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STRENGTHENING COLUMNS, FOUNDATIONS AND STONE STRUCTURES.

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A B S T R A C T

The article analyzes the reinforcement of columns, foundations and stone structures.

R T I C L E I N F O

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Introduction:

One of the most effective ways to reinforce reinforced concrete columns is to install reinforced concrete or metal rings. The simplest ring is a connection between a ring reinforcement and a reinforcing column reinforcement consisting of a conventional longitudinal and transverse reinforcement. In this method of reinforcement, it is important to ensure that the old and new concrete work together.

This is achieved by sanding the reinforced concrete surface, drawing lines on the surface, or treating it with a metal brush and washing the old concrete surface under pressure before concreting.

It is recommended to use polymer concrete to improve adhesion and replace concrete and reinforcement. Based on the calculation and design requirements of the thickness of the column ring should not exceed 300 mm. The cross-sectional area of the longitudinal working armature is also determined by calculation. Its diameter is assumed to be at least 16 mm for compression steigens and 12 mm for elongated steigens. Reinforced concrete rings are made in the form of a spiral winding of wire with a transverse reinforcement diameter of at least 6 mm. The distance between the rings of the spiral should not be less than 40 mm and not more than 100 mm.

Reinforced concrete rings are more efficient (but labor-intensive) in providing a connection between existing and additional reinforcement. Such rings are recommended when the existing reinforcement or concrete protective layer is severely damaged. In such cases, the reinforcement of the reinforced structure is thoroughly cleaned until it reaches the level of pure metal, the broken clamps are attached to the concrete with transverse groove reinforcement.

Additional longitudinal fittings are welded to the existing fittings using connecting rods (diameter 10-16 mm, from class A-1 fittings).

It is recommended to concrete the cover (shirt) with one side closed, the column is attached to the wall, without the possibility of replacing the ring. In columns, this is done by welding the chute to the column reinforcement. When work periods are short and it is not possible to increase the column cutting surface, metal rings consisting of angles and binktimv bars mounted on the edges of the column are recommended for reinforcement.

The performance of the column depends on the efficiency of the penetration of the metal rings, the tight adhesion of the metal angle to the surface of the column and the pre-stressing of the transverse bars. In order for the metal corners to adhere tightly to the concrete surface, the columns are carefully stacked with unevenness and leveled with a cement mixture.

Pre-stressing of the connecting bars is carried out by the thermal method. To do this, the bars are welded to the corners of the ring on one side, then heated to 100-120 ° C using a gas burner, and when heated, the other side of the rail is welded. As the bars cool, compression occurs on the cross-sectional surface of the column, which slightly increases the load-bearing capacity of the column. An effective means of reinforcing load-bearing

columns are pre-stressed metal splints, pre-stressed struts on one or both sides of the column, and single-sided or double-sided rings.

The first, i.e., one-way pre-tensioning, is used to increase the load-bearing capacity of a large or small eccentricity decentralized compression column, and the second is the use of pre-stressed one-way disengagement columns for central and decentralized compression columns. consists of two corners attached by. Special bars with a thickness of not less than 15 mm are welded to the upper and lower regions of the spreader, which transmit the load to the corners of the base and the spreader is equal to the cutting surface. The slats are installed so that they protrude 100-120 mm from the edge of the disassembly angle and provide two holes for the rod bolts.

Reinforcement of solid foundations can be done by increasing their heel or by using various piles. Deformation of rigid foundations is negligibly small, including structures that do not significantly affect the strength of the foundation. The load-bearing capacity of the foundations of the objects to be reconstructed is determined by taking into account the actual strength and deformation of the foundation material and soil, and in the case of pile foundations by field tests, ie probing and static testing. Increasing the size of the foundation is necessary in the event of increased load, insufficient load-bearing capacity of the ground and damage to the foundation.

Reinforcement of the strip foundation with an auxiliary support, partially or completely attached, reflects a solid cast shell that surrounds all sides of the existing foundation with a reinforced concrete coating. The shell reinforcement forms a spatial carcass, and the reinforcement structure of the old foundation must be welded to the previously exposed bare reinforcement to ensure that it works together. If, in addition to the reinforcement of the foundation, the column needs to be reinforced, then the ring should be concreted, concreting should be done simultaneously for the foundation and the column.

When reinforcing the foundation by the expansion method, its compensation is done by 1,2 or 3. In the expansion method, as in the cladding method, it is necessary to ensure that the old foundation is welded with the new reinforcement of the exposed reinforcement structure.

Laying a new part of the foundation can be done side by side with the existing foundation. In this case, the load is transferred from the load-bearing element to the foundation and to the metal conductor or reinforced concrete cladding.

When laying a new foundation, make sure that its heel is tight with the old foundation. When laying under a strip foundation, it is recommended to place the reinforcement structure on a parallel section with a maximum load, as the introduction of new foundations at the nodes and intersections poses a serious task and difficulty. Reinforcement of foundations by means of piles is carried out along the contour of the existing foundation or by installing piles under it. Such reinforcement is carried out when the load on the foundation is too high, when there is a slight and uneven subsidence in the ground, when the ground is affected by transverse and other similar forces. The choice of pile design depends on the internal dimensions of the building or structure, the description of the impact load, the design of the reinforced foundation, the availability of appropriate equipment for pile work.

An effective tool for strengthening foundations is a prefabricated (Mega) prefabricated pile, which does not require large dimensions and starts working with its introduction. The disadvantage of this pile is that it is labor intensive to work on them and digs deep under the foundation heel, which reduces the load-bearing capacity during the reinforcement process. A variety of integral cast piles are used to reinforce the foundation. These include: - drilled (the device is huge, but can be used in any ground conditions); - pneumatic (does not require complex technological equipment); - vibrostamping (can be used in any hydrogeological conditions, does not require complex equipment);

The calculation of the reinforcement of the foundations is carried out for both groups of boundary conditions, taking into account the requirements of the relevant regulations QMQ. The first group calculates the strength of the foundation structure and the load-bearing capacity of the soil. The second group requires the calculation of the deformation of the ground, which takes into account the interaction of the building and the ground.

When reconstructing buildings and structures made of stone structures, it is important to assess the true strength of the load-bearing elements. This assessment is carried out for reinforced and non-reinforced structures

by the method of destructive loads on the ground, taking into account the actual strength of the brick, the mixture, the flow limit of steel. It is necessary to take into account all the factors that can reduce the load-bearing capacity of the structure: cracks, major injuries, deviations of the team from the vertical, the connection between the load-bearing structures, and so on.

Since stone structures mainly absorb compressive stress, a more effective method of reinforcement may be steel, reinforced concrete, and reinforced composite rings. The rock team works in a ring that is compressed on all sides. In this case, its transverse deformation is significantly reduced, and as a result, the resistance to longitudinal forces increases. The steel ring consists of 2 main elements:

- vertical steel corners are installed on the corners of the window sill wall or columns made of cement mixture;

- strip or circular steel clamps.

The gaps between the teams should be thoroughly injected with a cement mixture to ensure that the ring is involved in the work of the team. Once the metal ring is installed, it is protected from corrosion by installing a metal mesh and a cement mixture 25-30 mm thick. Reinforced concrete ring is made of concrete class V10 and above, longitudinal reinforcement class A I, A II, A III, the distance between the transverse reinforcement should not exceed 15 cm.

The thickness of the ring is determined by calculation and is taken around 4-12 cm. Reinforced concrete ring differs from reinforced concrete in that it uses a cement mixture of 75-100 grades instead of concrete. The length of the ring.

Reinforcement of stone columns: Reinforcement with steel (a), reinforced concrete (b), reinforced composite ring (c). If the thickness is 2 or more times, it is necessary to install additional cross-connectors to ensure that its elements work together, making the distance between them in the plan of the team not more than 1 m, and the number of at least 2 are obtained. Their placement on the height should not exceed 75 cm.

Reinforcement of the wall with rings is recommended to simultaneously inject the existing cracks in the team using a cement mixture. To increase the efficiency of injection, Portland cement with a crushing rate of at least M 400, at least 2400 cmJ / g and a thickness of 20-25% of cement slurry is used. Fine sand with a modulus of 1-1.5 is used for the mixture. Injection is also performed by applying a mixture of cement or polymer to the affected area under pressure. There is a general rounding of the team, the restoration of the load capacity, and sometimes an increase.

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