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CALCULATION OF EXTREME BROADENING OF LOADED FOUNDATIONS ON NATURAL BASIS

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Bases loaded immediately after the construction, compared with those in which the area of the supporting parts increases as load grows, have different stress-strain state of the redistribution of the ground contact pressure at the base of the foundation.

The calculation is performed for an increasing area of foundation supporting parts in the process of construction. It is necessary to take into account different types of deformability of the foundation soil under the central and lateral areas at different stages of loading. The calculation is performed in two stages.

At the first stage we study the stress state of the system under load F_S, at the second - n.d.s. broadens the plate to size L under load F_i taking into account the different deformability of the soil under the central and side areas.

A stress field is formed when the initial load is applied to an array of ground. After the application of an additional load there appears an increase in the ground voltage. Reactive earth pressure under accrued (side) areas is ($\vartriangle L_1$; $\vartriangle L_2$) Function additional load is $P_Б(x;y) = f_1(\vartriangle F)$ And under the center – functioning of the initial and additional load at the same time $P(x;y) = f_2(F_S) + f_3(\vartriangle F)$. For the final decision we summarize the intermediate results.

Let us consider «strip» conventionally isolated from the foundation tape transverse as a strip of unit width. As indicated above, the calculation is performed in two stages. The first step in the study of the mechanism of formation n.d.s. where deformation characteristics of a base (using the Winkler hypothesis – the coefficient bed) are assumed to be constant over the entire length l. To determine these characteristics we use a graph of «load-precipitate». At the first stage of loading the load is considered tobe zero, then the numerical value of the coefficient of bed K_1 isdetermined in the first section of the chart, and the ratio of pressure on the ground p_1 to the value of rainfall Stamp S_1 experienced caused by this force action:

$$K_1 = \frac{p_1}{S_1}.$$

At the second stage, the calculation of band width loaded load is done $\vartriangle F = F_i - F_S$. Characteristics of subgrade at this stage of calculation should be made at different length L. For the central portion having already upset S_1 Coefficient bed K_2 characterized by cutting 1-2. Value K_2 equal:

$$K_2 = \frac{\vartriangle p}{S_2 - S_1}.$$

Under the side of the plate contact pressure distribution is uneven: the busiest section is $\vartriangle L_2$. Thus, we have two side portions that have come into operation at the same time after the application of the additional load $\vartriangle F$ having, in principle, different stress state. Coefficients of bed (K_1 ; K_3) are characterized by a secant slope portion 0-1 for marking the change in pressure in the first case from 0 to $\vartriangle p_1$ And in the second - from 0 to $\vartriangle p_2$. Coefficients K_1 and K_3 may be equal or different because of the peculiarities of formation of the state of stress. In the case of separation of the sole foundation from a subgrade bed one of the coefficients is zero.

The state of equilibrium or movable of deformable systems is known, besides differential equations it can be described by using variation principles. Thus, the equilibrium position of a conservative system is a position in which the force function of all the forces of the system has a minimum value. To determine this minimum,the so-called direct variation methods, including the Ritz method are applied. Most problems in the theory of elasticity and structural mechanics can not be solved exactly. The usage of the variation principles allows obtaining an approximate solution and at the same time with all desired accuracy.

This method is used to determine the effective forces, as well as linear and angular displacements broadened under load, applied with a certain force, the support member lying on the Vinklerovom basis. An elastic line study of the foundation strip ($b = 1m$) is described by a coordinate function adopted in the form of a polynomial of the 6th degree:

$$V(x) = a_{11} + a_{21}(15l^4x^2 - 5l^2x^4 + x^6),$$

where Initial bandwidth (after broadening L), a_{11}, a_{21} – Unknown coefficients.

At the ends of the strip imposed power conditions:

$$EIV^{II}(0) = 0,\ EIV^{II}(L) = 0,$$
$$EIV^{III}(0) = 0,\ EIV^{III}(L) = 0.$$

The left edge of the strip is accepted as original. Based on the upper band, the potential energy of the band broadening is the sum of the potential energy of bending plate and the potential energy of the elastic foundation:

$$\Pi_S = 1/2\int_0^l E_1 I_1 (V^{III}(x))^2\,dx + 1/2\int_0^l K_1 V_S^2 =$$
$$= 1/2\int_0^l E_1 I_1 \left[a_{21}(30l^4 - 60l^2x^2 + 30x^4)\right]^2 dx +$$
$$+1/2\int_0^l K_1\left[a_{11} + a_{21}(15l^4x^2 - 5l^2x^4 + x^6)\right]^2 dx =$$
$$= 1/2\left[E_1 I_1 a_{21}^2 186 l^9 + (a_{11}^2 l + 7.72 a_{11}a_{21} l^7 + 28.76 a_{21}^2 l^{13})K_1\right] =$$
$$= 93E_1 I_1 a_{21}^2 l^9 + K_1(0.5a_{11}^2 l + 3.86 a_{11}a_{21} l^7 + 14.38 a_{21}^2 l^{13}).$$

Power function of the external force has only term taking into account the initial work load:

$V_S = F_S V_S(l/2+e) = F_S\left\{a_{11} + a_{21}(3.43l^6 - 12.37l^5e + 8.4l^4e^2 - 7.5l^3e^3 - 1.25l^2e^4 + 3le^5 + e^6)\right\}$ The total energy of the system to build:

$$Э_S = \Pi_S - U_S = 93E_1I_1a_{21}^2l^9 + K_1(0.5a_{11}^2 l + 3.86a_{11}a_{21}l^7 + 14.38a_{21}^2l^{13}) - F_S V(l/2+e)\,.$$

Using the basic equation of the Ritz method:

$$\frac{\partial Э_S}{\partial a_i} = \frac{\partial(\Pi_S - U_S)}{\partial a_i} = 0\,.$$

Weobtain:

$$\frac{\partial Э_S}{\partial a_{11}} = K_1 a_{11} l + 3.86 K_1 a_{21} l^7 - F_S = 0$$

$$\frac{\partial Э_S}{\partial a_{21}} = 186E_1I_1a_{21}l^9 + 3.86K_1a_{11}l^7 + 22.08K_1a_{21}l^{13} -$$
$$-F_S(3.43l^6 - 12.31l^5e + 8.4l^4e^2 - 7.5l^3e^3 - 1.25l^2e^4 + 3le^5 + e^6) = 0.$$

We denote by A the expression at factor F_S in the formula . After transformations we obtain the system of equations:

$$\left\{\frac{a_{11}K_1 l + 3.86K_1a_{21}l^7 - F_S = 0}{3.86K_1a_{11}l^7 + a_{21}(186E_1I_1l^9 + 22.08K_1l^{13}) - F_S A = 0}\right\}.$$

Determine the parameters $a_{11}, a_{12}, a_{21}, a_{22}$,We obtain expressions for the forces acting in the broadened under load and upload foundation strip.

$$V(x) = V_1(x) + V_2(x) = a_{11} + a_{21}\left[15(l/2)^4x^2 - 5(l/2)^2x^4 + x^6\right] +$$
$$+a_{12} + a_{22}\left[15(L/2)^4x^2 - 5(L/2)^2x^4 + x^6\right];$$

$$\varphi(x) = V^I(x) = a_{21}\left[30(l/2)^4x - 20(l/2)^2x^3 + 6x^5\right] +$$
$$+a_{22}\left[30(L/2)^4x - 20(L/2)^2x^3 + 6x^5\right];$$

$$M(x) = -E_1I_1a_{21}\left[30(l/2)^4 - 60(l/2)^2x^2 + 30x^4\right] -$$
$$-E_2I_2a_{22}\left[30(L/2)^4 - 60(L/2)^2x^2 + 30x^4\right];$$

$$P(x) = -E_1I_1a_{21}\left[-120(l/2)x + 360x^2\right] - E_2I_2a_{22}\left[-120(L/2)x + 360x^2\right].$$

The endurance capacity of foundation depends on two factors: the strength of the structure itself and the stress state and the strength of the base. The diagram of the jet pressure on the broad foundation is different from that of the ordinary and it can be concluded that the stress field in the soil base will also be formed in different ways, ie, limit equilibrium zone soils at different stages of loading and under various sections of scalable foundation slab will have a different character.

As it is known, the zone of plastic deformation in the ground increases under the slab while it is located below the broadening of the plate edges. The broadening and dogruzheniya of these zones reduce, until the complete cover. But then increasing load zones begin to develop under the edges of the broadened plate. These areas are expanding and deepening. It is noticed firstly that the zones differ in configuration; secondly, that in the case of the construction of a consistent depth of zones of limit equilibrium is smaller; Thirdly, despite the greater depth of the development of the zones under the most critical section the foundation slab they are reduced in comparison with the areas emerging in the case of a single loading.

To investigate the stress-strain state (n.d.s.) of soil mass under Accreted stove should use one of the most popular numerical methods - the boundary element method (BEM). This method allows tosolve a variety of boundary value problems of mechanics of deformable bodies, using various fundamental solutions of boundary integral equations. In general terms, they can be taken down in the following way:

$$c_{ij}(\xi)u_j(\xi) + \int_r P_{ij}^*(\xi, x)u_j(x)d\Gamma(x) = \int_r u_{ij}^*(\xi, x)p_j(x)d\Gamma(x) .$$

In this work we present a study of a stress-strain state of round and rectangular plates supported by ribs, which appear during the operation of plastic deformation.The technique of determining the stress-strain state is enhanced by increasing the cross sectional area of the beams. We also formulate recommendations on the design to broadens the foundations on natural ground, loaded centrally and eccentrically with applied load. The obtained data in the conclusions and the methodology developed at an engineering level can be used to solve specific problems and remove defects in the development of standards of construction elements.

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COLOUR IN ARCHITECTURE

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The article is about different ways of using colour in architecture. It is devoted to the way a colour influences another one and human perception as well. It also explains how we can change the whole view of architectural objects using colour.

Colour in architecture is one of the means of art expressiveness. Composition tasks in the range of colour of constructions and architectural complexes are solved using the colour of buildings or finishing materials, the colouring of surfaces in building process, or emphasizing of separate constructive elements industrially. Colour promotes the manifestation of volumes, the planes, details.

With the help of colour, we can distinguish a separate building among other buildings of an architectural complex. For example, intensive colour of the building of the Moscow Council of deputies of workers distinguishes it from other buildings forming the street and the square adjoining the building. Thus, the building gets the predominating role in the composition of the street and area in spite of the fact that its size is less than the size of the neighboring buildings.