

North Dorchester Bay CSO Project



- **Objectives:** Monitor effect of nearby construction
- **Solution:** Jewell Instruments' Little Dipper
- **Benefits:** Versatility and exceptional repeatability
- **Results:** Continuous monitoring of project impact

Overview

The Massachusetts Water Resources Authority Board approved the construction of a 17-foot diameter, 2.1-mile long soft ground tunnel in South Boston that would virtually eliminate combined sewer overflows and stormwater discharges to the beaches in South Boston. The goal of the program was to protect swimming beaches, shell fishing beds and other sensitive waters from overflows resulting from heavy rains. The \$250 million storage tunnel project along the popular South Boston beaches make them among the most highly protected urban beaches in the country.

Background

The North Dorchester Bay Combined Sewage Overflow (CSO) Storage Tunnel contract is the largest construction contract associated with the CSO control plan for South Boston. The contractor – a joint venture of Shank/Balfour Beatty/Barletta – constructed the tunnel in soft ground using a tunnel boring machine. The work included a mining shaft at the downstream end of the tunnel in Massport's Conley Terminal; an equipment removal shaft at the upstream end of the tunnel near the Bayside Exposition Center; six intermediate drop shafts at the existing CSO outfalls; CSO and stormwater diversion and control structures; and associated shallow piping and utility conduits. With the existence of a shallow soft ground cover, a comprehensive, automated, web-based geotechnical instrumentation program needed to be designed and implemented.



Jewell Instruments Little Dipper Inclinometer



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Project

With many residential and historical buildings located along the alignment of the tunnel project, care needed to be taken to ensure they were not affected by construction activities. Designers implemented a geotechnical and structural monitoring program consisting of traditional survey instrumentation, along with modern state-of-the-art instruments consisting of:

- Tunnel Boring Machine (TBM) Data Monitoring: Nearly 500 sensors were monitored in real-time. Data from critical sensors consisted of face pressure, grout volume, and muck volume; and they

were updated on the web every 3 seconds

- Surface Settlement Monitoring: vibrating wire multipoint borehole extensometers were located in clusters of three; one located directly above the tunnel crown and one 20ft right and 20ft left of the tunnel centerline

- [Jewell Instruments Model 906 Little Dipper In-Place Inclonometers](#) were deployed at both the launch pit and receiving shaft to monitor lateral movement of the slurry wall panels

- Pore water pressure was measured along the tunnel alignment using vibrating wire piezometers located on the tunnel crown

- All instruments were monitored in real-time using a web-based data acquisition program.

Results

The North Dorchester Bay CSO Project was an unprecedented success. The contractor was able to drive the TBM at greater than 100 ft per day by using two 10 hour shifts. The automated geotechnical instrumentation program was a vital element for the success of the project. By using the web-based program, contractors, engineers, and the owners were able to continuously keep their collective eyes on the project 24 hours a day, thus minimizing down time due to miscommunication.

The [Jewell Instruments Model 906 Little Dipper](#) is an in-place inclinometer system for monitoring slopes,

embankments, deep excavations, tunnels, tank foundations, retaining walls, and other types of ground movement. Installed as a string of vertical or horizontal sensors inside inclinometer casing, or by direct burial, this instrument provides a continuous record of ground displacement. Fiberglass rods connect the sensors inside the casing, and fins or universal pivots couple the sensors to the casing walls. [Little Dipper's](#) on-board electronics accept a wide input voltage range and drive long cables without signal loss. The waterproof and non-corrodible ABS sensor housing also makes the Little Dipper a popular tool for underwater tilt measurements in shallow marine applications.



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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