JSC «ALT University named after Mukhamedzhan Tynyshpaev»

APPROVED
by the decision of the
ALT Academic Council from
«27» 03 2025y. (Protocol No. 8)
President - Rector
M.S. Zharmagambetova

EDUCATIONAL PROGRAM

Name of the educational program: 6B07180 Smart Underground: Tunnels and Subways
Level of preparation: bachelor's degree

Field of study: 6B071 – Engineering and engineering

Educational program group: B166 – Transport structures

Date of registration in the Register: May 28, 2025

Registration number: 6B07100144

Almaty, 2025

CONTENT

1. INFORMATION ON THE REVIEW, APPROVAI,AND ENDORSEMENT OF THE PROGRAM, AS WELL AS ON THE DEVEIOPERS,EXPERTS,AND REVIEWERS

1 DEVELOPED BY:

PhD in T. S., Associate Professor _____ Bikhozhaeva G.S.
position Signature

SC "KazDorNII", L. R, Doctor of Technical Sciences _____ Shalkarov A.A.
position Signature

PhD in Technical Sciences, Associate Professor _____ Tulemisov T.Zh.
position Signature

Master of Technical Sciences, Senior Lecturer _____ Imankulova A.S.
position Signature

Student of group MTM-22-1k _____ Gazizov A.M.
position Signature

2 EXPERTS:

Director of the Branch of JSC "NC "KTZ"
"Specialized Bridge Detachment" _____ Karbozov K.S.
position Signature

Head of the Production and Technical Department,
JSC "NC "KTZ" Specialized Bridge Detachment _____ Zhantleuova A.T.
position Signature

3 REVIEWER:

Satbayev University, PhD in Technical Sciences,
Senior Lecturer of the "SiSM" Department _____ Kaipova A.A.
position Signature

LLP "GEO TRACK" _____ Nusupov D.K.
position Signature

CONSIDERED AND RECOMMENDED:

Meeting of the AC (Department) "Transport Construction" Protocol No. 6, "24"02 2025 _____ Karibayeva G.B.

Meeting of the UMBI "Transport and Construction" Protocol No. 7, "28" 022025 _____ *AbdreshovSh.A.*

Meeting of the EMS "ALT University named after M. Tynyshpayev" Protocol No. 4, "20"03 2025 _____ Kodzhabergenova A.K.

APPROVED by the decision of the Academic Council of JSC "ALT University named after M. Tynyshpaev"
from 03/27/2025 No. 8

UPDATEDMay 23, 2025

2. REGULATORY REFERENCES

The educational program is developed based on the following regulatory legal acts and professional standards:

1. Law of the Republic of Kazakhstan "On Education" dated July 27, 2007 No. 319-III

2.The National Qualifications Framework, approved by the protocol of March 16, 2016, of the Republican Tripartite Commission on Social Partnership and Regulation of Social and Labor Relations.

3. Sectoral qualifications framework for the sphere of "Education", approved by the Protocol of the meeting of the sectoral commission of the Ministry of Education and Science of the Republic of Kazakhstan on

Social partnership and regulation of social and labor relations in the field of education and science of November 27, 2019, No. 3.

4.Standard rules for the activities of higher and postgraduate education organizations, Order of the Ministry of Education and Science of the Republic of Kazakhstan dated October 30, 2018, No. 595

5.State Compulsory Standard of Postgraduate Education, Order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated July 20, 2022, No. 2

6. Qualification directory of positions of managers, specialists and other employees, approved by order of the Minister of Labor and Social Protection of Population of the Republic of Kazakhstan dated August 12, 2022 No. 309. with amendments and additions dated July 25, 2023.

7. Classifier of areas of training for personnel with higher and postgraduate education, approved by the order of the Minister of Education and Science of the Republic of Kazakhstan dated October 13, 2018, with amendments and additions dated July 25, 2023

8. Classifier of areas of training of personnel with higher and postgraduate education, approved by the order of the Minister of Education and Science of the Republic of Kazakhstan dated

October 13, 2018 No. 569 (as amended and supplemented as of May 16, 2023).

9. Rules for maintaining a register of educational programs implemented by higher and (or) postgraduate education organizations, as well as grounds for inclusion in the register

educational programs and exclusions from them, order of the Minister of Science and Higher Education of the Republic of Kazakhstan dated October 12, 2022No. 106

10. RI-ALT-33 "Regulations on the procedure for developing an educational program for higher and postgraduate education."

11. Development of construction projects. July 28, 2023

12. Construction of other structures not included in other groups 12/19/2018

13. Geodetic work in construction September 1, 2023

14. Bridge and tunnel construction, December 21, 2022

15. Atlas of new professions:Digital designer (BIM specialist).https://atlasbt.enbek.kz/profession/344

3. Educational program passport

No.	Field name	Note
1	Registration number	***6B07100144***
2	Code and classification of the field of education	*6B07 Engineering, manufacturing and construction industries*
3	Code and classification of training areas	*6B071 – Engineering and Engineering Science*
4	Code and group of educational programs	*B166 – Transport Facilities*
5	Name of the educational program	*6B07180 Smart Underground: tunnels and subways*
6	Type of OP	*New*
7	The purpose of the OP	*Training specialists in the design, construction, and operation of tunnels and subways using digital and innovative technologies, including artificial intelligence, digital inclusion, and environmentally sustainable technologies.*
8	ISCED level	*6 - Bachelor's degree*
9	NQF level	*6 - Bachelor's degree*
10	Level according to the ORK	*6 - Bachelor's degree*
11	Distinctive features of the OP	*No*
	Partner university (SOP)	
	Partner university (DDOP)	
12	Form of study	*Full-time*
13	Language of instruction	*Kazakh, Russian, English*
14	Volume of loans	*241*
15	Awarded academic degree	*Bachelor of Engineering and Technology in the educational program "6B07180 Smart Underground: Tunnels and Subways"*
16	Availability of an appendix to the license for the direction of personnel training	***No. 0106****B071 – Engineering and Engineering Science*to the license***KZ87LAA00036465***
17	Availability of accreditation of the educational institution	Eat
	Name of the accreditation body	Independent Kazakhstan Agency for Quality Assurance in Education and Science of the Republic of Kazakhstan
	Validity of accreditation	*5 years*

4. Competency model of a graduate

Objectives of the educational program:

1. To develop an individual capable of self-improvement and professional growth, with diverse social, humanitarian, natural scientific, specialized and core knowledge and interests.

2. Developing the ability to critically rethink accumulated experience, change the profile of one's professional activity if necessary, awareness of the social significance of one's future profession, and possessing high motivation to perform professional activity.

3. Developing the ability to: find a compromise between various requirements (cost, quality, safety and deadlines) in long-term and short-term planning and make optimal decisions in the design, construction and operation of transport facilities; conduct work in research organizations under the guidance of leading specialists; possess a culture of thinking.

4. Development of the ability to: generalize, analyze and perceive information; set goals and choose ways to achieve them.

5. Assistance in developing the graduate's readiness to: perform design and calculation work; develop design and technical documentation; develop methodological materials, proposals and activities for the design, construction, operation and modernization of transport buildings and structures.

6. To develop graduates' readiness to conduct technical and economic analysis, substantiate decisions made and implemented in the design, construction, operation, and modernization of transport buildings and structures; apply the results in practice; and strive for self-development and improvement of their qualifications and skills.

7. Promoting the development of graduates' readiness for the economical and safe use of natural resources, energy and materials in the design, construction, operation and modernization of transport buildings and structures.

Learning outcomes: according to Unified State Educational Institution of Higher Education

PO1 - Apply mathematical methods, laws of mechanics, principles of strength of materials, fundamentals of building physics, environmentally sustainable technologies, and principles of digital inclusion to analyze the strength, stability, thermal performance, and deformation characteristics of structures in engineering problems.

PO2 - Use information and communication technologies, modeling tools and artificial intelligence to justify decisions on the reconstruction of transport facilities.

PO3 - Apply knowledge in the field of engineering geology, soil mechanics, geotechnics and GIS technologies to substantiate design decisions for the calculation and construction of foundations and foundations.

PO4 - Justify the choice of building materials, structures and engineering solutions when calculating the strength and stability of tunnel structures, taking into account the requirements of mechanics and operating conditions.

PO5 - Use automated design systems, regulatory and technical documentation, engineering surveying methods, as well as the fundamentals of law and anti-corruption culture when developing design solutions for transport tunnels and metro stations.

PO6 - Justify management, organizational, economic and legal decisions in the field of construction of transport tunnels and metro stations, taking into account the principles of sustainable development, financial responsibility and skills in using a professionally oriented foreign language.

PO7 - Assess the strength and operational characteristics of transport tunnels, bridges, subways and other engineering structures based on the principles of structural mechanics and requirements for reliability and stability.

PO8 - Identify key approaches to the diagnostics, maintenance, and repair of transport tunnels, subways, bridges, and interchanges, taking into account occupational health and safety requirements, as well as the principles of a green economy and sustainable entrepreneurship.

PO9 - Organize technological processes for the construction of underground transport infrastructure facilities using specialized equipment, mechanized complexes, and environmentally sustainable technologies.

PO10 - Demonstrate practical knowledge in the design of transport tunnels, bridges and subway stations, taking into account hydraulic conditions, cost estimates, assessment of strength, stability, economic efficiency of engineering solutions and the basics of financial literacy.

Field of professional activity: Rail and road transport: design, construction, maintenance and repair of bridges, transport structures.

Objects of professional activity:

- local executive authorities in the field of railway and automobile transport and their regional structures;
- organizations and enterprises of the transport industry in the field of design, construction, maintenance and repair of bridges and tunnels of the main railway network, subways and access railways, and highways of industrial enterprises;
- organizations and enterprises in the field of manufacturing building materials and structures for transport and communications facilities.

Types of professional activity:

- production and technological;
- organizational and managerial;
- service and operational;
- design.

Functions of professional activity:

1) Organization of production of building materials and structures for transport and communications facilities; organization of design, construction, maintenance and repair of bridges, tunnels and subways; use of standard methods for calculating the reliability of structures of bridges, tunnels and subways;

2) Management of production processes, analysis of the results of production activities; management of work on the implementation of design and construction work, technical maintenance and repair of bridges, tunnels and subways; technical diagnostics of bridges, tunnels and subways, the use of measuring equipment of bridge testing laboratories; analysis and assessment of production and non-production costs or resources for high-quality design, construction, technical maintenance and repair of bridges, tunnels and subways;

3) Development of new technologies, development of design and technological documentation using computer technologies;Calculation of the strength and stability of bridges, tunnels and subways under various types of loading, development of designs for new and reconstruction (modernization) of existing railway and road bridges and tunnels; selection of building materials for the manufacture of bridge, tunnel and subway structures, justification of technical solutions; development of technical specifications and technical conditions for designs for new and reconstruction (modernization) of existing railway and road bridges and tunnels, structures of bridges, tunnels and subways, technological processes for the technical maintenance and repair of bridges, tunnels and subways, means of technical diagnostics of bridges, tunnels and subways using modern information technologies and computer programs; design of new designs of bridges, tunnels and subways that meet the latest achievements of science and technology, safety requirements.

List of specialist positions: Head of Capital Construction Department, Head of Production (Technical, Production-Technical) Department, Site (Workshop) Head, Head of

Material and Technical Supply Department, Head of Occupational Health and Safety Department, Head of Normative Research Labor Laboratory, Head of Tool Department, Head of Production Laboratory (Production Control), Head of Quality Control Department, Head of Bridge Testing Laboratory, Bridge Master, Tunnel Master, Construction Master, Work Foreman, Industrial Training Master, Foreman for Current Maintenance and Repair of Artificial Structures, Inspector of Artificial Structures, Project Manager, Project Manager, Lead Engineer, Design Engineer, Process Engineer (Process Engineer), Repair Engineer, Engineer for Inventory of Buildings and Structures, Metrology Engineer, Labor Organization Engineer, Labor Standards Engineer, Occupational Health and Safety Engineer, Environmental Protection Engineer (Ecologist), Laboratory Engineer, Engineer, Chief Specialist, Leading Specialist, Specialist, Design Technician, Site Technician, Process Technician, Technician for Inventory of Buildings and Structures, Technician in metrology, labor technician, technician, laboratory technician, laboratory assistant.

Professional certificates received upon completion of training: Repairman of artificial structures, cladding worker.

Requirements for previous level of education:general secondary, technical and vocational, post-secondary, higher education (bachelor's degree).

During the training process, students undergo various types of professional practice:

- educational;
- production;
- production (pre-graduation).

Educational practice(geodetic)

The internship program is designed to familiarize undergraduate students with areas of professional activity and training profiles, as well as skills in geodetic surveying, forward and reverse traverse, leveling, referencing to benchmarks, setting out points and elevation marks from a map, and solving typical engineering and geodetic problems. The program also includes a field trip to the department's branch office at Saulet SKB LLC. Assessment is based on a report defense.

Industrial practice 1.

The main objectives of the industrial internship are to reinforce theoretical knowledge and practical skills in the chosen educational program in a production setting, gain organizational experience, obtain a trade specialty, and develop practical skills and competencies while completing the bachelor's degree program. The internship is conducted at the internship centers of the companies assigned to the educational program. The assessment is based on a report defense.

Pre-graduation/industrial practice 2.

The purpose of the internship for bachelor's students is to ensure a connection between the theoretical knowledge acquired in the chosen educational program and practical work. The objectives of this internship are to consolidate and deepen the theoretical knowledge acquired by students during their studies, gather information for their final thesis, study best practices at the enterprise, and gain experience in independent research and mastery of various research methods. It is conducted at the internship bases at the enterprises according to this educational program. The assessment method is a report defense.

Final certification

The objectives of the thesis are to assess the bachelor's degree program content, evaluate their readiness for independent work within the program, and consolidate and deepen their practical skills. A comprehensive exam is also included.