

4. Development of Cast-in-place Concrete Pile with High-strength Longitudinal Reinforcement

Yuki Wada, Hidetaka Funaki, Takeshi Kishimoto, Toshikazu Yamaguchi

To prevent overcrowding of rebars in cast-in-place concrete piles, nine companies, including our own company, jointly developed a cast-in-place concrete pile with high-strength (standard yield strength of 590 N/mm² and 685 N/mm²) longitudinal reinforcement. In this development, three main types of experiments were performed to establish a seismic design method for a cast-in-place concrete pile with high-strength longitudinal reinforcement.

The results of elemental experiments confirmed that immersing the rebars in stabilization slurry had no effect on bonding performance, or on the mechanical performance of the lap joints. From this, we gained knowledge on how to set the anchorage length of high-strength rebar into concrete and the lap joint length between high-strength rebars.

Next, structural experiments were performed on five piles, with axial force ratio and concrete strength as the main parameters. This increased our understanding of the damage process and deformation performance of the pile. It was also confirmed that, by conducting bending analysis of the cross section assuming a linear distribution of strains, it is possible to evaluate the relationship between bending moment and curvature up to the ultimate limit state.

Keywords: cast-in-place concrete pile, high-strength longitudinal reinforcement, stabilization slurry