

References

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DETERMINATION OF SAFE AREAS FOR BUILDING POSITIONING ON THE UNDERMINED TERRITORIES

Differential settlements and rolls caused by base deformations under difficult engineering and geological conditions are generally significantly higher than the corresponding values, which occur under ordinary geotechnical conditions. These are subsidence of forest soils by soaking, subsidence during thawing of frozen soil ice layers, raise of the ground surface by swelling or frost heaving, ground surface subsidence by underground mining or karst-suffusion processes occurrence, and others.

Areas of buildings and structures setting definition is an important issue in their design on undermined territories where the predicted deformation of the minework.

These areas should be defined on the basis of non-exceedance of permissible deformation values defined according to the standards.

We can note down the following conditions (considering the fact that the greatest deviation on the trough occurs in the radial direction):

$$S \geq n_s \cdot Z \quad x; y = n_k (w(x; y) + \eta(x; y))$$

$$i \geq n_i \cdot \frac{\Delta Z}{D} = n_i \frac{Z \cos \alpha; y + R \sin \alpha - Z(x - R \cos \alpha; y - R \sin \alpha)}{2R} ,)$$

where n_s, n_i – deformations reliability coefficients; x, y – plate center variables coordinates according to the maximum subsidence point; $[S]$ – the maximum subsidence of the foundation; $[i]$ – the maximum allowable building rolling; α – angle of the diameter passing through the center of subsidence trough, $w(x, y)$ – the vertical displacement of the plate points with loading; $\eta(x, y)$ – vertical displacement of the plate by the curving surface.

Vertical displacement w and η are found from the linear differential equation of the fourth order in plate with elastic foundation. It is assumed that the settling caused by minework will be found taking into account the geometry of subsidence trough according to the model of prof. Kolbenkov.

Having solved the inequality (1), we can get some area $Q(x; y; [S]; [i]; D)$, which will be the locus of points where the plate center is not allowed to be placed according to the standarts.

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