

## INTISARI

Proyek Kereta Cepat Jakarta-Bandung *Section 4* bidang *subgrade* menggunakan struktur dinding penahan tanah *counterfort* untuk menahan timbunan tanah struktur jalan rel. Struktur dinding penahan tanah *counterfort* terbuat dari beton bertulang yang dicor di lokasi. Penelitian dilakukan secara analitis menggunakan metode Rankine dan secara numerik dengan menggunakan Plaxis v8.6. Penelitian ini bertujuan untuk mengetahui stabilitas dinding penahan tanah *counterfort* di DK 130+969. Selain itu, penelitian ini meninjau *wall to wall strut* pada sebagai desain alternatif dinding penahan tanah

Penelitian dilakukan dengan meninjau faktor keamanan daya dukung tanah terhadap berat struktur dinding penahan tanah *counterfort* secara analitis. Kemudian, pemodelan numerik pada Plaxis v8.6 diawali dengan tahap perbaikan tanah dengan pemancangan *spun pile* hingga ke tahap pemodelan dinding penahan tanah *counterfort*. Pemodelan alternatif dilakukan dengan mengganti sistem *counterfort* menjadi *wall to wall strut*.

Berdasarkan hasil analisis secara analitis, faktor keamanan daya dukung diperoleh sebesar 5,16 sehingga dinding memenuhi syarat faktor aman minimum 3. Setelah dilakukan pemodelan secara numerik, faktor keamanan dinding penahan tanah *counterfort* diperoleh sebesar 4,52 dengan penurunan 11,57 cm. Pada pemodelan alternatif dinding penahan tanah menggunakan *wall to wall strut* diperoleh faktor keamanan 4,51 dan penurunan sebesar 11,74 cm. *Wall to wall strut* menggunakan baja profil WF 350.150.7.11 dengan rasio momen 0,21. Adapun hasil analisis dinding penahan tanah kantilever tanpa menggunakan sistem penunjang diperoleh faktor keamanan sebesar 4,41 dan penurunan sebesar 11,68 cm. Perbandingan hasil analisis desain alternatif dengan kondisi eksisting menunjukkan selisih nilai faktor keamanan yang kecil dan biaya yang lebih rendah sehingga penggunaan baja WF dapat menggantikan fungsi *counterfort*.

**Kata kunci:** dinding penahan tanah, *counterfort*; kereta cepat; *wall to wall strut*; simulasi numeris.

## ABSTRACT

*Jakarta-Bandung High-Speed Railway Project Section 4 in the subgrade area uses a counterfort retaining wall system to retain the embankment of the railroad structure. The counterfort retaining wall is made of reinforced concrete cast on site. The research was carried out analytically using the Rankine method and numerically using Plaxis v8.6. This study aims to determine the stability of the counterfort retaining wall in DK 130+969. In addition, this research analyzed wall to wall strut as an alternative design for the retaining wall system.*

*The research was conducted by reviewing the safety factor of the soil bearing capacity against the weight of the counterfort retaining wall structure analytically. Afterwards, numerical modeling in Plaxis v8.6 begins with the soil improvement stage by driving spun piles to the counterfort retaining wall modeling stage. Alternative modeling is done by changing the counterfort system to wall to wall strut.*

*Based on the results of analytical analysis, the bearing capacity safety factor is 5.16 so that the wall meets the minimum safety factor requirements of 3. After numerical modeling, the safety factor of the counterfort retaining wall is 4.52 with a vertical displacement of 11.57 cm. In the alternative modeling of retaining walls using wall to wall struts, the safety factor is 4.51 and a vertical displacement of 11.74 cm. Wall to wall strut using profile steel WF 350.150.7.11 with a moment ratio of 0.21. The results of the analysis of the cantilever retaining wall without using a support system obtained a safety factor of 4.41 and a vertical displacement of 11.68 cm. Comparison of the results of the analysis of alternative designs with existing conditions shows a small difference in the value of the safety factor and lower costs so that the use of WF steel can replace the counterfort function.*

**Keywords:** retaining wall, counterfort; high speed railway; wall-to-wall struts; numerical simulation.