

Barrette Integrity Measurements for High-Rise Construction in Paraguay

Challenge:

A 55-story residential tower in Asunción required measurement of concrete integrity for deep barrette foundations installed within a constrained urban site. The foundation system consisted of 44 barrettes, each approximately 36 to 40 meters in length. The size of the reinforcement cages, combined with limited site access, required an integrity evaluation approach that could be implemented efficiently during construction while minimizing risk to instrumentation and avoiding impacts to the construction schedule.

Method:

Thermal integrity testing was performed on 22 of the 44 installed barrettes. Each test element was instrumented with eight longitudinal thermal sensors extending the full length of the shaft. Due to the depth of the foundations, reinforcement cages were assembled from multiple segments, requiring pre-planned sensor splice locations to ensure continuous thermal measurement over the full barrette length. Only the portions of the thermal sensors extending above the final concrete elevation were placed inside PVC sleeves to protect them during cage handling, placement, and backfilling. Sensors embedded within the concrete remained fully exposed to ensure proper thermal measurement. All barrettes were installed below grade, and gravel was placed above the concrete to fill the excavation to final elevation.

Temperature data was collected continuously throughout the concrete hydration process. Given the rectangular geometry of the barrettes, results were evaluated qualitatively by comparing thermal response consistency along the sides and corners of each element. Temperature variations were reviewed to assess concrete uniformity and to identify potential indicators of localized defects or reinforcement cage misalignment.

Results:

Thermal sensor survivability was approximately 100 percent across all tested elements. Measured temperature profiles exhibited slightly cooler responses at barrette corners, consistent with expected heat dissipation behavior for rectangular shafts. Minor variations consistent with reinforcement cage alignment tolerances were identified and were not considered structurally significant. No localized temperature anomalies indicative of deficient concrete quality were observed.

Peak hydration temperatures were reached within approximately 43 hours of concrete placement, allowing timely evaluation and acceptance of the tested barrettes. The testing program provided reliable confirmation of foundation integrity and supported uninterrupted continuation of foundation and superstructure construction.

Project Details

Client: Soletanche-Bachy

Location: Asunción, Paraguay

GRL Office: Central (Headquarters)

GRL Services

- Thermal Integrity Profiling (TIP) Testing



BARRETTE P033 - RESULT

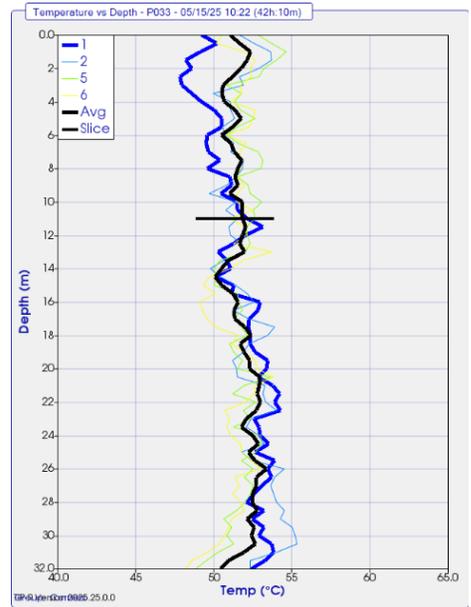
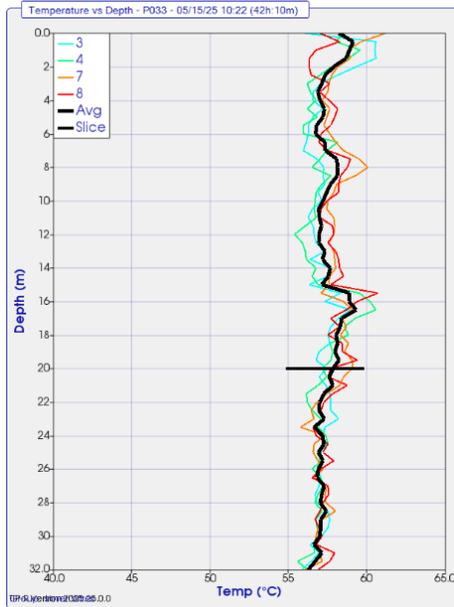
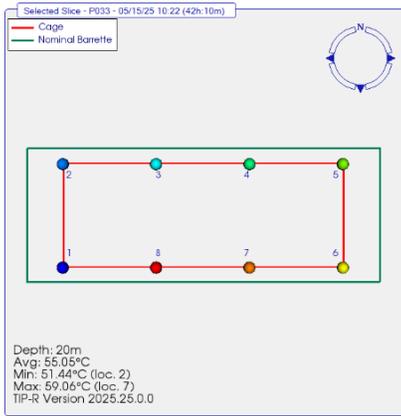


Figure 1. Temperature vs. Depth Profiles at 42h After Placement (layout, interior and corner results)