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 2023

NJSC "Kazakh National RESEARCH Technical University"
named after K.I. Satpaev"

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

Minutes № 5 dated « 24 » november 2022.

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

Minutes № 3 dated « 17 » november 2022.

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	6B071Engineering 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 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. Result 2 Solve a set of issues related to the relationship of technical, operational and economic indicators of transport operation with technological conditions and factors affecting the efficiency of the use of the material and technical base, as well as the foundations of entrepreneurship, leadership and

		anti-corruption culture, fixed assets, capital investments, investments. Result 3 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. 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 pavement and technologies for their implementation on roads and railways, including documenting technological solutions at the design and implementation stage. Result 5 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. Result 6 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. Result 7 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. Result 8 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. Result 9 Apply and develop the basic provisions of scientific works, research activities in the transport facility, and develop new patents for the transport facility. Result 10 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 and subways . Result 11 Apply the skills of linear constructive construction and the principles of choosing a technique for the execution of a particular object in the computer-aided design of roads using graphic complexes, the production and operation of road works, the main methods, methods and means of obtaining, storing, processing information, information technology, organizing landscape design systems roads and airfields. Result 12 Determine the rules for ensuring traffic safety on railways, roads and artificial structures, the rules for the technical operation of transport facilities, technical regulations for transport infrastructure, ecology and life safety issues. Result 13 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.
13	Form of study	full-time
14	Training period	4 years
15	Volume of loans	240
16	Languages of instruction	Kaz, Russian
17	Awarded Academic Degree	Bachelor of Engineering and Technology in areasconstruction and production of building materials and structures.
18	Developer(s) and authors:	Department "SiSM"No. 401-P/Ө 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																
Cycle of general education disciplines Selectable Component																
1	Fundamentals of anti-corruption culture and law	The course introduces students to the improvement of socio-economic relations of Kazakhstan society, psychological features of corrupt behavior. Special attention is paid to the formation of an anti-corruption culture, legal responsibility for acts of corruption in various spheres. The purpose of studying the discipline «Fundamentals of anti-corruption culture and law» is to increase 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. Expected results: to realize the values of moral consciousness and follow moral norms in everyday practice; to work on improving the level of moral and legal culture; to use spiritual and moral mechanisms to prevent corruption.	5		+											

2	Fundamentals of scientific research methods	The purpose of studying the discipline is, on the basis of theoretical and practical knowledge, to ensure the adoption of evidence-based decisions in the performance of professional tasks. In the process of achieving the goal, tasks such as the formation of a scientific way of thinking, the acquisition of a complex of knowledge about the methodology of scientific knowledge and creativity, familiarization with the fundamental principles of planning and organizing scientific work in relevant areas.	5								+				
3	Fundamentals of economics and entrepreneurship	Discipline studies the foundations of economics and entrepreneurial activity from the point of view of science and law; features, problematic aspects and development prospects; the theory and practice of entrepreneurship as a system of economic and organizational relations of business structures; The readiness of entrepreneurs for innovative susceptibility. The discipline reveals the content of entrepreneurial activity, the stages of career, qualities, competencies and responsibility of the entrepreneur, theoretical and practical business planning and economic examination of business ideas, as well as the analysis of the risks of innovative development, the introduction of new technologies and technological solutions.	5		+											

4	Ecology and life safety	The discipline studies the tasks of ecology as a science, environmental terms, the laws of the functioning of natural systems and aspects of environmental safety in the conditions of labor activity. Monitoring of the environment and management in the field of its safety. Sources of pollution of atmospheric air, surface, groundwater, soil and ways to solve environmental problems; life safety in the technosphere; natural and man-made emergencies														+	
Cycle of basic disciplines University component																	
5	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 of the current level of development of the transport system in our country and in the world.	4					+		+							
6	Engineering and computer graphics	The discipline is aimed at the study of methods for the image of objects and the general rules of drawing, using computer graphics; the study of the basic principles and geometric modeling approach and methodology for developing applications with a graphical interface; the formation of skills in the use of graphic systems for the development of drawings, using 2D and 3D modeling methods	5												+		

7	Mathematics I	The course is devoted to the study of the basic concepts of higher mathematics and its applications. The main provisions of the discipline are applied in the teaching of all general education engineering and special disciplines taught by graduate departments. The course sections include elements of linear algebra and analytical geometry, an introduction to analysis, differential calculation of functions of one and several variables. Methods for solving systems of equations, problems of using vector calculations in solving problems of geometry, mechanics, and physics are considered. Analytical geometry on a plane and space, differential calculation of functions of one variable, derivatives and differentials, study of the behavior of functions, derivative and gradient in direction, extremum of a function of several variables.	5								+					
8	Mathematics II	The discipline is a continuation of Mathematics I. sections of the course include integral calculus of a function of one variable and several variables, series theory. Indefinite integrals, their properties and methods of their calculation. Certain integrals and their application. Incorrect integrals. Numerical series theory, functional series theory, Taylor and Macloren Series, application of series to	5								+					

		approximate calculations.														
9	Occupational health and safety at industry	The discipline contributes to the formation of students knowledge, abilities and skills according to the methods and ways of protecting workers at industry, identifying dangerous and harmful industrial factors and mastering the methods of calculating protec-tion against them. The discipline acquaints students with the regulatory framework for occupational health and safety, the study of harmful industrial factors, familiarization with the causes of accidents and occupational diseases at work, the main measures to protect workers at the enterprise.	5												+	
10	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.	4				+									
11	Building mechanics 1	The discipline studies the behavior of various materials under the influence of force and temperature factors, methods for calculating the most common elements of machines and structures for strength, rigidity and stability, determining stresses and deformations in parts with rational satisfaction of reliability and cost-effectiveness	5	+												

		requirements.														
12	Building structures	This discipline reflects the current state of theory and practice of building structures Industrial buildings; It contains general information about physic -mechanical properties of structural materials, the basis for calculating structural elements Industrial buildings, methods of calculating the structure of the group of limiting states.	5	+												
13	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																
14	Computer-aided design in transport construction	The discipline studies use of spreadsheets in engineering calculations, determination of the geometric solution of systems equations, interpolation tabular functions, the construction of	6											+		

		design schemes for spans of bridges and tunnel linings, the execution of drawings of elements of artificial structures and structures in general using graphic editors (mostly AutoCad)														
15	Road Landscape Design Architecture	The discipline is aimed at studying the detailed question 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											+		
16	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	5													+

		about state geodetic networks; about methods of creating survey networks; application of geometric leveling and the main types of topographic surveys.															
17	Geodesy with the basics of topography	The purpose of this course is to teach the necessary fundamental knowledge about the topographic map, its main properties, content, modern methods and technologies of creation and use for solving scientific and practical problems. 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														+
18	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 foundations, performs work on the calculation, analysis geotechnical structures, foundations and foundations of buildings and structures, geotechnical surveys aimed geological environment, properties and processes are studied.	5			+											
19	Geotechnics I	The discipline studies the	4			+											

		physico-chemical and physico-mechanical properties of soils and their change under various factors, basic concepts of groundwater, their origin, methods interaction natural environment and the behavior of soils under load, the principles of the organization of the construction of bridge structures on the railway and by road.															
20	Geotechnics II	The discipline studies to give an opportunity to correctly assess the properties of soils in the base, their joint work with the foundation and above-foundation structures. This, in turn, makes it possible to rationally choose the type of foundation and foundation, and the.	5			+											
21	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 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.	5													+	
22	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,	5	+													

		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.														
23	Engineering Mechanics 2	Discipline is an optional component. The study of methods for calculating various structures for strength, rigidity, and stability; mastering the basic universal analytical methods for calculating structures under static and dynamic effects; the development of students' logical thinking, self-thinking skills necessary in further work in solving certain technical problems. Kinematic analysis of structures, calculation of flat frames, flat shapes, determination of movements of elastic systems, calculation of statically indeterminate frames by the method of movements.	5	+												
24	Computer graphics in transport construction	The discipline studies the theoretical foundations for constructing images points, lines, planes and certain types of lines and surfaces, 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.	6												+	
25	Materials Science and Technology of Structural Materials	The discipline studies the correct use of various materials used in the railway and automotive	5													+

		industries, as well as manufacturing technology, machine parts and mechanisms associated with their processing. Production technologies of carbon alloys; area, properties and grades carbon alloy steels, non-ferrous alloys polymer materials; processes thermal and thermochemical treatment.														
26	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													+
27	Bridges and pipes	The discipline is aimed at providing theoretical and practical training of specialists in the design of bridges and pipes at the level of higher professional education, forms the skills of the basic principles of bridge design, technical design conditions and basic bridge structures, basic methods of calculating bridge elements from various materials.	5										+			
28	Oil and gas pipelines	The discipline studies the properties of oil and petroleum products, the composition of the structures of the main oil and gas pipelines, methods of hydraulic calculation of the main pipeline, methods of technological calculation of the oil product	5							+						

		pipeline during sequential pumping of oil, pressure characteristics of the oil pipeline and pumping stations, methods of pumping high-viscosity oils, the thermal regime of hot main pipelines.															
29	Ensuring safety in transport construction	The discipline studies the following issues ensure traffic safety in transport: Basic concepts of system for ensuring traffic safety in modes transport. Indicators of reliability operation of technical devices and structures. Supervision the field transport security. Regulatory framework ensuring transport security. Fundamentals of ensuring traffic safety by means of transport.	5													+	
30	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 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.	5										+				
31	Fundamentals of hydrogeology and engineering geology	The discipline studies the main characteristics of watercourses, methods of their determination, the laws of hydrostatics and fluid hydrodynamics, the causes and formation of sediments on watercourses, the occurrence of hydraulic resistances, methods	5			+											+

		for calculating hydraulic characteristics and structures, methods and methods of hydraulic calculation of pressure pipelines.														
32	Fundamentals of electronics and measuring technique	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 of electronic and electrical circuits and signals, assessing their accuracy.	5								+					
33	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	+												
34	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	6					+	+							

		system of road structures for traffic control (traffic lights, parking lots, signs and signs), lighting systems, traffic light objects , road signs, pointers and road markings.														
35	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	+												
36	Construction works and processes	The discipline studies the theoretical foundations, methods and ways of implementing construction processes that 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.	5													+
37	Technology of building manufacture	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				+									
38	Technology for the construction of bridges, tunnels, and subways	The discipline studies technologies for the installation of bridge spans by a longitudinal slide, hinged and semi-	5				+	+								

		suspended assembly, technology for the construction of supports, technologies for the penetration of distillation and station tunnels of subways, the production of earthworks by scrapers, bulldozers and graders, single-bucket and multi-bucket excavators, features of the production of earthworks in winter, drilling and blasting technology, production of concrete and reinforced concrete works in winter.														
39	Oil and gas facilities construction technology	The discipline studies the main provisions of the technology of construction of oil and gas facilities, methods of construction of oil and gas facilities, rules for the installation of vertical and horizontal tanks, methods of testing tanks for tightness, installation work, rules for checking the operability of devices mechanisms, general construction processes, methods of construction of oil and gas facilities in accordance with design and regulatory documents	5				+	+					+			
40	Transport systems	The study of the discipline ensures the coordinated development and operation all modes of transport in order to maximize the satisfaction of transport needs at minimal cost. The transport system designed to meet the transport needs person and includes means of transportation, objects of transportation, as well as the	5				+									

		environment.														
41	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											+		
42	Economics and management in construction	The discipline studies the purpose, classification, basic parameters and principles of operation of general construction machines, machines for equipment for transport construction, their equipment, methods for calculating productivity, operating time and selection for the production process of general construction machines, machines for the construction of railways, roads and airfields	5		+											
43	Economics and construction management	Economics and Construction Management discipline studies a holistic view of the essence the overall management process its various forms and main stages investments for its implementation theories of management development in various countries. Forms the general strategic thinking and specific practical managerial skills of a manager who can	5		+											

		significantly increase.															
44	Electrical engineering	The purpose of the discipline is the development of the theoretical foundations of electrical engineering, the acquisition of knowledge about the designs, principles of operation, parameters and characteristics of various electrical circuits and electrical devices, preparing the student to understand the principle of operation of modern electrical equipment.	5								+						
Cycle of major disciplines University component																	
Cycle of major disciplines Selectable Component																	
45	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 regulations	5							+							
46	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	5							+							

		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														
47	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					+								
48	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 and sealing oil and gas facilities during repair work	6					+								
49	Subways	Disciplines - the ability to determine the loads on the load-bearing structures of all metro structures and perform their calculation; To have an idea	5							+			+			

		about the features of geodetic works during the construction of subways, about the physical nature of the processes occurring in the ground mass when opening the workings; about ventilation and lighting, electricity, signaling, centralization, water supply, sewerage and heating on subways. To carry out the organization and control of all types of construction and installation works														
50	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							+						
51	Research activities in transport construction 1	The discipline studies the following: Increasing the level motivation of students to actively participate in research activities. Development creative thinking students. Deepening and expanding knowledge in a specialty or profession. Propaganda among students of various forms scientific creativity in accordance with the principle of unity of education, science and practice.	5									+				
52	Research activities in transport construction 2	The discipline studies Modern methods of monitoring the	5									+				

		structures of transport facilities. Analyzes the results of scientific research, taking into account theoretical calculations. Software complexes for modeling transport facilities. Innovative methods for monitoring and analysis of characteristic damage and defects in the structure and foundations of structures.														
53	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							+			+			
54	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 of organization construction and production of works organization of in-line construction modeling of construction production tasks of technical rationing engineering and production preparation for the construction bridges, tunnels and subways.	5					+								
55	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	5					+								

		production of work, the organization of in-line construction, the modeling of construction production, the tasks of technical regulation, engineering and production preparation for the construction of oil and gas facilities														
56	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					+								
57	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					+								
58	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	5				+	+								

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

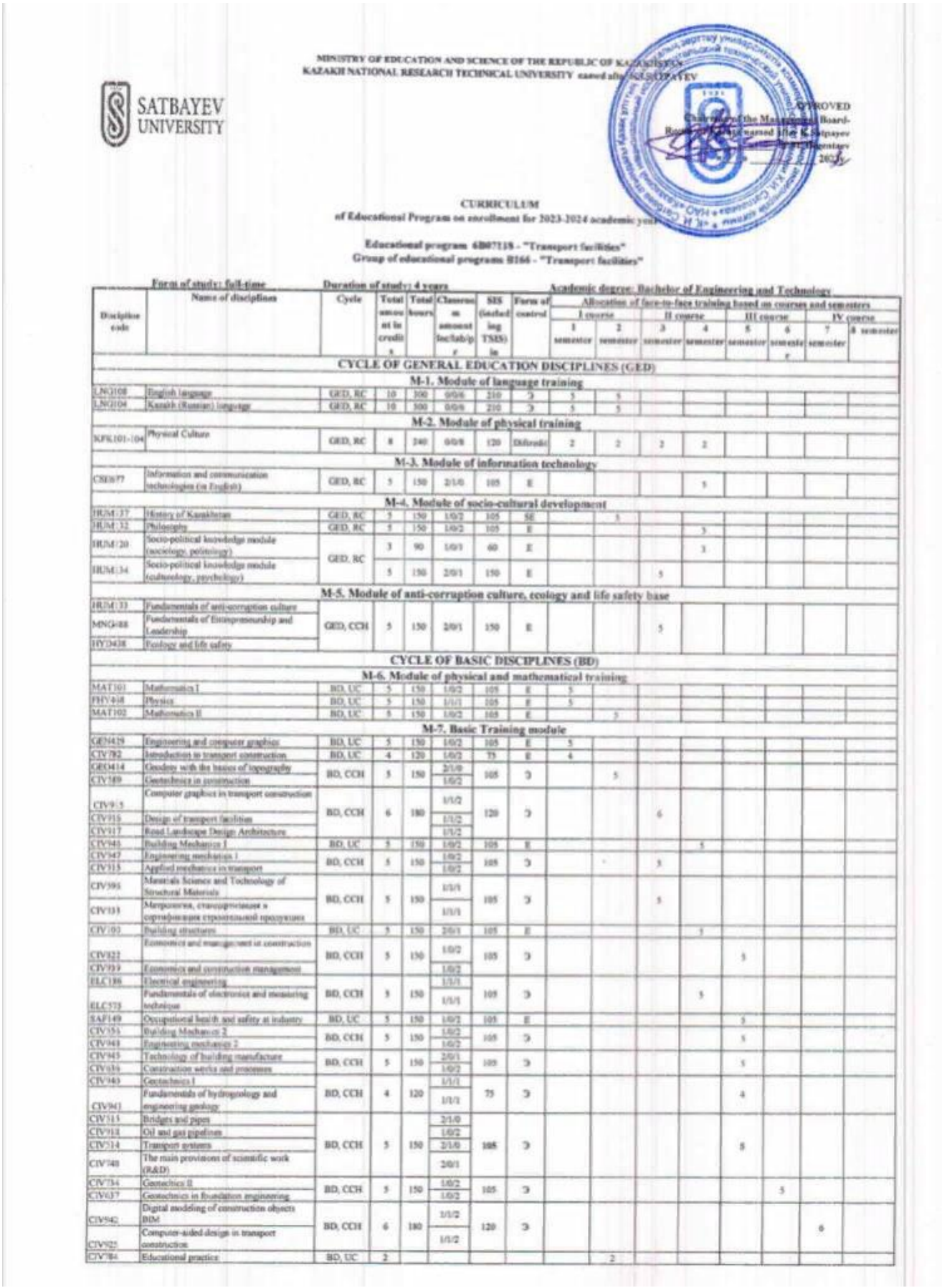
62	Design of bridges and tunnel crossings	The discipline studies the methods of installation of reinforced concrete and metal bridges, supports and foundations of bridges, construction methods of tunnels and subways, elements of prefabricated reinforced concrete bridge structures, manufacturing technology of precast concrete beams with pretensioning, steel spans.	6					+	+							
63	Design of oil and gas pipeline systems	The discipline studies the general principles of designing oil and gas pipeline systems, methods of substantiation and survey of main pipeline routes, route plan, classification of sections and terrain categories, technological schemes for the construction of oil and gas pipelines, structural reliability of oil and gas pipeline systems, the composition of structures of main oil and gas pipelines, reliability of pipelines in accordance with regulatory documents during design and operation.	4					+	+							
64	Design of oil and gas storage facilities	The discipline studies the specifics 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 storage tanks for liquefied gases and main gas pipelines, the purpose and principles of operation of gas tanks and gas storage facilities, the norms of technology and	6						+				+			

		design of gas storage facilities, underground gas storage facilities, the purpose and operation of gas storage facilities.														
65	Technical regulations of transport infrastructure	The discipline studies the organization and safety during 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												+	
66	Maintenance and repair of bridges and pipes	The discipline studies general information about artificial structures, loads and impacts on bridges and pipes, methods of limit states used in the calculation of bridge structures, design of artificial structures, development of rational structures of artificial structures, methods of calculation of bridge structures, fundamentals of calculation of bridges and pipes using modern technologies in construction, repair and reconstruction.	5							+						
67	Maintenance and repair of oil and gas pipelines	The discipline studies the types and purposes of pipeline transport devices, the principles of pipeline maintenance and repair, requirements for pipelines and the quality of maintenance, the technology of main pipeline transport maintenance, the technology of major repairs of main pipelines, the complex of repair works during the construction of oil and gas	5							+						

		pipelines, technical requirements that ensure high quality of repair work.														
68	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							+						
69	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							+						
70	Technological support of construction objects	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				+						+			

		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														
71	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



SATBAYEV UNIVERSITY

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named after K.I. SATBAYEV

APPROVED
Chairman of the Management Board-
Rector of the NJSC named after K.I. Satpayev
[illegible]
2023

CURRICULUM
of Educational Program on enrollment for 2023-2024 academic year

Educational program 6B07118 - "Transport facilities"
Group of educational programs B166 - "Transport facilities"

Form of study: full-time | Duration of study: 4 years | Academic degree: Bachelor of Engineering and Technology

Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	Classroom amount lec/lab/pr	SIS (including TSIS) in	Form of control	Allocation of face-to-face training based on courses and semesters							
								I course		II course		III course		IV course	
								1 semester	2 semester	3 semester	4 semester	5 semester	6 semester	7 semester	8 semester
CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)															
M-1. Module of language training															
LNG108	English language	GED, RC	10	300	0/0/6	210	Э	5	5						
LNG104	Kazakh (Russian) language	GED, RC	10	300	0/0/6	210	Э	5	5						
M-2. Module of physical training															
KFK101-104	Physical Culture	GED, RC	8	240	0/0/8	120	Difzach	2	2	2	2				
M-3. Module of information technology															
CSE877	Information and communication technologies (in English)	GED, RC	5	150	2/1/0	105	E				5				
M-4. Module of socio-cultural development															
HUM137	History of Kazakhstan	GED, RC	5	150	1/0/2	105	SE		5						
HUM132	Philosophy	GED, RC	5	150	1/0/2	105	E				5				
HUM120	Socio-political knowledge module (sociology, politology)	GED, RC	3	90	1/0/1	60	E				3				
HUM134	Socio-political knowledge module (culturology, psychology)		5	150	2/0/1	150	E			5					
M-5. Module of anti-corruption culture, ecology and life safety base															
HUM133	Fundamentals of anti-corruption culture	GED, CCH	5	150	2/0/1	150	E			5					
MNG488	Fundamentals of Entrepreneurship and Leadership														
HYD438	Ecology and life safety														
CYCLE OF BASIC DISCIPLINES (BD)															
M-6. Module of physical and mathematical training															
MAT101	Mathematics I	BD, UC	5	150	1/0/2	105	E	5							
PHY408	Physics	BD, UC	5	150	1/1/1	105	E	5							
MAT102	Mathematics II	BD, UC	5	150	1/0/2	105	E		5						
M-7. Basic Training module															
GEN429	Engineering and computer graphics	BD, UC	5	150	1/0/2	105	E	5							
CIV782	Introduction to transport construction	BD, UC	4	120	1/0/2	75	E	4							
GEO414	Geodesy with the basics of topography	BD, CCH	5	150	2/1/0	105	Э								
CIV589	Geotechnics in construction				1/0/2				5						
CIV915	Computer graphics in transport construction	BD, CCH	6	180	1/1/2	120	Э			6					
CIV916	Design of transport facilities				1/1/2										
CIV917	Road Landscape Design Architecture				1/1/2										
CIV944	Building Mechanics I	BD, UC	5	150	1/0/2	105	E				5				
CIV947	Engineering mechanics I	BD, CCH	5	150	1/0/2	105	Э			5					
CIV315	Applied mechanics in transport				1/0/2										
CIV591	Materials Science and Technology of Structural Materials	BD, CCH	5	150	1/1/1	105	Э			5					
CIV133	Материалтар, стандарттау және сертификаттау негіздері				1/1/1										
CIV102	Building structures	BD, UC	5	150	2/0/1	105	E				5				
CIV822	Economics and management in construction	BD, CCH	5	150	1/0/2	105	Э					5			
CIV919	Economics and construction management				1/0/2										
ELC186	Electrical engineering	BD, CCH	5	150	1/1/1	105	Э				5				
ELC573	Fundamentals of electronics and measuring technique				1/1/1										
SAF149	Occupational health and safety at industry	BD, UC	5	150	1/0/2	105	E					5			
CIV351	Building Mechanics 2	BD, CCH	5	150	1/0/2	105	Э					5			
CIV948	Engineering mechanics 2				1/0/2										
CIV945	Technology of building manufacture	BD, CCH	5	150	2/0/1	105	Э					5			
CIV636	Construction works and processes				1/0/2										
CIV940	Geotechnics I	BD, CCH	4	120	1/1/1	75	Э					4			
CIV941	Fundamentals of hydrogeology and engineering geology				1/1/1										
CIV315	Bridges and pipes	BD, CCH	5	150	2/1/0	105	Э					5			
CIV918	Oil and gas pipelines				1/0/2										
CIV514	Transport systems				2/1/0										
CIV740	The main provisions of scientific work (R&D)				2/0/1										
CIV734	Geotechnics II	BD, CCH	5	150	1/0/2	105	Э						5		
CIV637	Geotechnics in foundation engineering				1/0/2										
CIV542	Digital modeling of construction objects BIM	BD, CCH	6	180	1/1/2	120	Э							6	
CIV925	Computer-aided design in transport construction				1/1/2										
CIV784	Educational practice	BD, UC	2						2						

M-8. Module "Technology of linear structures"																
CIV321	Technology for the construction of bridges, tunnels, and subways	BD, CCH	5	150	1/0/2	105	3						5		
CIV322	Oil and gas facilities construction technology				1/0/2										
SEV122	Modern methods of calculating pavement	BD, UC	4	120	1/0/2	75	3								4
M-9. Module "Rules of technical operation for linear structures"																
CIV639	Ensuring safety in transport construction	BD, CCH	5	150	1/0/2	105	3						5		
CIV313	Road traffic safety conditions				1/0/2										
CYCLE OF PROFILE DISCIPLINES (PD)																
M-10. Module of professional activity																
CIV658	Organization and planning of construction of bridges, tunnels and subways	PD, CCH	5	150	1/0/2	105	3							5	
CIV511	Organization and planning of construction of oil and gas facilities				1/0/2										
CIV943	Machinery and equipment for the construction of bridges, tunnels and subways	PD, CCH	6	180	2/0/2	120	3							6	
CIV944	Machinery and equipment for the construction of oil and gas facilities				2/0/2										
CIV606	Transport tunnels	PD, CCH	4	120	1/0/2	75	3						4		
CIV608	Oil and gas storage				1/0/2										
CIV618	Fundamentals of organization and planning of construction of transport facilities	PD, CCH	5	150	1/0/2	105	3						5		
CIV938	Organization of construction				1/0/2										
CIV508	Organization, planning and management in construction				2/0/1										
CIV709	Research activity in transport construction 1 (R&D)				0/0/3										
CIV603	Subways	PD, CCH	5	150	1/0/2	105	3							5	
CIV604	Pumping and compressor stations in oil and gas production				1/0/2										
CIV705	Production practice I	PD, UC	2								2				
CIV706	Production practice II	PD, UC	3										3		
M-11.Module "Design of linear structures"																
CIV929	Design of bridges and pipes	PD, CCH	4	120	1/0/2	75	3						4		
CIV930	Design of oil and gas pipeline systems				1/0/2										
CIV931	Design of bridges and tunnel crossings	PD, CCH	6	180	2/0/2	120	3							6	
CIV932	Design of oil and gas storage facilities				2/0/2										
M-12. Module "Technology of linear structures"																
CIV654	Maintenance and repair of bridges and pipes	PD, CCH	5	150	1/0/2	105	3							5	
CIV655	Maintenance and repair of oil and gas pipelines				1/0/2										
CIV750	Research activity in transport construction 2 (R&D)				0/0/3										
CIV662	Maintenance and repair of tunnels and subways	PD, CCH	5	150	1/0/2	105	3								5
CIV661	Maintenance and repair of oil and gas storage facilities				1/0/2										
CIV335	Technological support of construction objects				2/0/1										
M-13. Module "Rules of technical operation for linear structures"																
CIV709	Diagnostics of bridges, tunnels and subways	PD, CCH	5	150	1/0/2	105	3								5
CIV711	Diagnostics of oil and gas facilities				1/0/2										
CIV751	Patenting in transport construction (R&D)				1/0/2										
CIV915	Rules for the technical operation of transport facilities	PD, CCH	5	150	1/0/2	105	3								5
CIV916	Technical regulations of transport infrastructure				1/0/2										
M-14. Module of final attestation																
ECA178	final attestation	FA	8												8
M-15. Module of additional types of training																
AAP530	Military affairs	ATT	0												
	Total based on UNIVERSITY:							31	29	28	32	29	31	33	27
								60		60		60		60	

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			
		required component (RC)	university component (UC)	component of choice (CCH)	Total
GED	Cycle of general education disciplines	51		5	56
BD	Cycle of basic disciplines		47	65	176
PD	Cycle of profile disciplines		5	59	
	Total for theoretical training:	*51*	*57*	*124*	*232*
FA	final attestation	8			8
	TOTAL:	59	57	124	240

Decision of the Academic Council of Kazatu named after K.Satpayev. Protocol № 5 24 november 2022 y.

Decision of the Educational and Methodological Council of Kazatu named after K.Satpayev. Protocol № 3 17 november 2022 y.

Decision of the Academic Council of the Institute_____. Protocol No. 01 от "4" 10 2022

Vice-Rector for Academic Affairs		B.A. Zhurtikov
Institute Director		B.U. Kaspangaliev
Department Head		D.A. Ahmetov
Specialty Council representative from employers		D.K. Nusupov

EXPERT OPINION

for educational programs 6B07305 - "Transport construction", 6B07118 - "Transport facilities"

Submitted for reviewing educational programs 6B07305 - "Transport construction", 6B07118 - "Transport facilities", developed by the faculty of the department "Construction and building materials", Institute of Architecture and Construction, NAO "Kazakh National Technical University named after K.I. Satpaev" - associate. Professor SCM Akhmetov D.A., Professor Shayakhmetov S.B. senior teacher Kurbenova A.K., Art. teacher Zhangabylova A.M., doctoral student Kystaubaev S.K.

The developed educational programs include the basic rules and norms in the direction of training bachelors 6B07305 - "Transport construction", 6B07118 - "Transport facilities", a list of legal documents, the expected competencies of students based on the results of the full development of the 4-year cycle, a working curriculum.

According to the educational programs, curricula for the modular training system of the direction 6B07305 - "Transport construction", 6B07118 - "Transport facilities". All disciplines included in the curriculum are evenly distributed over the semesters, the logical sequence of studying the disciplines is observed.

Summing up, we can conclude that the considered educational programs, the catalog of elective disciplines and the working curriculum can be used to organize the educational process in the direction 6B07305 - "Transport construction", 6B07118 "Transport facilities", mastering the disciplines of the proposed modules contributes to the formation of demanded graduates to solve the construction of transport facilities..

Expert,

Ph.D., head of the company

«Geo Track» LLP **D.K. Nusupov**