

ANALYSIS OF SOFT SOIL IMPROVEMENT WITH AND WITHOUT PREFABRICATED VERTICAL DRAINS (PVD) FOR CONSOLIDATION ACCELERATION USING ANALYTICAL METHODS AND PLAXIS MODELING ON THE RENGAT–PEKANBARU TOLL ROAD CONSTRUCTION PROJECT PEKANBARU RING ROAD SECTION

Student Name : Nur Selviana
ID Number : 4204221527
Thesis Supervisor : Junaidi., S.T., M.T

ABSTRACT

The construction of the Rengat–Pekanbaru Toll Road, Pekanbaru Ring Road Section, faces geotechnical problems due to the presence of soft soils consisting of peat and soft clay, which have high compressibility and low permeability, potentially resulting in significant consolidation settlement and a prolonged consolidation time. This study aims to analyze and compare the consolidation behavior of soft soil under conditions without and with Prefabricated Vertical Drain (PVD) using analytical methods and PLAXIS 2D numerical modeling.

The analysis was conducted based on boring log, Cone Penetration Test (CPT), and laboratory soil parameters. The consolidation time and settlement were calculated using the Terzaghi, Barron, Hansbo, and Carrillo methods, followed by validation using PLAXIS 2D and calibration using the Asaoka method based on field monitoring data.

The analytical results show that the installation of PVD accelerates the time required to reach 90% degree of consolidation from 2,599 days to 348 days, or approximately 7.5 times faster, with a time efficiency of 86.6%. PLAXIS 2D modeling resulted in settlements of 0.432 m without PVD and 0.441 m with PVD, while the analytical results calibrated using the Asaoka method showed differences from the field data of 0.003 m (1.53%) for settlement and 2 days (0.57%) for consolidation time. The study concludes that PVD is effective in accelerating the consolidation process without reducing the final settlement of the soft soil, making it a feasible alternative for soil improvement in toll road projects in Riau Province.

Keywords: *Analytical Method, Consolidation, PLAXIS 2D, PVD, Soft Soil.*