

System of combined foundation as base for mega-structures

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Abstract

The paper presents structural concept of innovative structural system of combined foundation, which makes possible to construct foundations for buildings, including heavily loaded objects, located on subsoil of very small load capacity. It consists of component parts having different forms and playing various structural roles. Some of these components can be designed as huge waterproof boxes having substantial uplift pressure, that is why they could be component parts of structures of artificial islands. The proposed foundation system, due to its inner build, is able to absorb significant part of the energy caused by an earthquake. There are presented some proposals of its possible applications as the base for high-rise buildings and for mega-structures.

Keywords: Foundation; subsoil; load capacity; structural system; high-rise building; mega-structure.

1 Introduction

Systems of deep foundations are complex, they need a long time to be constructed, they are the expensive technical solutions and their applications may have serious impact on the environment. Thus it seems to be more convenient to apply one of shallow types of the foundation systems but practical application of it is a difficult task [1-9].

2 Structural concept

The main structural goal of proposed system of the combined foundation is to distribute the concentrated load force (F), see Fig. 1, to numerous central nodes (C_n) uniformly arranged along neutral axes of horizontal beams (1) and connected to the matter of these beams. In the narrow space between two beams, situated parallel to each other, is arranged an intermediate system composed of lenticular modules (2). Vertical members of these modules are jointed to the central nodes (C_n) and to the structural nodes (S_n). Nodes A, B, C and the structural nodes (S_n) are not

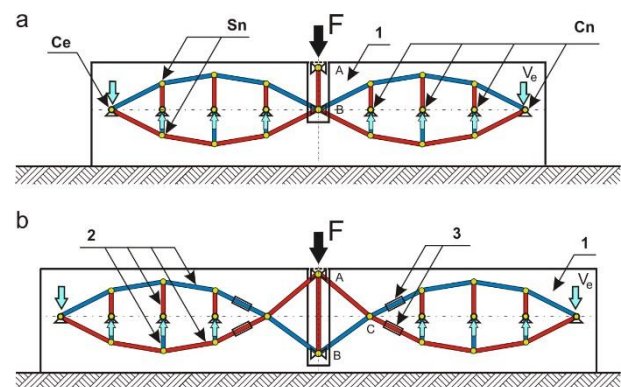


Figure 1. Schemes of concept of proposed system

connected to the main matter of foundation structure in form of beams (1). Boundary nodes (C_e), where act vertical components of reactions directed down, have to be suitably stabilized. Lenticular modules have to be connected by means of nodes of the type B, see Fig. 1a, or of the type C, see Fig. 1b. This structural configuration has some inherent features of damping of energy of vibrations evoked by dynamic load. This ability can be significantly increased e.g. by application of hydraulic jacks (3), computer controlled, which can