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GEODETIC WORKS ON BRIDGE CONSTRUCTION

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Abstract: Bridges are complicated artificial engineering constructions built at the intersections of roadways, watercourses, and other locations where a bridge is required. Despite the variances in purpose, building technology, design and purpose nature, and even names, they all serve the same objective: transportation. The main geodetic work begins after defining the location and coordinating with other government departments (architectural, environmental, etc.).

Introduction

A bridge is an engineering construction built to span a gap (river, canal, ravine, or other place). Bridges for autos, railroads, and pedestrians are separated into numerous types. Bridge, overpass; built on city bridges and suburban roads, depending on location; combined (built together for roads and railways), depending on the material used, depending on the timber, stone, metal, reinforced concrete bridge, prolyot systems, beams, arches and suspensions, consoles; single-prolet and multi-proletarian according to the number of prolific; types that move above, below, or in the middle, depending on their location relative to the load-bearing structure; depending on whether the traffic is continuous or intermittent, the bridge can be permanent or moving (opening, rising, sliding); prefabricated and subdivided types.

There are also bridge-canals and bridge-houses. In addition to acting as a bridge, they also serve as a house and a canal. In the past, bridges were mostly made of wood and stone. Ancient wooden bridges have not survived. In the Middle Ages, arched rock bridges (mostly in Rome, Spain, and China) were built. There were wooden and stone bridges in Central Asia and Russia. A floating bridge was used to cross major rivers. Cast iron bridges in England (1779), then in Russia (1784); the suspension bridge was built in America (1796), then in England and Russia.

Once the location of the bridge is determined, the main geodetic work will begin, as agreed by various government agencies (architectural, environmental, etc.). The main geodetic works for the construction of bridges include:

1. To study the relief and relief of the water table bottom;
2. Construction of planned and high-altitude geodetic networks;
3. Planning of center and axes of bridge piers and canal piers
4. Detailed planning of the support body;
5. Manage the installation of the supports and the executive shot during their installation;
6. Planning of regulatory and rapper protection structures;
7. Road planning as you approach the bridge;
8. Executive inquiry on the work of the center and the installation of the superstructure;

9. Measurement of deformations of superstructures during bridge tests;

10. Observation of deformations of rolls and superstructures of dwellings and piers during construction and operation of the bridge.

Basic research will be conducted in a comprehensive manner to evaluate the proposed construction site:

- engineering-geodesy,

-engineering-geological and hydrogeological;

-hydrometeorological, climatic, meteorological, soil-geobotanical and others.

Basic research is being done on all types of structures.

Engineering and geodetic surveys provide information about the relief and condition of the area and serve as a basis not only for design, but also for other types of surveys and research.They execute geodetic surveying and topographic surveying of various sizes on the building site, observation of linear constructions, geodetic surveying of geological works, hydrological sections, geophysical survey points, and a variety of other tasks as part of engineering and geodetic surveys.

Engineering-geological and hydrogeological investigations allow for a better understanding of the area's geological structure, physical-geological phenomena, soil strength, groundwater composition and nature, and so on. This data will enable you to precisely analyze the state of the construction.

Hydrometeorological studies provide information on river and reservoir water regimes, as well as the climate of the region. They evaluate the nature of changes in levels, slopes, analyze the direction and velocity of flow, compute the velocity of water flow, conduct depth measurements, take sediments into account, and so on during hydrometeorological research.

Civil engineering research includes:

- geotechnical control, hazard and risk assessment of natural and man-made processes; substantiation of measures for engineering protection of territories;

- local monitoring of environmental components, scientific research in the process of engineering research, field control over the use of research products;

- cadastral and other relevant work and research in the process of construction, operation and completion of facilities.

The content and scope of engineering research is determined by the type and size of the projected facility, local conditions and their level of knowledge, as well as the design phase. Research is being conducted on different types of structures with very similar construction technologies and similar schemes.

The order, methodology, and accuracy of engineering research are largely determined by building codes, for examples, QMQ 11-02-96 and QMQ 11-04-97.

At the next stage, during the construction of the direct bridge, the main geodetic works are: planning of the axes of the centers and supports, planning of intermediate structures, control of the dimensions of the assembly elements supplied from the factory, construction planning and control planning of all parts of the structure, ancillary and temporary structures (buildings, roads, berths, etc.), executive survey of constructed objects, observation of deformations.

Geodetic and leveling works, which provide the design condition and dimensions of both the structure and its individual parts, will be carried out during the construction of the bridge. At the same time, the geodetic plan and elevation foundations will be restored to the ground.

Systematic control over the construction of individual parts of the structure, ensuring their design; check the sizes and shapes of assembly elements from factories; auxiliary production facilities at the construction site and access roads and stairs in residential buildings will be planned.

From the preliminary work to the completion of the bridge, geodetic services at the construction site are necessary. Used geodetic instruments, measuring tapes, and tape measurements should all be in good working order and inspected on a regular basis.

Before beginning work on the bridge or road, the project organization that conducted the study and design must hand over to the builders the materials and inspect them to strengthen the axis of the bridge route in

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compliance with the act in the presence of the customer. It contains information on the transverse profile of the crossing, regulatory planning axes, as well as the condition and types of centers that strengthen the transverse axis of the bridge, floor criteria and wall markings.

Initial data, essentials and technique of measurement and correctness of angles, initial mock-up work when determining and correcting a bridge crossing, and so on should be included in the master layout plan to which the explanatory letter is attached. The materials provided to the builders to reinforce the axis of the bridge route and the reference network should show a relationship to the state-planned and elevated geodetic base's centers and markings. The condition of the anchor centers along the bridge's transverse axis is indicated in the picket, and the elevation signs are indicated in the road project's sign system. The extent of geodetic signs (centers and indicators) materials and plans must match the set parameters.

Construction	plan scale	The distance between the horizontal lifts, in height, m	The number of axis centers of the bridge and their detection	The number of rappers or stamps and the feature of their designation
Bridge length, 100 to 300 m	1: 2000	0,5	At least two on each shore; capital centers	One rapper on each side; anchor constant
The length of the bridge, more than 300 m	1: 5000	1,0	At least two on each shore; capital centers	Two rappers on each side; anchor constant

The most commonly used tools in geodetic works in the construction of bridges and tunnel crossings are N-3 and N-05, is also used when mounting characters on supports. Theodolites 2T2, 2T5 and their modifications are also used. 2T3O theodolites are used in the engineering and geodetic survey phase and in the production of some planning works.

Theodolite T1 is utilized when high-precision angular measurements are required, such as when building discontinuous networks on bridges over 1 km. Many countries (including the United States, Switzerland, Germany, Japan, Sweden, and East Germany) have developed and are mass-producing automatic electronic tacheometers with microcomputer and geodetic computation software packages. The control panel for these devices allows you to enter the following values:

aerial conditions, instrument height, vertical and horizontal angles, as well as code numbers, such as stop and view point numbers, topographic objects, and more, are all adjusted. Calculates horizontal distances and heights while taking the curvature of the ground into consideration. The data has been presented.

When using the taximeter to measure distance, the signal strength is automatically configured, you can work in observation mode, and the reference along the horizontal circle can be adjusted to zero or in a certain direction. The gadget accepts data from external memory and has a recording device as well as a data processing and transmission unit.

The latest types of electronic total stations can work in observation mode, which means they can continually determine the position of a moving reflector with constant eyesight. In this situation, new horizontal direction and distance data are displayed on a regular basis. Data storage devices (storage devices) or data processing equipment receive data output.

These devices allow for the free selection of fixed points based on measurement data to establish the spatial position of research points in a direct field. It's worth noting that computer programs for processing networks and evaluating their accuracy are constructed using the most common methods, and they can be applied to any type of network - triangle, line-angle, polygonometry, and trilateration - with equal success. Such computations may be performed manually using desktop computing devices, but doing so with current equipment integrated with electronic computers would boost our productivity even more.

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