consists of a 33-story tower and a 4-story operation wing. This crucial complex also sat immediately adjacent to the 115 ft deep, open-cut construction of Boston's I-93 Central Artery Tunnel (CAT) project. The tower foundation and adjacent slab-on-grade structure were susceptible to soil movements from potential slurry wall displacements during construction. A detailed monitoring plan was required to assure continuous operation (24/7) of this crucial facility throughout construction.

One Financial Center (OFC), Boston's 7th-tallest building at 46 stories sits immediately opposite from the Federal Reserve Bank (FRB) across the open-cut excavation. The building mat foundation sits on soil and is sensitive to foundation distortion from potential soil subsidence from the construction activity just 20 ft away.



Jewell Instruments 700 series tiltmeter



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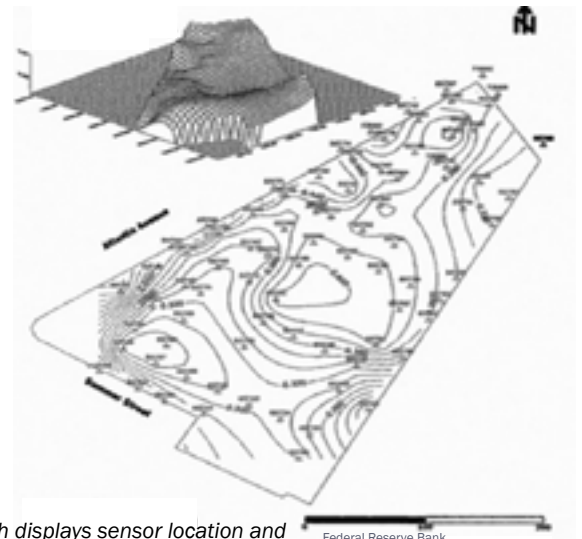


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Project

The instrumentation program included more than 300 sensors in each building to monitor beam/column stresses, foundation distortion, and building settlement. Beam/column stresses were monitored in real-time utilizing an autonomous data logger system with threshold alarms set to alert building owners and CAT personnel of potential concerns. An array of Jewell Instruments [700-Series](#) biaxial tiltmeters were used in both buildings to compliment a precision survey network to document foundation distortion and settlement through foundation topographic plots.



Graph displays sensor location and elevation contour lines

Federal Reserve Bank
Basement Floor Contour Plan
Based on deformation of monitoring points

“The program provided assurance to the building owners and tunneling contractors...”



Results

This program was in place from 1993 through 2003 to cooperatively evaluate and project the potential effects of excavation, dewatering, and tunnel construction. The goal was to minimize risk of unanticipated building damage caused by the adjacent construction. “We’re extremely pleased with the way our system seamlessly disseminates data and presents technical and non-technical users with information in an understandable and meaningful form” says Tom Weinmann, former Jewell Instruments Structural Health Monitoring Manager.

The program provided assurance to the building owners and tunneling contractors that facility operation was not compromised and tunneling operations went as expected.

About Jewell Instruments

Jewell Instruments is a world leader in the design, manufacture, and distribution of high-precision products. Our expertise includes acceleration and tilt sensors, electronic compasses, avionics components, solenoids, and panel meters. The extensive application knowledge we have obtained through decades of experience allows us to provide custom solutions for a diverse group of industries. In fact, customers from all over the globe contact us for solutions to aerospace, medical, industrial, and telecommunications applications - to name a few.

To find out more, visit our website!



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