



**Institute of Architecture and Construction. T.K. Basenova
Department of Construction and Building Materials**

**EDUCATIONAL PROGRAM
6B07118 "Transport facilities"
code and name of the educational program**

Code and classification of the field of education: 6B07 Engineering,
Manufacturing and Civil engineering

Code and classification of areas of study: 6B071 Engineering and
engineering trades

Group of educational programs: B166 Transport facilities

NQF level: 6

ORC level: 6

Duration of study: 4 years

Credits: 240

Almaty 2025

Educational program 6B07118 "Transport facilities" was approved at a meeting of the Academic Council of KazNITU named after. K.I. Satpaeva.

Minutes No. 13 dated march 06, 2025

Considered and recommended for approval at a meeting of the Educational and Methodological Council of KazNITU named after. K.I. Satpaeva.

Minutes No. 7 dated march 17, 2025

Educational program 6B07118 "Transport facilities" was developed by the academic committee in the direction " Engineering and engineering trades"

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1. Description of the educational program

sphereprofessional activity can be the following industries: transport and communication, construction, oil and gas, machine building, chemical, manufacturing, industry.

Objects professional activities are: building assembly departments and organizations of transport construction, research and design institutes, in metro and road construction organizations, in centers for diagnosing the operational state of bridge and tunnel structures, as managers of construction and installation works. oil and gas enterprises, enterprises By repair of road construction machinery and equipment, joint-stock companies associations for the construction of bridges andgas and oil pipelines, laboratories for technical diagnostics of pipelines, gas and oil pipelines,for quality control and certification of building materials and products.

Subjects of professional activity: organization and conduct of construction work, organization and conduct of work on the operation of bridges and gas and oil pipelines and technical equipment, work in research organizations under the guidance of leading experts,organization, planning and management in bridge and tunnel construction.

Types of professional activity. Bachelors by specialty

"Transport facilities" can perform the following types of professional activities:

- production and management - to manage teams that carry out construction and installation work on the construction, operation and reconstruction of bridges and gas and oil pipelines, gas and oil storage facilities, transport facilities; for the operation and repair of road-building machines, mechanical, electrical equipment and automation equipment; technological lines for the production of road building materials and products;
- design and development - to carry out design and development work on the construction and reconstruction of transport facilities, technical structures, engineering systems, mechanical and electrical equipment.
- design and survey - to organize and carry out work on engineering-geological, engineering-geodetic surveys in the design of transport construction facilities, highways, airfields, bridges and tunnels;
- organizational and technological - to organize the work of construction, production organizations and transport construction enterprises;
- scientific and pedagogical - to participate in the implementation of research work and conduct scientific and pedagogical activities in educational organizations.

Directions of professional activity: design, construction and operation of transport construction facilities and technical structures, production of road building materials, products and structures.

The content of professional activity: to make calculations of the elements of

bridge structures of transport construction, draw up technical solutions, participate in the development of technical specifications for the construction and reconstruction of transport construction objects, taking into account the requirements of ecology and life safety, perform construction and installation works, develop options for a bridge structure; technology for the production of works in the construction of bridge structures and gas oil pipelines and gas storage facilities.

2. Purpose and objectives of the educational program

Purpose of the OP: Training of highly qualified personnel with professional competencies, taking into account the growing requirements for the quality of specialists with the necessary theoretical knowledge and practical skills in the design, calculation, installation, reconstruction and operation of transport facilities of the transport infrastructure, in particular highways, oil and gas pipelines, bridges, tunnels and subways, capable of quickly adapting to dynamically changing socio-economic conditions.

Objectives of the educational program:

1. Assistance in the formation of the graduate's abilities:
 - 1) demonstrate developmental knowledge and understanding gained at the higher education level that is the basis or opportunity for original development or application of ideas, often in the context of scientific research;
 - 2) apply knowledge, understanding and ability to solve problems in new or unfamiliar situations in contexts and within broader (or interdisciplinary) areas related to the field of study;
 - 3) integrate knowledge, cope with complexity and make judgments based on incomplete or limited information, taking into account the ethical and social responsibility for the application of these judgments and knowledge;
 - 4) clearly and clearly communicate their conclusions and knowledge and their rationale to specialists and non-specialists;
2. Assistance in the formation of a graduate's readiness:
 - 1) develop design documentation for the creation and modernization of transport construction;
 - 2) carry out design and calculation work on the modernization of existing transport construction facilities;
 - 3) develop technical documentation and methodological materials, proposals and measures for the creation and modernization of transport construction facilities.
 - 4) conduct a feasibility study, a comprehensive justification of the decisions

made and implemented in the field of operation, repair and maintenance of transport construction facilities, their units, systems and elements;

- 5) apply the results in practice, the desire for self-development, improving their qualifications and skills.
- 6) to the economical and safe use of natural resources, energy and materials during the operation, repair, maintenance of transport facilities and structures.

3. Requirements for evaluating the learning outcomes of an educational program

3.1 Entry requirements

Admission of applicants to higher educational institutions is carried out on applications on a competitive basis in accordance with the scores of the certificate issued on the basis of the results of the unified national testing (UNT) or comprehensive testing (CT) conducted using technologies developed by the National Testing Center (NTC) of the Ministry of Education and Science of the Republic of Kazakhstan, on the basis of Model rules for admission to study in educational organizations that implement professional training programs of higher education, approved by the Decree of the Government of the Republic of Kazakhstan dated January 19, 2012 No. 111 (with amendments and additions as of 07/04/2014). The applicant must have a state document on secondary (complete) general education or secondary vocational education. For specialty "Transport facilities" in the Kazakh National Research Technical University named after K. Satpayev enrolled graduates of general secondary education of the current year, who passed the UNT and participants in complex testing, who scored at least 70 points according to the test results.

Applicants are tested in the following subjects: the state or Russian language (the language of instruction), the history of Kazakhstan, mathematics and physics. Students are enrolled if they receive at least 7 points in mathematics, and in other subjects - at least 4 points. In case of receiving less than 4 points in one of the subjects taken as part of the UNT or comprehensive testing, persons are not allowed to enroll in paid education or participate in the competition for the award of educational grants.

3.2 Requirements for completing studies and obtaining a diploma

Description of mandatory standard requirements for graduation from a university and the award of an academic degree of a bachelor of engineering and technology in the field of construction and operation of transport facilities: mastering at least 240 academic credits of theoretical training and final thesis.

4. Passport of the educational program

4.1. General information

No.	Field name	Note
1	Code and classification of the field of education	6B07 Engineering, Manufacturing and Civil engineering
2	Code and classification of areas of study	6B071 Engineering and engineering trades
3	Group of educational programs	B166-Transport facilities
4	Name of the educational program	6B07118 "Transport facilities"
5	Brief description of the educational program	The sphere of professional activity can be the following industries: transport and communication, construction, oil and gas, engineering, chemical, manufacturing, industry.
6	Purpose of the OP	Training of highly qualified personnel with professional competencies, taking into account the growing requirements for the quality of specialists with the necessary theoretical knowledge and practical skills in the design, calculation, installation, reconstruction and operation of transport facilities of the transport infrastructure, in particular highways, oil and gas pipelines, bridges, tunnels and subways, capable of quickly adapting to dynamically changing socio-economic conditions.
7	OP type	new
8	NQF level	6
9	ORC level	6
10	Distinctive features of the OP	No
eleven	List of competencies of the educational program:	B - Basic knowledge, P - Professional competencies, M - Universal, social and ethical competencies: C - Special and managerial competencies:
12	Learning outcomes of the educational program:	Result 1 Solve a set of issues related to the relationship of technical, operational and economic indicators of transport with technological conditions and factors affecting the efficiency of use of the material and technical base, the practical use of all tools in the financial sector, as well as the basics of entrepreneurship, leadership and anti-corruption culture, fixed assets, capital investments, investments. Result 2 Solve a number of tasks related to the design and operation of oil pipeline transportation systems, and technological calculations of intrabase pipelines, issues of designing an oil depot or an oil and gas storage facility for receiving and storing, develop projects for bridge crossings and tunnel crossings, maintenance and repair of bridges, pipes, tunnels

		<p>and subways .</p> <p>Result 3 Apply in practice the methods of performing geodetic work during the construction and operation of transport facilities, the principles of geotechnical research and the choice of structural materials for use in production and construction processes, regulatory and technical documentation, the basics of metrology, standardization and certification.</p> <p>Result 4 Apply the basic rules and tasks of construction production, types and features of the main processes in the construction of structures and their equipment, modern methods for calculating road pavement and technologies for their implementation on roads and railways, including documenting technological solutions at the stage of design and implementation, as well as studying national and international standards, analysis of successful ESG projects and strategies for their implementation in enterprises and organizations.</p> <p>Result 5 Apply and develop the basic provisions of scientific works, research activities in the transport facility, and develop new patents for the transport facility.</p> <p>Result 6 Determine the rules for ensuring traffic safety on railways, roads and artificial structures, rules for the technical operation of transport structures, technical regulations of transport infrastructure, ecology and life safety issues, the fundamentals of legislation on intellectual property and industrial designs, including basic regulatory documents, copyrights, patents, trademarks.</p> <p>Result 7 Solve issues of general principles for the design of oil and gas pipeline systems, aboveground and underground gas storage facilities, bridges, tunnels, pipes and transport facilities.</p> <p>Result 8 Apply the skills of linear-constructive construction and principles of equipment selection, execution of a specific object in automated design of highways using graphic complexes, production and operation of road works, basic methods, ways and means of obtaining, storing, processing information, information technologies, organization of landscape design systems of roads and airfields, as well as understanding the basic principles of operation of artificial intelligence systems and their role in the modern world. The</p>
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		<p>application of skills of linear-constructive construction and principles of equipment selection, execution of a specific object in automated design of highways using graphic complexes should also include approaches aimed at ensuring inclusiveness, accessibility and sustainability.</p> <p>Result 9 Show skills for solving engineering and geological issues, bases and foundations of transport facilities, in preparing design and feasibility studies for their projects, participate in the preparation of project documentation.</p> <p>Result 10 Solve a set of issues related to the repair of tunnels and subways and the operation of oil pipeline transportation systems and study the types of maintenance and repair of oil and gas pipelines, oil and gas storage facilities, know the purpose of pumping and compressor stations, and also show the basic provisions for diagnosing oil and gas facilities, bridges, tunnels and subways.</p> <p>Result 11 Use the knowledge of fundamental systems (mathematical, natural science, engineering and electrical) to recognize, detect and solve engineering problems, to obtain theoretical and practical knowledge about the laws of physics and electrical circuits in the field of transport facilities.</p> <p>Result 12 Use design methods and mathematical modeling, principles of organization and management of bridge-tunnel and oil and gas production to determine the degree of stability, durability, reliability and cost-effectiveness of structures of artificial structures during operation and reconstruction using lifting mechanisms and machines, using general construction machines and equipment.</p> <p>Result 13 Determine the basic laws of mechanics, general calculation methods, principles of design and construction, construction models and calculation algorithms according to the main performance criteria, when assessing the reliability of a structure under operating conditions.</p>
13	Form of study	full-time
14	Training period	4 years
15	Volume of loans	240
16	Languages of instruction	Kaz, Russian. Eng
17	Awarded Academic Degree	Bachelor of Engineering and Technology in areas construction and production of building materials and structures.
18	Developer(s) and authors:	Department "SiSM" No. 401-P/Θ dated 11/23/2022

4.2. The relationship between the achievability of the formed learning outcomes in the educational program and academic disciplines

No.	Name of the discipline	Brief description of the discipline	Number of credits	Formed learning outcomes (codes)																				
				PO1	PO2	PO3	PO4	RO5	RO6	RO7	RO8	RO9	RO10	RO11	RO12	RO13								
Cycle of general education disciplines Required Component																								
	Foreign language	<p>The purpose of the discipline: to form a multi-level foreign language professionally-oriented competence among students. To develop the ability to realize communicative intention in various situations of professionally-oriented oral and written communication based on four types of linguistic activity: listening, speaking, reading and writing. To teach the usage of a foreign language as a means of accumulating the information for educational, professional and academic communication.</p> <p>Within the framework of the discipline, students master linguistic means, a system for constructing meaningful utterances in a foreign language. Learners report and request information, express their own opinion/judgment, logically and consistently build an oral/written statement for educational, professional as well as academic purposes.</p>															+		+					+

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	Kazakh (Russian) language	The main course goal is upgrading the initial level of proficiency in Kazakh (Russian) language, achieved by them at the previous stage of education, and mastering students necessary and sufficient communicative competence formation for solving social-communicative purposes in various fields of routine, cultural, professional and scientific activities, and also for further self-education.				+	+						+	
	Physical Culture	The purpose of the discipline is to provide basic knowledge about the use of physical culture and sports to maintain health and maintain optimal professional performance. To form a motivational and value attitude towards physical culture and focus on a healthy lifestyle, improve health, develop and improve basic motor qualities, communication skills, thinking and self-development				+	+	+						
	Information and Communication Technologies (in English)	The course is designed to form and consolidate the digital skills and competencies of students in an increasingly globalized and digital world. The content of this course is in line with the DigComp conceptual reference model in the European Digital Competence Framework for Citizens. The course aims to develop the digital skills of students in various activities. The course is an introduction to computer hardware, software and												

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		communication systems and the study of the functionality of hardware, software and network components of computer systems.														
	Modern history of Kazakhstan	"History of Kazakhstan" in a holistic form studies historical events, phenomena, facts, processes that reveal historical patterns that took place on the territory of the Great Steppe from the Stone Age to the present day. The purpose of the course: to give the necessary amount of historical knowledge, scientifically reliable facts about the content of the main events of national history from ancient times to the present day, ideas about the continuity and continuity of historical and cultural development, deep roots of spiritual heritage, precedents of humanism, patriotism, creative work of past generations, great personalities of the people, to promote the formation of respect among young Kazakhstanis to historical experience and national traditions.				+	+					+				
	Philosophy	Philosophy forms and develops critical and creative thinking, worldview and culture, provides knowledge about the most common and fundamental problems of life and gives them a methodology for solving various theoretical and practical issues. Philosophy expands the horizon					+	+								

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		of vision of the modern world, forms citizenship and patriotism, promotes self-esteem, awareness of the value of human existence. It teaches to think and act correctly, develops skills of practical and cognitive activity, helps to look for and find ways and ways of life in harmony with yourself, society, with the world around you.														
	Module of socio-political knowledge (sociology, political science)	The discipline is designed to improve the quality of both general humanitarian and professional training of students. Knowledge in the field of sociology and political science is the key to the effective professional activity of a future specialist, as well as for understanding political processes, for forming a political culture, developing a personal position and a clearer understanding of the measure of one's responsibility.					+	+	+							
	Module of socio-political knowledge (cultural studies, psychology)	Module of socio-political knowledge (cultural studies, psychology) is designed to familiarize students with the cultural achievements of mankind, on their understanding and assimilation of the basic forms and universal laws of the formation and development of culture, on the development of their aspirations and skills to independently comprehend the entire wealth of values of world culture for self-improvement and professional growth. During the					+	+	+							

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		<p>course of cultural studies, the student will consider the general problems of the theory of culture, leading cultural concepts, universal patterns and mechanisms of the formation and development of culture, the main historical stages of the formation and development of Kazakhstani culture, its most important achievements.</p> <p>In the course of studying the course, students acquire theoretical knowledge, practical skills and abilities, forming their professional orientation from the standpoint of psychological aspects.</p>															
Cycle of general education disciplines Selectable Component																	
	Fundamentals of anti-corruption culture and law	<p>Purpose: to increase the public and individual legal awareness and legal culture of students, as well as the formation of a knowledge system and a civic position on combating corruption as an antisocial phenomenon.</p> <p>Contents: improvement of socio-economic relations of the Kazakh society, psychological features of corrupt behavior, formation of an anti-corruption culture, legal responsibility for acts of corruption in various fields.</p>	5		+												
	Fundamentals of scientific research methods	<p>The purpose of studying the discipline is to ensure the adoption of scientifically sound solutions to technical and economic problems, based on theoretical and practical</p>	5		+												

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		knowledge, while performing professional tasks. In the process of achieving the goal, the issues of mastering the basics of the methodology of scientific research, the ability to set research tasks, to know the methods and means of measuring the parameters of systems, having the skills to conduct an experiment, processing, analysis and generalization of research results, mastering the theory of engineering decision-making are solved.														
	Basics of Financial Literacy	Purpose: formation of financial literacy of students on the basis of building a direct link between the acquired knowledge and their practical application. Contents: using in practice all kinds of tools in the field of financial management, saving and increasing savings, competent budget planning, obtaining practical skills in calculating, paying taxes and correctly filling out tax reports, analyzing financial information, orienting in financial products to choose adequate investment strategies.	5		+											
	Fundamentals of economics and entrepreneurship	Purpose: formation of ecological knowledge and consciousness, obtaining theoretical and practical knowledge on modern methods of rational use of natural resources and environmental protection. Contents: the study of the tasks of ecology as a science, the laws of the functioning of natural	5		+											

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		systems and aspects of environmental safety in working conditions, environmental monitoring and management in the field of its safety, ways to solve environmental problems; life safety in the technosphere, emergencies of a natural and man-made nature.														
	Ecology and life safety	The discipline studies theoretical and practical skills to create safe, harmless and environmentally friendly living conditions. The impact of natural and man-made hazards on the human body and their monitoring; culture of life safety; industrial sanitation; the impact of harmful substances and sources of pollution on the human body and their maximum permissible concentrations in the air of the working area; natural and man-made emergencies.	5		+										+	
Cycle of basic disciplines University component																
	Introduction to transport construction	The study of the discipline allows you to get a general idea of the chosen direction of training, to study the main types of transport and directions of its development. Get an idea about the current level of development of the transport system in our country and in the world, as well as about the regulatory documentation for the construction of the subgrade and the machines and equipment used for its construction.	4						+		+					
	Engineering and computer graphics	The course develops the following skills for students:	5												+	

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		depict all possible combinations of geometric shapes on a plane, conduct research and measure them, allowing image transformations; create technical drawings, which are the main and reliable means of information providing communication between the designer and the designer, technologist, builder, in the AutoCAD environment.														
	Mathematics I	The course is based on the study of mathematical analysis in a volume that allows you to explore elementary functions and solve the simplest geometric, physical and other applied problems. The main attention is paid to differential and integral calculus. The sections of the course include differential calculus of functions of one variable, derivative and differentials, study of the behavior of functions, complex numbers, polynomials. Indefinite integrals, their properties and methods of calculation. Definite integrals and their applications. Improper integrals.	5								+					
	Mathematics II	The discipline is a continuation of Mathematics I. The sections of the course include elements of linear algebra and analytic geometry. The main questions of linear algebra are considered: linear and self-adjoint operators, quadratic forms, linear programming. Differential calculus of a function of several	5								+					

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		variables and its applications. Multiple integrals. The theory of determinants and matrices, linear systems of equations, as well as elements of vector algebra. Includes elements of analytical geometry in the plane and in space.															
	Occupational health and safety at industry	The discipline contributes to the formation of students' knowledge, skills and abilities on the methods and means of protecting workers in production, identifying dangerous and harmful production factors and mastering the methods for calculating protection against them. The discipline introduces students to the legal framework for labor protection, the study of harmful production factors, familiarization with the causes of accidents and occupational diseases at work, the main measures to protect workers at the enterprise.	5														+
	Modern methods of calculating pavement	The discipline studies modern approaches to the design of road structures, calculations for shear resistance, according to the criteria of longitudinal and transverse evenness, and methods that allow taking into account the effect of damage accumulation, as well as the impact of dynamic loading.															
	Building mechanics 1	The discipline studies the behavior of various materials when exposed to force and temperature factors, methods for calculating the most common	5	+													

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		elements of machines and structures for strength, rigidity and stability, determining stresses and strains in parts while rationally meeting the requirements of reliability and economy.														
	Building structures	This discipline reflects the current state of the theory and practice of building structures of industrial buildings; it contains general information about the physical and mechanical properties of structural materials, the basics of calculating the structural elements of industrial buildings, methods for calculating the structure for a group of limit states.	5	1												
	Physics	The course studies the basic physical phenomena and laws of classical and modern physics; methods of physical research; the influence of physics as a science on the development of technology; connection of physics with other sciences and its role in solving scientific and technical problems of the specialty. The course covers the following sections: mechanics, mechanical harmonic waves, fundamentals of molecular kinetic theory and thermodynamics, electrostatics, direct current, electromagnetism, geometric optics, wave properties of light, laws of thermal radiation, photoelectric effect.	5							+						

Cycle of basic disciplines Optional component															
	Computer-aided design in transport construction	The discipline studies the use of spreadsheets in engineering calculations, the determination of the geometric solution of systems of equations, the interpolation of tabular functions, the calculations of statically indeterminate systems, the determination of displacements, the construction of design schemes for span structures of bridges and tunnel linings, the execution of drawings of elements of artificial structures and structures in general using graphic editors (mostly AutoCad)	6											+	
	Road landscaping architecture	The discipline is aimed at studying the detailed issue of the rational ratios of the road elements that ensure its smoothness and the optimal mode of movement of cars, methods for assessing the smoothness of the route are described. One of the promising areas in the design of roads is landscape design, in the smooth pairing of road elements with each other and its harmonious combination with the surrounding landscape while meeting the requirements of environmental protection, experience in landscape design of roads and recommendations on the principles of their tracing in characteristic natural areas.	6											+	

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	Geodesy in construction	The purpose of studying the discipline is to determine the role of geodesy in construction; obtaining a modern idea of the shape and size of the Earth; concepts of geoid, ellipsoid; coordinate systems used in geodesy; coordinate systems at construction sites; orientation lines on the ground. The tasks of the discipline are to gain knowledge for the use of maps and plans, the use of information about state geodetic networks; about methods of creating survey networks; application of geometric leveling and the main types of topographic surveys.	5												+
	Geodesy with the basics of topography	The discipline studies the representation on maps of elements of cartographic content: hydrographic objects, relief, vegetation and soils, means of communication and communications. During the construction process, constant checks by geodetic methods of the correct installation of building structures in the design position are carried out.	5												+
	Geotechnics in foundation engineering	The discipline studies the construction and operation of works on geotechnical monitoring of deformations of structures and structures of buildings, as well as the foundations of foundations, performs work on the calculation, analysis and design of geotechnical structures, foundations and foundations of	5		+										

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		buildings and structures, geotechnical surveys are studied aimed at studying the geological environment, properties and processes.														
	Geotechnics I	The discipline studies the physical-chemical and physical-mechanical properties of soils and their change under various factors, the basic concepts of groundwater, its origin, methods of hydrogeological research, soils, geological and engineering-geological processes that occur when interacting with the natural environment and the behavior of soils under load, principles of organizing the construction of bridge structures on the railway and highway	4			+										
	Geotechnics II	The discipline studies giving the opportunity to correctly assess the properties of soils in the base, their joint work with the foundation and over-foundation structures. This, in turn, makes it possible to rationally choose the type of base and foundation, and use this knowledge in the process of developing and implementing the most economical and safe design methods.	5			+										
	Road traffic safety conditions	The discipline is aimed at studying the following points: Basic terms and definitions in the field of road conditions and traffic safety. The main regulatory documents regulating road conditions and traffic safety. Requirements and norms	5												+	

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		of the rules of technical operation on the design, maintenance and operation of technical means to ensure traffic safety. Classification of permissible violations of traffic safety.														
	Engineering Mechanics 1	The discipline studies the equilibrium conditions of a solid body, ways to specify the movement of a point, basic concepts and definitions, methods and principles for calculating structural elements for strength and stiffness for the simplest types of deformations, as well as recommendations for the rational design of engineering structures.	5	+												
	Engineering Mechanics 2	The discipline is an elective component. Studying methods for calculating various structures for strength, rigidity and stability, kinematic analysis of structures, calculation of flat frames, flat forms, determination of displacements of elastic systems, calculation of statically indeterminate frames using the displacement method, mastering the main universal analytical methods for calculating structures under static and dynamic effects; development of students' logical thinking, skills of independent thinking, necessary in further work when solving certain technical problems.	5	+												
	Computer graphics in transport construction	The discipline studies the theoretical foundations for	6											+		

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		constructing images of points, lines, planes and certain types of lines and surfaces, the theory and practice of constructing computer graphics in AutoCAD. The basic requirements of the ESKD standards for drawings and diagrams, the execution of drawings and diagrams in the AutoCAD system, to read drawings, to determine the geometric shapes of simple parts from their images.															
	Materials Science and Technology of Structural Materials	The discipline studies the correct use of various materials used in the railway and automotive industries, as well as manufacturing technology, machine parts and mechanisms associated with their processing. Technologies for the production of carbon alloys; area, properties and grades of carbon alloy steels, non-ferrous alloys and polymeric materials; processes of thermal and thermochemical treatment.	5														+
	Metrology, standardization and certification of construction products	The discipline studies knowledge in the field of fundamentals of metrology, standardization and certification, allowing the use of modern measuring technologies, which are a sequence of actions aimed at obtaining measurement information required quality. In a modern market economy, the quality of products determines the competitiveness of an enterprise.	5														+
	Bridges and pipes	The discipline is aimed at providing theoretical and practical training of specialists in	5											+			

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		the design of bridges and pipes at the level of higher professional education, forms the skills of the basic principles of bridge design, design specifications and basic structures of bridges, basic methods for calculating bridge elements from various materials.														
	Oil and gas pipelines	The discipline studies the properties of oil and oil products, the composition of the structures of main oil and gas pipelines, methods of hydraulic calculation of the main pipeline, methods of technological calculation of the oil product pipeline during sequential pumping of oil, pressure characteristics of the oil pipeline and pumping stations, methods of pumping high-viscosity oils, thermal conditions of hot main pipelines.	5							+						
	Ensuring safety in transport construction	The discipline studies the following issues of ensuring traffic safety in transport: Basic concepts of the system for ensuring traffic safety in modes of transport. Indicators of reliability of operation of technical devices and structures. Supervision in the field of transport security. Regulatory framework for ensuring transport security. Fundamentals of ensuring traffic safety by means of transport.	5												+	
	The main provisions of scientific work	The discipline studies General concepts of science. The main stages in the development of science. Classification of sciences. Science as a social	5								+					

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		<p>institution. Science as a result. General patterns of development of science. The structure of scientific knowledge. Criteria of scientific knowledge. Classification of scientific knowledge. Methodology of science. scientific foundations. Norms of scientific ethics. Purpose and tasks of scientific knowledge. Principles of scientific knowledge. Scientific criteria.</p>													
	Fundamentals of hydrogeology and engineering geology	<p>The discipline studies the main characteristics of watercourses, methods for their determination, the laws of hydrostatics and hydrodynamics of a liquid, the causes and formation of sediments on watercourses, the occurrence of hydraulic resistance, methods for calculating hydraulic characteristics and structures, methods and methods for hydraulic calculation of pressure pipelines with steady and unsteady movements, outflows through holes and capacity of road structures.</p>	5			+									+
	Fundamentals of Artificial Intelligence	<p>Purpose: to familiarize students with the basic concepts, methods and technologies in the field of artificial intelligence: machine learning, computer vision, natural language processing, etc. Contents: general definition of artificial intelligence, intelligent agents, information retrieval and state space exploration, logical agents, architecture of artificial</p>	5			+									

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		intelligence systems, expert systems, observational learning, statistical learning methods, probabilistic processing of linguistic information, semantic models, natural language processing systems.															
	Fundamentals of sustainable development and ESG projects in Kazakhstan	<p>Purpose: the goal is for students to master the theoretical foundations and practical skills in the field of sustainable development and ESG, as well as to develop an understanding of the role of these aspects in the modern economic and social development of Kazakhstan.</p> <p>Contents: introduces the principles of sustainable development and the implementation of ESG practices in Kazakhstan, includes the study of national and international standards, analysis of successful ESG projects and strategies for their implementation in enterprises and organizations.</p>	5			+											
	Fundamentals of electronics and measuring technique	<p>The study of the modern level of electronic technology, the principles of construction and operation of semiconductor devices, their areas of application. The study of measurement technologies that combine a set of methods, approaches, software and logic support for the organization of measurements; trends in the development of measuring instruments and basic methods for measuring the characteristics</p>	5			+											

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		of electronic and electrical circuits and signals, assessing their accuracy.														
	Legal regulation of intellectual property	Purpose: the goal is to form a holistic understanding of the system of legal regulation of intellectual property, including basic principles, mechanisms for protecting intellectual property rights and features of their implementation. Content: The discipline covers the basics of IP law, including copyright, patents, trademarks, and industrial designs. Students learn how to protect and manage intellectual property rights, and consider legal disputes and methods for resolving them.	5			+										
	Applied mechanics in transport	The discipline studies the general patterns of the mechanical movement of bodies and their balance, methods for calculating the strength and rigidity of typical elements of various structures, the main types of mechanisms, methods for studying and calculating their kinetic and dynamic characteristics.	5	+												
	Design of transport facilities	The discipline studies the process of creating design and estimate documentation for highways under construction or existing highways undergoing modernization or reconstruction to infrastructure transport infrastructure facilities with a system of road structures for traffic control (traffic lights, parking lots, signs and signs),	6					+	+							

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		lighting systems, traffic light objects , road signs, pointers and road markings.														
	Modern methods for calculating pavement	The discipline studies modern approaches to the design of road structures, calculations for shear resistance, according to the criteria of longitudinal and transverse evenness, and methods that allow taking into account the effect of damage accumulation, as well as the impact of dynamic loading.	5				+									
	Building Mechanics 2	The discipline studies the stress-strain state of rods and rod systems under the influence of various loads, the principles and methods for calculating structures for strength, rigidity and stability in order to ensure the reliability of structures with the lowest consumption of materials.	5	+												
	Construction Materials	The discipline studies the relationship of the composition, structure and properties of materials, the classification of building materials and products, structural materials and materials for special purposes, technological principles for obtaining, functional, operational properties, areas of application of building materials in accordance with the nomenclature of their most important groups.	5													+
	Construction works and processes	The discipline studies the theoretical foundations, methods and ways of implementing construction processes that	5													+

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		ensure the processing of building materials, semi-finished products, products; a qualitative change in their state, physical and mechanical properties in order to obtain construction products.														
	Building production technology	The discipline studies the basic provisions of the construction industry, the most advanced methods of building processes; the main technologies for the erection of buildings and structures and the development of directive organizational and technological documentation on this informative basis.	5				+									
	Construction technology of bridges, tunnels and subways	The discipline studies the technology of installation of span structures of bridges with longitudinal sliding, mounted and semi-mounted assembly, the technology of erecting supports, the technology of driving distillation and station tunnels of subways, the production of earthworks with scrapers, bulldozers and graders, the work of single-bucket and bucket-wheel excavators, the features of earthworks in winter, the technology of drilling and blasting works, production of concrete and reinforced concrete works in winter.	5				+	+								
	Construction technology of oil and gas facilities	The discipline studies the main provisions of the construction technology of oil and gas facilities, methods of building oil and gas facilities, the rules for installing vertical and horizontal	5				+	+					+			

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		tanks, methods for testing tanks for tightness, installation work, the rules for checking the performance of mechanisms, general construction processes, methods for building oil and gas facilities in accordance with design and regulatory documents														
	Transport systems	The study of the discipline ensures the coordinated development and operation of all modes of transport in order to maximize the satisfaction of transport needs at minimal cost. The transport system is designed to meet the transport needs of a person and includes means of transportation, objects of transportation, as well as the environment. The transport system includes the following components: road transport complex; • road users; environment.	5				+									
	Digital modeling of construction objects BIM	The discipline is aimed at studying the technology of modeling objects, including buildings, railways, bridges, tunnels, in BIM and 3D modeling in both cases, the building design should be carried out in three-dimensional space. Including not only the bearing lines and texture of materials, but also other data that are relevant to the building, BIM takes into account the physical characteristics of the object.	6											+		
	Economics and management in construction	The discipline studies construction as a special branch of the national economy, which	5			+										

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		is formed, on the one hand, as a process of reproduction of fixed assets, requiring the necessary capital investments for its implementation, and on the other, as a process of the own development of this branch of material production.														
	Economics and construction management	The discipline studies a holistic view of the essence of the overall management process; its various forms and main stages of formation requiring the necessary capital investments for its implementation; theories of management development in various countries. Forms a general strategic thinking and specific practical managerial skills of a manager who can significantly increase the productivity of employees and the efficiency of the organization in the market as a whole.	5		+											
	electrical engineering	Electrical and magnetic circuits. Basic definitions, parameters and methods for calculating DC electrical circuits. Analysis and calculation of linear AC circuits. Analysis and calculation of electrical circuits with non-linear elements. Analysis and calculation of magnetic circuits. Electromagnetic devices and electrical machines	5							+						
	electrical and Electronics	The purpose of the discipline is the acquisition of theoretical and practical knowledge on the basics of electrical engineering and electronics. The main regularities of the processes	5							+						

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		occurring in electromagnetic and electronic circuits and methods for determining the electrical quantities that characterize these processes are studied. Methods for calculating direct current electric circuits are studied; analysis and calculation of linear AC circuits; analysis and calculation of magnetic circuits. Electromagnetic devices and electrical machines. Fundamentals of electronics and electrical measurements. Element base of modern electronic devices. Fundamentals of digital and microelectronics, microprocessor tools.															
Cycle of major disciplines University component																	
									v								
Cycle of major disciplines Selectable Component																	
	Diagnostics of bridges, tunnels and subways	The discipline studies methods for examining bridges and pipes, static and dynamic tests, running in bridges. Ability to evaluate and analyze test results, technical condition: steel, reinforced concrete and wooden structures and apply them in practice. Know the instruments and methods of statistical processing of the results of instrumental studies of the strength of concrete. Ensures compliance with health and safety	5								+						

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		regulations															
	Diagnostics of oil and gas facilities	The discipline studies the fundamentals of the system of technical diagnostics and methods for evaluating pipeline transport, physical foundations, non-destructive testing methods for detecting and diagnosing problems with technological equipment of oil and gas facilities, types and purposes of pipelines for non-destructive testing, testing methods, diagnostic features and operation of a typical oil and gas pipeline	5														
	Machinery and equipment for the construction of bridges, tunnels and subways	The discipline is aimed at the formation of professional competencies among students in the construction of machines and mechanisms for the construction of bridges, tunnels and subways, the scope of machines and mechanisms for the construction of tunnels. Classification of bridge-building and tunneling machines; the concept of complex mechanization; describe lifting machines and mechanisms	6														
	Machinery and equipment for the construction of oil and gas facilities	The discipline studies the classifications and main elements of machines for the construction and repair of pipelines, special transport machines, machines for the production of special earthworks, lifting and assembly machines and equipment, machines and equipment for cleaning and insulating gas and oil pipelines, machines for constructing underwater crossings, for testing	6														

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		and sealing oil and gas facilities during repair work																
	Metrology, standardization and certification	The discipline describes the basics of standardization, the basics of certification, confirmation of the conformity of goods and services to requirements, and also teaches the basics of metrology and ensuring the unity of measurement.	5															+
	Metrology, standardization and certification of construction products	The discipline studies knowledge in the field of the basics of metrology, standardization and certification, allowing the use of modern measuring technologies, which are a sequence of actions aimed at obtaining measuring information of the required quality. In a modern market economy, the quality of manufactured products determines the competitiveness of an enterprise, its viability and sustainable development.	5															+
	Subways	Disciplines - the ability to determine the load on the supporting structures of all metro structures and perform their calculation; To have an idea about the features of geodetic works during the construction of subways, about the physical essence of the processes occurring in the soil mass during the opening of the working; on ventilation and lighting, power supply, signaling, centralization, water supply, sewerage and heating in subways. Organize and supervise all types of	5							+			+					

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		construction and installation works															
	Pumping and compressor stations in oil and gas production	The discipline studies the hydraulic part of pumps and compressors, the speed of pumps and compressors of various types, the principles of modeling hydrodynamic similarity in centrifugal pumps, the scope of various types of pumps and compressors in the oil and gas industry, pumping and compressor stations for oil and gas industries.	5								+						
	Research activities in transport construction 1	The discipline studies the following: Increasing the level of motivation of students to actively participate in research activities. Development of creative thinking of students. Deepening and expanding knowledge in a specialty or profession. Mastering the methods of conducting scientific research, developing the skills of research work of students. Propaganda among students of various forms of scientific creativity in accordance with the principle of unity of education, science and practice.	5									+					
	Research activities in transport construction 2	The discipline studies Modern methods of monitoring the structures of transport facilities. Analyzes the results of scientific research, taking into account theoretical calculations. Software packages for modeling transport facilities. Innovative methods for monitoring and analysis of characteristic damage and	5										+				

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		defects in the structure and foundations of structures. Practical goals and rationale for improving the reliability of transport facilities, taking into account new achievements in science.														
	Oil and gas storage	The discipline studies general information on the operation and storage of oil and oil products, measures to combat oil losses, methods for developing a master plan for the construction area of an oil depot, designs of tank farms, the procedure for checking the geometric parameters of the tank body for stability, the rules for measuring and accounting for oil and oil products, methods for laying pipelines .	4							+			+			
	Organization and planning of construction of bridges, tunnels and subways	The discipline studies the basics of rational planning and design of the construction of bridges, tunnels and subways, the project for the organization of construction and production of works, the organization of in-line construction, the modeling of construction production, the tasks of technical regulation, engineering and production preparation for the construction of bridges, tunnels and subways.	5						+							
	Organization and planning of construction of oil and gas facilities	The discipline studies the planning and design of the construction of oil and gas facilities, the project for the organization of construction and production of work, the organization of in-line	5						+							

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		construction, the modeling of construction production, the tasks of technical regulation, engineering and production preparation for the construction of oil and gas facilities															
	Organization of construction	The discipline studies the preparation for construction, establishing and ensuring the order, sequence and timing of work, ensuring the supply of all necessary types of resources, assessing economic costs. The organization of construction is necessary to ensure the commissioning of all facilities on time.	5					+									
	Organization, planning and management in construction	The discipline studies the methodological foundations of the management model, conducts risk assessment and basic decision-making skills, integration processes in construction management, group dynamics and leadership, strategic and tactical planning in the personnel policy management system at the enterprise.	5					+									
	Fundamentals of organizing and planning the construction of transport facilities	The discipline studies the basics of rational planning and design of construction, the project for the organization of construction and the production of work of the organization of in-line construction, the modeling of construction production, the assessment of economic costs, the tasks of technical regulation of engineering and production preparation for the construction	5				+	+									

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		of transport facilities.															
	Patenting in transport construction	The discipline studies the following: consulting on issues related to obtaining the most effective and reliable protection of the intellectual property of the applicant. Preliminary information search on the database of the patent office: on the Kazakhstani database; according to foreign databases; on shared databases. Preparation and submission of an application to the Patent Office of the Republic of Kazakhstan for registration of an invention.	5														
	Rules for the technical operation of transport facilities	The discipline studies the organization and safety in the construction of oil and gas facilities, guided by the relevant requirements of technical regulations. Normative and technical requirements for structures, types and elements of transport structures.	5														
	Bridge and pipe design	The discipline studies a set of measures for the reconstruction, strengthening and repair of bridges, increasing the cross-section of elements with simultaneous strengthening, strengthening and changing the system of trusses or beams, rebuilding a steel superstructure into a steel-reinforced concrete one, widening superstructures, complete replacement of superstructures, methods for determining the reliability of bridges during reconstruction , reinforcement and repair	4														

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	Design of bridge crossings and tunnel crossings	The discipline studies the methods of installation of reinforced concrete and metal bridges, supports and foundations of bridges, methods of constructing tunnels and subways, the technology of manufacturing elements of prefabricated reinforced concrete bridge structures, prestressed reinforced concrete prefabricated beams, steel superstructures of bridges.	6					+	+						
	Design of oil and gas pipeline systems	The discipline studies the general principles of designing oil and gas pipeline systems, methods for substantiating and surveying routes of main pipelines, a route plan, classification of sections and categories of terrain, technological schemes for the construction of oil and gas pipelines, structural reliability of oil and gas pipeline systems, the composition of structures of oil and gas pipelines, the reliability of pipelines in accordance with regulatory documents in the design and operation.	4					+	+						
	Design of oil and gas storage facilities	The discipline studies the features of planning gas supply systems, the role of gas storage facilities in the operation of a single fuel and energy complex, gas tanks, gas distribution stations, gas filling stations, the design of tanks for storing liquefied gases and main gas pipelines, the purpose and principles of operation of gas tanks and gas storage facilities,	6							+		+			

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		technology standards and design of gas storage facilities, underground gas storages, purpose and operation of gas storages.															
	Transport infrastructure technical regulations	The discipline studies the organization and ensuring safety in the construction of transport structures, guided by the relevant requirements of technical regulations, interstate and national standards, rules, methodological documents and other industry methods.	5														+
	Maintenance and repair of bridges and pipes	The discipline studies general information about artificial structures, loads and effects on bridges and pipes, methods of limit states used in the calculation of bridge structures, the design of artificial structures, the development of rational structures of artificial structures, methods for calculating bridge structures, the basics of calculating bridges and pipes using modern technologies in the construction, repair and reconstruction.	5							+							
	Maintenance and repair of oil and gas pipelines	The discipline studies the types and purposes of pipeline transport devices, the principles of maintenance and repair of pipelines, requirements for pipelines and the quality of maintenance, technology for servicing main pipeline transport, technology for overhauling main pipelines, a set of repair work during the construction of oil and gas	5							+							

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		pipelines, technical requirements that ensure high quality of repair works.														
	Maintenance and repair of oil and gas storage facilities	The discipline studies the principles of maintenance and repair of tanks, the structure and strategy of the process of maintenance and repair of equipment, technological processes, the system of preventive and preventive maintenance of tanks, the parameters of oil and gas storage workflows, methods of installing thermal insulation coatings for tank equipment.	5							+						
	Maintenance and repair of tunnels and subways	The discipline studies the technology of installation of span structures of bridges with longitudinal sliding, mounted and semi-mounted assembly, the technology of erecting supports, the technology of driving distillation and station tunnels of subways, the production of earthworks with scrapers, bulldozers and graders, the work of single-bucket and bucket-wheel excavators, the features of earthworks in winter, the technology of drilling and blasting works, production of concrete and reinforced concrete works in winter.	5							+						
	Technological support of construction projects	The discipline studies the basic design documentation for carrying out transport construction and installation works, as well as the necessary design documentation, studies it in detail, it is especially	5				+						+			

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		important that the engineering and technical staff have a clear idea of the composition of the design documentation and the procedure for its transfer to construction organizations														
	Transport tunnels	The discipline studies general information about tunnels, theoretical knowledge in the field of design, organization and construction technology of tunnels and underground structures constructed by mining and shield methods, as well as tunnels constructed by special methods	4					+		+						+

5. Curriculum of the educational program

NON-PROFIT JOINT STOCK COMPANY
"KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY NAMED AFTER K.I. SATPAEV"



«APPROVED»
Decision of the Academic Council
NFJSC «KazNITU»
named after K. Satpaev
dated 06.03.2025 Minutes No 10

WORKING CURRICULUM

Academic year
Group of educational programs
Educational program
The awarded academic degree
Form and duration of study

2025-2026 (Autumn, Spring)
B166 - "Transport facilities"
688708 - "Transport facilities"
Bachelor of engineering and technology
full time - 4 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	Module Contact hours	In hours SIS (including TES)	Form of control	Allocation of face-to-face training based on courses and semesters								Prerequisites
									1 course		2 course		3 course		4 course		
									1 sem	2 sem	3 sem	4 sem	5 sem	6 sem	7 sem	8 sem	
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)																	
M-1. Module of language training																	
LNG108	Foreign language		GED, RC	5	150	00:45	105	E	5								
LNG104	Kazakh (russian) language		GED, RC	5	150	00:45	105	E	5								
LNG108	Foreign language		GED, RC	5	150	00:45	105	E		5							
LNG104	Kazakh (russian) language		GED, RC	5	150	00:45	105	E		5							
M-2. Module of physical training																	
KFK105	Physical culture I		GED, RC	2	60	00:30	30	E	2								
KFK102	Physical culture II		GED, RC	2	60	00:30	30	E		2							
KFK103	Physical culture III		GED, RC	2	60	00:30	30	E			2						
KFK104	Physical culture IV		GED, RC	2	60	00:30	30	E				2					
M-3. Module of information technology																	
CSE677	Information and communication technology		GED, RC	5	150	30:15:0	105	E			5						
M-4. Module of socio-cultural development																	
HUM137	History of Kazakhstan		GED, RC	5	150	15:0:30	105	GE		5							
HUM134	Module of socio-political knowledge (cultural studies, psychology)		GED, RC	5	150	30:0:15	105	E			5						
HUM132	Philosophy		GED, RC	5	150	15:0:30	105	E				5					
HUM128	Module of socio-political knowledge (sociology, political science)		GED, RC	3	90	15:0:15	60	E				3					
M-5. Module of anti-corruption culture, ecology and life safety base																	
CHE656	Ecology and life safety	1	GED, CCH	5	150	30:0:15	105	E				5					
MNG489	Fundamentals of economics and entrepreneurship	1	GED, CCH	5	150	30:0:15	105	E				5					
CTV976	Fundamentals of scientific research methods	1	GED, CCH	5	150	30:0:15	105	E				5					
HUM136	Fundamentals of anti-corruption culture and law	1	GED, CCH	5	150	30:0:15	105	E				5					
MNG564	Basics of Financial Literacy	1	GED, CCH	5	150	30:0:15	105	E				5					
CYCLE OF BASIC DISCIPLINES (BD)																	
M-6. Module of physical and mathematical training																	
MAT108	Mathematics I		BD, UC	5	150	15:0:30	105	E	5								
PHY448	Physics		BD, UC	5	150	15:15:15	105	E	5								

