

Geo-Instruments: Remote Vibration Monitoring Systems

The Project:

Construction of a new Ferry Terminal at Pier 79 on Manhattan's west side required construction just 60 feet above the existing three tubes of the Lincoln tunnel.

The majority of the project consisted of pipe & sheet pile driven for the new ferry terminal structure, and docking facilities, requiring pipe piles be driven to within 15 feet of tunnel structures.

Tunnel Protection Monitoring

The Port Authority of NY&NJ and the consulting engineer, Langan Engineering, were concerned about damage to the tunnels during construction; they wanted early warning of potential damage to modify construction procedures. Piezometers, Crackmeters, Vibration monitoring in the tunnels and vent buildings during pile driving operations were specified to provide this early warning. The tunnels were active, and did not lend themselves to traditional manned, monitoring stations, due to safety, cost and logistic considerations.

The Solution:

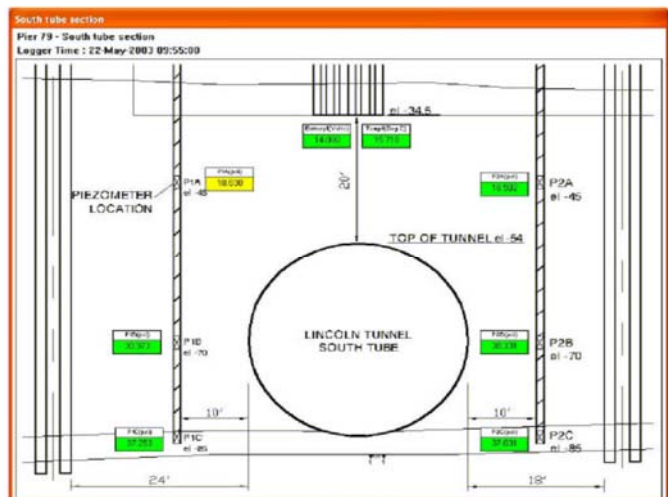
Geo-Instruments suggested an innovative approach to this monitoring question: *Use remote wireless connections to the internet.* Instead of traditional manned systems, Geo-Instruments offered a real time interface to the remote tunnel monitoring stations using fixed IP addressable wireless modems. This approach allowed the concerned parties to have unlimited access to data during construction, without the delay, or costs of a field visit to manually collect data.

The installed system uses four vibration monitors, for monitoring high vibration due to pile driving, three dataloggers to read twelve VW crackmeters for structural displacements, and twelve Piezometers, for measuring changes in pore pressures.

The solution provides a fixed IP address that an offsite monitoring PC can connect data in to for real-time for processing and posting to a project web site. The web site provides real time display, reporting, audio/visual/ email alarm notification, and data archiving.

The Results:

The system was installed in 2003, and removed in 2004 after successful completion of construction. The system saved the owner countless man-hours in monitoring costs, and provided the needed early warning required when working around sensitive structures.



Above: Screen shot of the website showing cross section of tunnel, with Vibration monitoring data, crackmeter data, and pore pressure data. Users can click on a data box to get trend graphs for each sensor displayed. Note color change to indicate alarm condition

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the data you need.

