



LIMA METRO LINE 2

LIMA, PERU

Line 2 of Metro Lima is a 27 kilometer underground line linking the district of Ate in Lima and the Callao region adjoining the capital. The line will interconnect with the current Line 1 station in Grau and the line no. 1 of the BRT in Central Station.

The Lima Metro, an ongoing project for many years, began construction of Line 1 in the 1980's. For various reasons construction progress was interrupted for prolonged periods. The 21.5-mile-long, 26 station Line 1 completed construction in July 2014.

Construction of Line 2 commenced in February 2012 and is still ongoing. Fugro Loadtest periodically performed O-Cell® testing at stations along the Line 2 alignment for a total of 9 which ending with station E-27 in January 2020. As the included map shows, 4 additional metro lines are planned in Lima, which will soon bring a very different look to the city!

Subsurface conditions in Lima are generally consistent, with the upper 8 to 10 meters being

primarily a stratum of loose gravel/fill material. The underlying stratum, below 10 meters, is typically a very dense gravel. Tests were planned to garner as much information as possible about the side shear and end bearing capabilities of these materials as seismic activity is very common for Peru. This information is critical for optimizing the foundation design, maximizing strength of material use, while insuring a safe seismic activity design.

The 1.8-meter test shafts were constructed with a bentonite slurry. Prior to concrete placement inspection of the excavations with SONICaliper™ allowed generation of a 3D profile which confirmed excavation shape, verticality and alignment. This information

PROJECT INFORMATION

- Owner: Ministry of Transportation
- Drilling Contractors: Pilotes Terratest and Soletanch Bachy Peru
- General Contractor: Sociedad Concesionaria Metro de Lima Linea 2 S.A.
- Completion Date: 2022

SERVICES PROVIDED

- 9 Single Level O-Cell® Load Tests
- Load Test Program Design
- SONICaliper™ Shaft Profiling

helps identify conditions which can cause construction quality issues and it aids greatly the interpretation of load test results. See the image included herein.

Seven of the test shafts, between 28 and 32 meters in length, produced very consistent O-Cell test results showing unit end bearing values from 8,600 to 13,000 KPa, which varied with tip depth, and side shear values ranging from 200 to 350 KPa. The overall mobilized capacities of these seven tests ranged between 49 to 70 MN. The remaining two tests shafts, at 42 meters and 51 meters depth, as expected, yielded higher capacities.

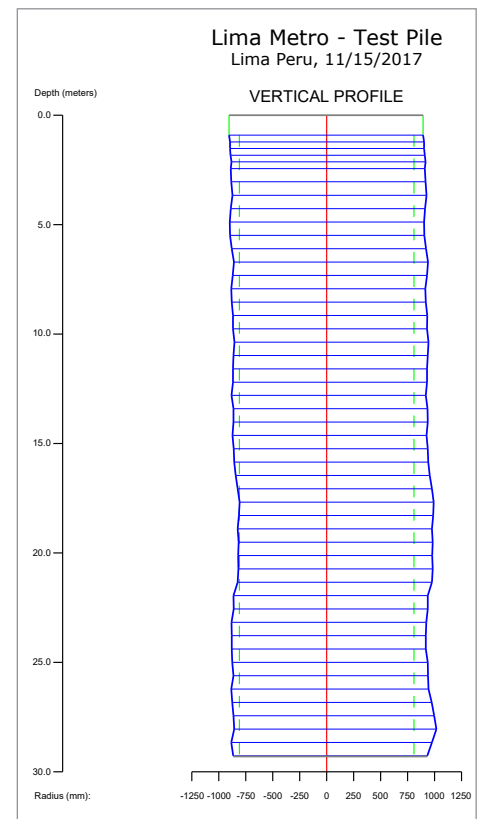
Accurate measurement of actual foundation performance allows engineers to optimize foundations designs while knowing that safe foundation performance is possible for extreme events.



O-Cell cage assembly



Image by aate.gob.pe/contacto/



SONICaliper test pile results.