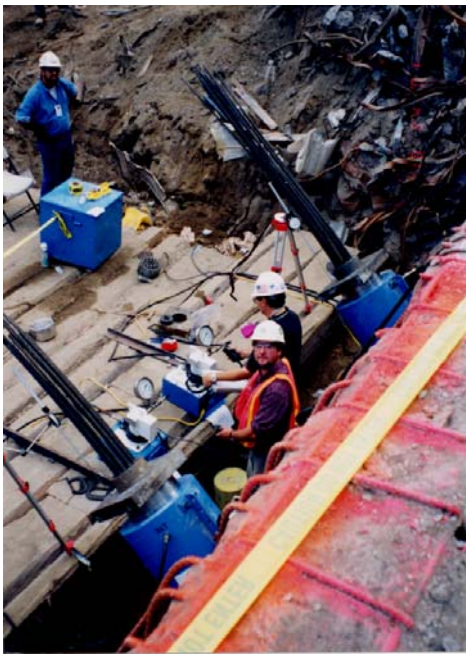
Mueser Rutledge
Consulting Engineers



Above: Site overview taken 2/4/02 during tieback reinstallation. At right: MRCE engineers conduct load tests on tiebacks. At left: MRCE engineers performed a condition survey of the damage on the 1/9 and N/R subway lines under and near the WTC site following the collapse of the towers.

World Trade Center Below Grade Recovery Effort

New York, NY

When the twin towers collapsed as a result of the attack on 9/11/01, the condition of the slurry wall--the watertight perimeter wall that surrounds the site-- and the six basement levels within it became a major focus for the recovery workers. Mueser Rutledge Consulting Engineers' scope of work for this project included:

- Work with the NYC Department of Design and Construction, the NYC Fire Department, the Port Authority, the Transit Authority, and structural engineers from Thornton-Tomasetti, the structural engineering firm advising the public agencies on the above ground structures. MRCE provided rescue workers with information on the location of the underground structures, and reviewed schemes for placing the large cranes needed for rubble removal.
- Conducted damage assessment within the slurry wall perimeter. Of particular concern was the support of the slurry wall. Following damage assessment, MRCE developed a scheme to support the slurry wall while the rubble is removed and tiebacks are reinstalled. Slope indicators and monitoring wells are installed at strategic locations along the slurry wall to monitor water levels and wall movement during rubble removal.
- Worked with the New York City Transit Authority to assess damage to the subway tunnels under and near the collapsed towers. MRCE designed support and shoring plans for WTC subgrade structures. The N and R line was braced in both the station and tunnel, enabling workers to excavate to the west. The 1 and 9 IRT subway tunnel, located just several feet underground, was partially collapsed under the WTC site. MRCE engineers are on the team to study the TA's options for the future alignment of this line.
- Performed studies of the below ground parts of surrounding buildings which were damaged in the collapse of the towers. These studies included 1 Liberty Plaza and two of the World Financial Center buildings.

The slurry wall was effectively resupported and the site turned back to the City in May 2002. MRCE is working on numerous post-recovery projects within the WTC site, including the new WTC 7 foundations, the Freedom Tower foundaitons, the foundations for proposed Towers 2, 3, and 4, the Memorial and the cultural center, as well as the new PATH station and the nearby Dey Street Connector and Fulton Transit Center.