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METHODOLOGY FOR CALCULATING THE BEARING CAPACITY OF THE PLATE AND THE MAIN BEAMS OF THE INTERMEDIATE DEVICE OF BUILDINGS AND STRUCTURES

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Abstract:
This article presents the method and scheme for calculating the load-carrying capacity of the intermediate device plate and the main beam of buildings and structures.

Keywords: reinforced concrete, construction, operation, intermediate devices, support.

When recalculating reinforced concrete intermediate devices of buildings and structures, the ability of a structure to perceive real live loads is performed by the classification (class) method [1, 2, 3, 4, 5, 6].
The maximum permissible ratio of an intermediate device element of class K to the main time load is determined in the following ratio according to scheme N1.

$$K = \frac{\varphi k}{k_n(1+\mu)}; (1)$$

where, $\varphi -$ is the coefficient of unification of the results of the classification of the head beam of metal and reinforced concrete intermediate devices; k-is the permissible temporary load; k_n- is the regulatory load according to scheme H1; $(1 + \mu)$ is the dynamic coefficient.
The condition for the possibility of transferring a live load is written in the following form:

$$K \geq K_0 (2)$$

where, K_0- is the rolling stock class.
The calculation of permanent live loads is carried out in two ways:
- calculation of intermediate devices according to the drawings of the form and fittings;
- introduction of intermediate devices developed on the basis of regulatory documents, in comparison with the current regulatory documents.
With the first method, it can be used on the basis of reliable reinforcement drawings; in the absence of such drawings, the second method can be used. If the results were insufficient when determining the bearing capacity of the intermediate device by the second method, it was recommended to determine it by the first method by testing the jumpers or opening the selected reinforcement of the intermediate device.
When determining the process of maintaining the operability of the designed reinforced concrete intermediate device, information about the location of the bridge structures, its purpose, the influence of climate, the traffic structure and the designed speeds will be known in advance. At the same time, the intermediate devices of reinforced concrete bridges are preliminarily evaluated according to the results of the first calculation of the limit state for the strength of the beam, the strength and durability of the pavement slab [7, 8, 9, 10, 11, 18,20].

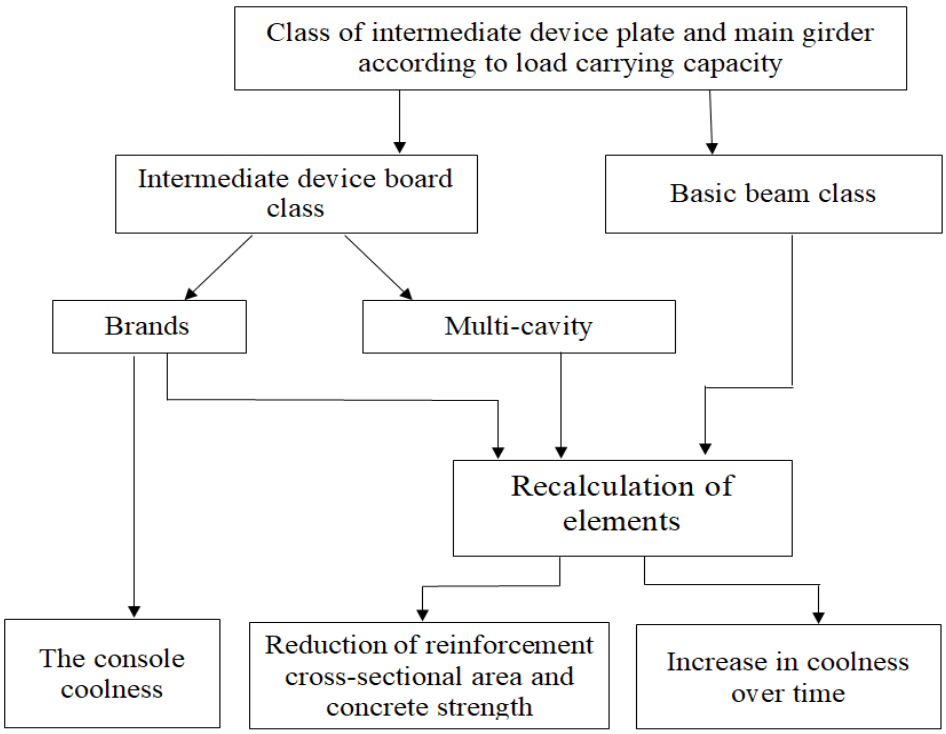
It is required in all cases to take into account the existing defects that affect the bearing capacity of the reinforced concrete intermediate device.

The design cross-sectional surface for determining the bearing capacity of reinforced concrete intermediate devices consists of the following:

- for the main beams - in places of rapid changes in the average intermediate section, sections and structural geometric dimensions, in places where there are defects;
- in the middle spans of the slab and in sections in the repaired areas.

The regulatory documents contain instructions for taking into account defects and damage, cracks that reach the compression limit, displacement of the road axis relative to the bridge axis, an increase in constant loads with an increase in the ballast layer, and the curvature of the outer console of the bridge. the plate is taken into account when calculating the corrosion of concrete and reinforcement.

In accordance with these standards, structures must take into account seismic loads in combination with permanent loads and the action of friction of movable bearing parts and loads created by a movable structure (composition). Taking into account seismic effects, bridge calculations are developed in cases where there is a movable structure (composition) on the bridge and when it is not. When calculating the strength of structures with intermediate devices over 18 m, vertical and ground vibrations generated by seismic loads, and seismic loads that cause vertical ground vibrations, should be multiplied by the correlation coefficient.



Picture 1. Block diagram of recalculation of reinforced concrete intermediate device plate and main beam

When calculating the structure of buildings and structures in other calculations, it is allowed not to take into account seismic loads that create vertical ground vibrations. It should be noted that the longitudinal and transverse seismic loads along the axis of the bridge, which create horizontal ground vibrations, are calculated separately. When calculating seismic loads on the structures of buildings and structures, it is necessary to take into account the occurrence of vibration of parts of

the bridge due to inertia and the effect of seismic pressure on soil and water. To determine the inertia force of buildings and structures as a whole or its individual elements, the structure of the dynamic calculation scheme for independent oscillations of the system is used.

And for grounded cases, it is allowed to develop calculations taking into account the uniformity of symmetry and other well-founded bridge structures according to a simplified scheme [11, 12, 13].

Picture 2. "XND-2-3030C" tool

The "XND-2-3030C" tool is used to complete the above processes. The results obtained with its help are of great importance in determining the bearing condition and service life of structures according to the above formulas.

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