Development of road transport infrastructure through the construction of a runway in the city of Tobolsk

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Abstract. This article discusses the construction of a runway in the city of Tobolsk. The development of road transport infrastructure will allow the territory to open up new opportunities. The author examines the structure of the construction of the runway, analyzes the necessary costs for the construction of a road transport facility. Highlights the main prospects for further development of the territory.

1. Introduction

Airports occupy a special place in the functioning of the city and the country as a whole, providing major external transport links, but at the same time forming powerful self-sufficient structures that have an active impact on urban subsystems and the environment. Qualitative improvement of the architectural and planning, functional and social characteristics of international air terminals will allow them not only to function effectively in the modern world, but also to integrate organically with the urban environment, and in some cases to gain special significance in existing urban structures, providing a new round of development of large cities [1].

The airfield is designed for take-off, landing, taxing, maintenance and placement of the safest transport according to world statistics-aircraft, as well as helicopter and glider. The importance of aviation is increasing every year, therefore, the design of the airfield is relevant today and in the future for many years [2].

The runway plays an important role in ensuring safe and efficient landings and takeoffs. Therefore, their design takes into account the operational and physical characteristics of the aircraft that will be operated on this runway.

The relevance of the construction of the airport in Tobolsk-first of all for citizens:
- this is a social value, as it will increase their mobility and, perhaps, reduce their travel costs in our country;
- the formation of an information society in our country is impossible without the formation of new transport hubs. the airport will certainly soon become one of these hubs;
- in the future, the airport will allow more effective implementation of other projects of national and regional significance.

The main purpose of this study is to study the main control functions observed during the construction of the runway.

The object of research is a runway located in the city of Tobolsk, Tyumen region. The subject of the study is the observed control functions during the construction of the runway.
National interests of the Russian Federation in the field of aviation are determined by several factors: the size of the country, to the insufficient development of land transport linkages, especially in the area of Siberia, the value of aviation to the defence and socio-economic issues; the level of development of science, technology and the latest technology; the present state of the aviation infrastructure – airports and civil aerodromes [3].

2. Materials and methods
The construction site is located South-East of the village "Irtys Yurt" at a distance of about 21 kilometers from the center of Tobolsk. The total land area is 335.27 ha. The construction site is covered with forest vegetation and swampy, there are no access roads. The nearest motorway is up to 1 km away.

Artificial runway (2400 meters*45 meters), with an airfield - dimensions of 2700 meters*300 meters.

For access to the landing site, the project provides for the construction of two temporary roads adjacent to the road 71A-1601 "Tobolsk-Vagay". The entrance to the territory of the landing site of construction equipment and delivery of construction materials is provided through two temporary checkpoints. The project provides for the construction of the following facilities (figure 1).

The project provides for the construction of the following facilities

- The elements of the light-signal equipment:
  - Drainage-drainage network and sewage pumping station;
  - Surface wastewater treatment plants;
  - Steering road;
  - Platform;
  - Complex of de-icing treatment of aircraft;
  - Objects of radio engineering support of flights and aviation telecommunications;
  - Objects and infrastructure elements of aviation security, transport security and anti-terrorist protection;
  - Power supply facilities and networks.

The total area of artificial surfaces for the elements of the landing site are summarized in table 1.

To ensure the power supply of lights of light-signalizing equipment, this section provides technical solutions for laying cable-protective pipes Embedded elements of light-signalizing equipment in the projected layers of new airfield structures.

For this purpose, the coatings provide:
- the device of a ROV in crushed stone to a depth of 0.3...0.5 meters with a base device for cable protection pipes made of cement concrete B7. 5 (M100) 5 cm thick;
- laying of polymer (PE 100) cable protection pipes;
- backfill of the Rove with cement concrete, up to the level of the rubble base.
Table 1. The area of artificial surfaces runways.

| Type of coverage | Artificial runway | Steering road-A | Steering road-V | Platform | Subtotal |
|------------------|------------------|-----------------|-----------------|----------|----------|
| Coverage C1.     | 71185            | 4205            | 4720            | 38892    | 119002   |
| Coverage C1.1    | -                | -               | -               | 576      | 576      |
| Coverage C1.2    | -                | -               | -               | 1188     | 1188     |
| Coverage C2.     | 40165            | -               | -               | -        | 40165    |
| Coverage A1.     | 4480             | 1430            | 1370            | 1056     | 8336     |
| Coverage A2.     | -                | -               | -               | 1427     | 1427     |
| Coverage A2.1    | -                | 1125            | 1220            | -        | 2345     |
| Coverage A2.2    | 5220             | -               | -               | -        | 5220     |
| Total            | 178259           |                 |                 |          |          |

For power supply of side lights, the device of a fine line is provided for laying 1 low-voltage cable in the upper layer of the asphalt-concrete blind area, the roadside with subsequent sealing of the fine line with polymer mastic.

Also provides vertical holes under the lights of the light-signal equipment in the layers of concrete and asphalt (up to tie-in cablecasting Packed in a tube).

The total number of drills is 111 pieces. The total length of cable protection pipes is 1266.1 meters. The total length of the shtraba in asphalt concrete is 44 meters.

This project provides for a system of lighting equipment (SSO) OVI-1 with Mkpos-255° and low-intensity lights (OMI) with Mkpos-75°.

The main layers of construction of a new airfield structure

- the device of a ROV in crushed stone to a depth of 0.3...0.5 meters with a base device for cable protection pipes made of cement concrete B7.5 (M100) 5 cm thick
- laying of polymer (PE 100) cable protection pipes
- backfill of the Rove with cement concrete, up to the level of the rubble base

Figure 2. The main layers of construction of a new airfield structure.

The design area of the lighting equipment system is shown in figure 3.
Figure 3. The composition and structure of the lighting equipment.

The project documentation provides for the use of equipment of domestic production of Aviasvetotekhnika, LLC, Russia, together with the lights of the company "IDMAN".

This study requires determining the amount of capital investment required for the construction of industrial buildings at the airport. To do this, you need to calculate the cost of construction and installation work and equipment, take into account the costs of design and survey work, the cost of maintaining the customer's service, as well as a reserve for unforeseen work and costs [4].

The cost estimate is calculated in two stages.

At the first stage, the calculation is based on the physical volume of all necessary resources that will be needed for the object and possible works. At the second stage, homogeneous resources that have a uniform cipher are added together, and then a local resource statement is formed.

Local resource estimate. This document is based on a summary statement of resources. The cost of estimated resources is calculated approximately without accurately estimating each resource [5].

When making estimates, do not confuse the concepts of local estimates and local estimates. The local calculation is performed approximately, and is subject to revision in the future. A local estimate is an official document that is drawn up and approved between the contractor and the customer, and does not require additional information or additional calculations.

Additional recalculations can be performed if the requester's wishes are revised, or if the item forms are added or reduced.

The resource method best meets the conditions of market relations. It provides for the calculation of direct costs by multiplying the expenditure of resources used for construction and installation works by the prices of resources consumed.

The base-index method is based on the use of indexes (transition coefficients) to the cost determined by the norms and prices of the base year. To determine the cost of work at the basic level, use Federal and territorial collections of unit prices, as well as collections of aggregated indicators for construction work.

The resource-index method occupies an intermediate position. It implies a combination of the resource method for calculating the cost of basic resources with indexing the cost of auxiliary
resources used in the performance of work. Indices that take into account inflation are regularly developed in all regions of the Russian Federation.

Overhead costs can be calculated in two ways: either as a percentage of direct costs, or as a percentage of workers’ wages (payroll). It is almost also possible to determine the estimated amount of profit, which is taken as a percentage of either the cost of work (the amount of direct costs and overhead), or the size of the payroll.

The choice of the method and method for calculating the estimated cost of work depends on the type of work, the availability of the estimated regulatory framework, the required completeness and accuracy of the calculation.

The cost of construction of any industrial building that is part of the airport should take into account the costs of General construction work, water supply, Sewerage, heating and ventilation, electrical installation, installation of technological equipment.

The construction of the ground part is connected with the construction of walls, roofs, floors, interior decoration, etc.

Then a summary of the cost of work is generated.

The working project (for single-stage design) includes:
- summary estimate;
- summary of costs;
- object and local estimates (for the duration of construction of enterprises, buildings and structures up to two years, as well as for construction carried out on standard and reusable cost-effective individual projects);
- object and local estimates (for the duration of construction of enterprises, buildings and structures for more than two years, and for the amount of work in the first year of construction-object and local estimates);
- estimates for design and survey work.

The structure of the project (for two-stage design) includes:
- summary estimate;
- summary of costs;
- local and object cost estimates;
- estimates for design and survey work.

The working documentation includes object and local estimates. In addition, along with the estimated documentation, the following documents are also being developed:
- as part of the working project-a statement of the estimated cost of construction;
- objects included in the start-up complex; statement of the estimated cost of objects and works on environmental protection (for the duration of construction of enterprises, buildings and structures up to two years, and for a longer duration-for objects put into operation in the first year of construction);
- as part of the project-a statement of the estimated cost of construction of objects included in the launch complex, and a statement of the estimated cost of objects and works on environmental protection;
- as part of the working documentation-a statement of the estimated cost of construction of objects included in the launch complex.

When making estimates using the resource method specialists pay attention to the following criteria:
- First of all, waste on products and consumables is included;
- Calculated the cost of services and work of specialists;
- On complex objects and the use of special methods, it is necessary to take into account the work of special materials and tools;
- It is important to take into account the costs of various resources, such as electricity, water and other energy carriers, when working as a contractor.

When determining the cost of work, the parties are guided by the current tariffs and prices on the day of conclusion of the estimate. Once the estimate is fully ready, it will consist of several
documents: a resource statement and a local resource shift calculation. All indicators are calculated based on the standard estimates, and coefficient adjustments are possible.

A local resource statement is a document that calculates all the production resources needed to execute an object. Indicators are calculated based on project data and government characteristics.

The basis for making estimates, at best, is a defective statement. It is also called the defect statement and the work volume statement. In fact, a defective statement is a description of the shortcomings that need to be fixed, that is, it is filled in when repairs are necessary.

In the case of new construction, of course, it is more correct to say-the list of work volumes.

The statement of work volumes must include a complete list of works indicating the volumes. This greatly speeds up further work with it and the preparation of estimates based on it.

3. Results
Under the influence of the market economy and, consequently, competition, the activities of airport enterprises annually require improvement. Improvement of airport operations can be successfully carried out with the help of innovation and innovative technologies.

During the formation of new economic relations, the airport, representing a separate aviation enterprise, provides its activities with income from providing airlines with appropriate services for ground handling of air transport.

For reliable and safe provision of take-off and landing operations, commercial and technical services on the apron and Parking areas of aircraft, passenger service, aviation security and other services, airports should be appropriately equipped with special technical buildings, structures and equipment of the airfield, service and technical territory, air traffic control territory and administrative territory.

The airport should be provided with appropriate air approaches on the aerodrome territory, have air navigation and meteorological support that allows for reliable control and safe management of aircraft flights on routes, lines and routes.

3 contractors are working on the construction of the runway in the city of Tobolsk.

The construction of this airport is estimated in the range of 8 to 18 billion rubles.

4. Discussion
Great importance in the construction of the runway is assigned to the Department of production and technical services, which consists of:

- pre-production and design teams
- estimate and contract group.

The functions of the production and technical department.

1. Preparation of production:

- Receipt of documentation; verification of design documentation for compliance provided by the project physical production of materials and specifications of materials, completeness of documents. Drafting comments and suggestions, reviewing with customers, making decisions.
- Obtaining work permits, including:
- opening orders, orders, orders and approval of work in Supervisory, controlling and other territorial bodies;
- drawing up work schedules based on data provided by line staff;
- development of projects of manufacture of works;
- development of technological maps;
- preparation of requests for materials and equipment;
- checking the requests of foremen for materials, registration (extract) of materials and equipment supplied by the customer;
- preparation of orders for the production of products;
- monitoring the status of orders and the quality of their production.
2. Timely issuance of working documentation for construction sites, work projects, work logs, and other specialized magazines, as well as the necessary documentation in accordance with regulatory requirements and customer requirements.

3. Technical supervision over construction:
   - Current control of the volume and quality of work performed, their compliance with the approved design and estimate documentation, working drawings, building codes, standards, safety standards, requirements of rational labor organization;
   - Verification of compliance with the solutions developed in the work project;
   - Control of timely delivery of works to the customer and controlling authorities;
   - Development of measures to reduce the cost of construction and approval of changes in design decisions with the customer and design organizations;
   - Solving current issues on the production of works that arise during construction.

4. Commissioning of facilities:
   - Preparation of documentation on completed objects for the admissions Committee;
   - Control of timely delivery of works to the customer (signing of acts).

5. Working with subcontractors:
   - Conducting tenders, recommendations on the selection of subcontractors;
   - Current control of the volume and quality of work performed, their compliance with the approved design and estimate documentation, working drawings, building codes, standards, safety standards, requirements of rational labor organization;
   - Monitoring the execution of the work schedule;
   - Checking the planned production works developed by subcontractors and monitoring compliance with the decisions taken;
   - Monitoring compliance with the schedule of work and timely delivery of work;
   - Registration and transfer of the finished project documentation to the customer.

5. Conclusion

1. The city of Tobolsk is rapidly developing, both from the tourist point of view and from the industrial side. The presence of the airport will give great opportunities to the city. This is a joint project of SIBUR and the government of the Tyumen region, which will improve the transport infrastructure and give impetus to the development of the city. The airport will be used for both normal passenger transport and cargo transportation. The development of domestic air routes is a key element in maintaining the transport connectivity of the territory with the greater Tyumen region. The city of Tobolsk is a tourist destination and the new airport will significantly increase the flow of tourists. The status of the city will increase, and it will get a direct connection to Moscow and Saint Petersburg.

2. Making estimates is an important stage of working on the object. The success of construction and the percentage of rational, rather than unnecessary, costs depend on correct calculations and planning.

3. Production and technical Department is an important and key point in any construction. All types of work included in the topographic and geodetic production must be performed in accordance with the requirements, as well as other applicable rules and safety instructions.

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