

## Height of Highway Embankment for Tolerable Residual Settlement of Loose Cohesionless Subsoil Overlain by Stronger Soil

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**Abstract :** Residual settlement of cohesionless or non-plastic soil of different strength underlying highway embankment overlain by stronger soil layer highway embankment is studied. A parametric study is carried out for different height of embankment and for different ESAL factor. The sum of elastic settlements of cohesionless subsoil due to axle induced stress and due to self-weight of pavement layers is termed as the residual settlement. The values of residual settlement ( $S_r$ ) for different heights of road embankment ( $H_e$ ) are obtained and presented as design charts for different SPT Value ( $N_{60}$ ) and ESAL factor. For rigid pavement and flexible pavement in approach to bridge or culvert, the tolerable residual settlement is 0.100m. This limit is taken as 0.200m for flexible pavement in general sections of highway without approach to bridge or culvert. A simplified guideline is developed for design of highway embankment underlain by very loose to loose cohesionless subsoil overlain by a stronger soil layer for limiting value of the residual settlement. In the current research study range of ESAL factor is 1-10 and range of SPT value ( $N_{60}$ ) is 1-10. That is found that, ground improvement is not required if the overlying stronger layer is minimum 1.5m and 4.0m for general road section of flexible pavement except bridge or culvert approach and for rigid pavement or flexible pavement in bridge or culvert approach. Tables and charts are included in the prepared guideline to obtain minimum allowable height of highway embankment to limit the residual settlement with in mentioned tolerable limit. Allowable values of the embankment height ( $H_e$ ) are obtained corresponding to tolerable or limiting level of the residual settlement of loose subsoil for different SPT value, thickness of stronger layer ( $d$ ) and ESAL factor. The developed guideline is may be issued to be used in assessment of the necessity of ground improvement in case of cohesionless subsoil underlying highway embankment overlain by stronger subsoil layer for limiting residual settlement. The ground improvement is only to be required if the residual settlement of subsoil is more than tolerable limit.

**Keywords :** axle pressure, equivalent single axle load, ground improvement, highway embankment, tolerable residual settlement

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