Institute T.K. Basenov of Architecture and Construction
Department of Construction and Building Materials

EDUCATIONAL PROGRAM
6B07305 "Transport construction"

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 training areas: 6B073 Architecture and Civil engineering
Level based on NQF: B074 Urban planning, construction work and civil engineering
Level based on NQF: 6
Level based on IQF: 6
Study period: 4
Amount of credits: 240

Almaty 2025

Educational program 6B07305 "Transport construction"
code and name of educational program
was approved at the meeting of K.I. Satbayev KazNRTU Academic Council

Minutes № 5 dated « 06 » march 2025.

was reviewed and recommended for approval at the meeting of K.I. Satbayev KazNRTU Educational and Methodological Council

Minutes № 3 dated «17 » march 2025 .

The educational program 6B07305 "Transport construction" was developed by the academic committee in the direction of training "Architecture and construction"

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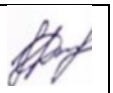
Nusupov Dzhetybay Kozhabekovich	candidate of technical sciences	Head of Geo Track LLP	GEOTRACK LLP, mobile phone: +77017460487, work phone: +77272919496, +77272784371	
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Table of contents

1. Description of the educational program

The sphere of professional activity may be the following from- rasli: head of the capital construction department, head of the production (technical, production and technical) department, head of the site (workshop), head of the material and technical supply department, head of the Safety and Labor Protection Department, head of the regulatory research laboratory for labor, head of the tool department, head of the production laboratory (production control), head of the quality control department, head of the road laboratory, site master (road master), work producer (foreman), master of industrial training, foreman, project manager, project manager, lead engineer, design engineer, process engineer (technologist), repair engineer, inventory engineer of buildings and structures, metrology engineer, labor organization engineer, labor rationing engineer, safety and labor protection engineer Types of professional activity: 14 environment (ecologist), laboratory engineer, engineer, chief specialist, leading specialist, specialist, design technician, site technician, process technician, inventory technician of buildings and structures, metrology technician, labor technician, technician, technician-laboratory assistant, laboratory assistant

The objects of professional activity are: local executive authorities in the field of railway and road transport and their regional structures; - organizations and enterprises of the transport industry in the field of design, construction, maintenance and repair of railways and highways and airfields of the main network of railways and highways, city and village streets and access roads of industrial enterprises; - organizations and enterprises in the field of manufacturing of building materials and structures for objects of the transport and communication complex.- communication complex.

Subjects of professional activity: organization and execution of construction works, organization and execution of works on the operation of railways and highways and technical equipment, work in research organizations under the guidance of leading specialists, organization, planning and management in bridge and tunnel construction.

Types of professional activity. Bachelors in the specialty

- production and technological;
- organizational and managerial;
- project

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

1) Organization of manufacturing of building materials and structures for transport and communication facilities; organization of design, construction, maintenance and repair of railways and highways and airfields; use of standard methods for calculating the reliability of structures of highways and airfields.

2) Management of production processes, analysis of the results of production activities; management of works on the implementation of design and construction works, maintenance and repair of railways and highways and airfields; technical diagnostics of highways and airfields, the use of measuring instruments of road laboratories; analysis and evaluation of production and non-production costs or resources for high-quality design, construction, maintenance maintenance and repair of railways, highways and airfields.

3) Development of new technologies, development of design and technological documentation using computer technology; calculation of strength and stability under various types of loading of railways and highways and airfields, development of projects for new and reconstruction (modernization) of existing highways and airfields; selection of building materials for the manufacture of structures of railways and highways and airfields, justification of technical solutions; development of technical specifications and technical conditions for projects of new and reconstruction (modernization) of existing highways and airfields, structures of railways and highways and airfields, technological processes of maintenance and repair of railways and highways and airfields, means of technical diagnostics of highways and airfields using modern information technologies and computer programs; design of new structures of railways, highways and airfields that meet the latest achievements of science and technology, safety requirements.

Areas 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 elements of transport construction, to design technical solutions, to participate in the development of technical specifications for the construction and reconstruction of transport construction facilities taking into account the requirements of ecology and life safety, to perform construction and installation work; technology of work in the construction of railways and highways.

2. The purpose and objectives of the educational program

The purpose of the EP: Training of competitive specialists with higher education in the field of transport construction, taking into account the increasing quality requirements of specialists with the necessary theoretical knowledge and practical skills in the field of design, calculation, installation, reconstruction and operation of transport infrastructure.

Tasks of EP: 1. Formation of a person capable of professional activity to participate in the survey and design of railways and highways and airfields, in the organization of work on the production of road-building materials, in the organization of work on the construction of railways and automobile and airfields, in the operation of highways and airfields. 2. Formation of the ability to carry out

work on the continuation of the route on the ground and the restoration of the route in accordance with the project documentation; to maintain and execute the documentation of the survey party. 3. Formation of the ability: to design a route plan, longitudinal and transverse road profiles; to make technical and economic comparisons; to use modern computer equipment; to use personal computers and programs for them for the design of railways and highways and airfields; to draw up design documentation; to navigate the main stages of preparing the field for development. 4. Formation of the ability to: reasonably choose the operating schemes of mining equipment; establish the technological sequence of preparation of asphalt concrete, cement concrete and other mixtures according to the schemes; build, maintain and repair railways and highways and airfields, independently form tasks and determine ways to solve them within the framework of professional competence; work with regulatory documents, standard design and technological documentation; use modern information technologies; 5. Assistance in the formation of a graduate readiness: to assess and analyze the condition of railways and highways, airfields and their structures; to develop a technological sequence of processes for the maintenance of various types of coatings and elements of the arrangement of roads and airfields; to calculate the needs of machines for cleaning snow from railways and highways and airfields and the distribution of anti-icing materials on them; to develop a technological sequence of processes for the repair of all types of road clothes. 6. Formation of graduates' readiness to determine the types of work to be accepted and to assess the quality of repair and maintenance, railways and highways and airfields. 7. Assistance in the formation of graduates' readiness for the economical and safe use of natural resources, energy and materials in the design, construction, survey and design of railways, highways and airfields

3. Requirements for the evaluation of learning outcomes of the educational program

Description of the mandatory standard requirements for graduation and awarding an academic bachelor's degree: mastering at least 240 academic credits of theoretical training and a final thesis

4.Educational program name

4.1. General information

№	Field name	Note
1	Code and classification of the field of education	6B07 Engineering, manufacturing and construction industries
2	Code and classification of training areas	6B073 Architecture and construction
3	Group of educational programs	B074 Urban planning, construction works and civil engineering
4	Name of the educational program	6B07305 "Transport construction"

5	Brief description of the educational program	The content of professional activity: to make calculations of elements of buildings and structures of transport construction, highways, airfields, bridges and tunnels, to design technical solutions, to participate in the development of technical conditions for the construction and reconstruction of transport construction facilities taking into account the requirements of ecology and life safety, to perform construction and installation work, selection of composition and technological lines for the production of road-building materials and products
6	Goal EP	Training of competitive specialists with higher education in the field of transport construction, taking into account the increasing quality requirements of specialists with the necessary theoretical knowledge and practical skills in the field of design, calculation, installation, reconstruction and operation of transport infrastructure.
7	view EP	new
8	Level based on NQF:	6
9	Level based on IQF:	6
10	Distinctive features EP	No
11	List of competencies of the educational program:	B – Basic knowledge, P – Professional competencies, O - Universal, socio-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 Apply knowledge on the development of the theory and practice of designing railways and highways, the rules of traction calculations on railways, tracing methods, designing a longitudinal profile and a plan of a railway line, on the main types of work, methods for choosing the position of a highway route. Result 3 Solve the simplest, geometric, physical and other problems using fundamental knowledge systems (mathematical, natural science, engineering and electrical engineering) 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 construction . Result 4 Perform calculations and design of building structures using the basic laws of mechanics. Result 5 Demonstrate knowledge of traffic safety in transport, methods, engineering and technical means and systems for ensuring traffic safety in transport, rules for the technical operation of transport facilities. Ensure traffic safety and safe working conditions for transport workers within the framework of professional competencies, study the preparation and submission of an application to the patent office of the Republic of Kazakhstan for registration of an invention. Result 6 Know the rules for ensuring traffic safety in transport, methods, engineering and technical means and systems for ensuring traffic safety in transport, rules for the technical operation of transport structures. Ensure traffic safety and safe working conditions for transport workers within the framework of professional competencies, study the preparation and submission of an application to the Patent Office of the Republic of Kazakhstan for registration of an invention and management of intellectual property rights Result 7 Solve engineering and geological issues of foundations and foundations, methods of geological research and evaluate the properties of soils, in the analysis, design of geotechnical structures in transport construction. Result 8 Know the classification and basic parameters and principles of operation of general construction and track machines and equipment, the methodology for calculating operational performance. Possess the skills to substantiate the choice of options for general construction and track machines and equipment of domestic and foreign production according to technical and economic characteristics. Result 9 Apply skills of linear-constructive construction and principles of choosing the technique for the execution of a specific object in automated design of transport construction in the production and operation of road works, landscape design using graphic editors and Unified System for Design Documentation (ESKD), as well as

		understanding the basic principles of operation of artificial intelligence systems and their role in the modern world. Ability to analyze risks and develop effective algorithms to ensure the safety and reliability of IT infrastructure, including the principles of sustainable development and the principles of inclusive design of infrastructure for transport systems. Result 10 Determine the main provisions, methods and means of diagnosing the railway track, their standardization and certification allowing the use of modern measuring technologies, classification of tracks depending on operational parameters, operating conditions of the railway track and highways, types and technologies for performing maintenance and repair of the railway track and airfields. Result 11 Apply in practice methods for performing geodetic work during the construction and operation of transport facilities, the principles of geotechnical research and the selection of structural materials for use in production and construction processes, regulatory and technical documentation, as well as the study of national and international standards, analysis of successful ESG projects and strategies for their implementation at enterprises. Result 12 Apply the main provisions and tasks of the construction industry, the types and features of the main processes in the construction of structures and their equipment, the technology for their implementation, including the methodology for selecting and documenting technological solutions at the design and implementation stage. Result 13 Determine the effectiveness of technological solutions in the performance of various types of construction works and processes, ensure the quality of construction works and processes, assess economic costs, risks and basic decision-making skills in construction projects and projects for organizing the construction of transport facilities.
13	Form of training	full - time
14	Duration of training	4 года
15	Amount of credits:	240
16	Languages of instruction	Kaz, rus.eng
17	Academic degree awarded	Bachelor of Engineering and Technology
18	Developer(s) and authors:	Department of "CaCW" No. 401-P/O from 11/23/2022

4.2. Relationship between the achievability of the formed learning outcomes based on educational program and academic disciplines

№	Discipline name	Short description of discipline	Amount of credits	Generated learning outcomes (codes)												
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13
Cycle of general education disciplines Required component																
Cycle of general education disciplines University 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	5									+				

		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.														
3	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													
4	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	5		+											

		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	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																	
6	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	4												+		

		current level of development of the transport system in our country and in the world.															
7	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												+		
8	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						+							

9	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 approximate calculations.	5							+						
10	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									+			+	
11	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.	5			+										

12	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 requirements.	5			+										
13	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			+										
14	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; the relationship 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 Component of choice																	
15	Computer-aided design in transport construction	The discipline studies the use of spreadsheets in engineering calculations, determination of geometric solutions of systems of equations, interpolation of tabular functions, calculations of statically indeterminate systems, determination of displacements, construction of calculation schemes of bridge spans and tunnel linings, execution of drawings of elements of artificial structures and structures in general using graphic editors (mainly AutoCAD)	6													+	
16	Car roads	The discipline studies the following questions: Technical standards for the design the main elements of highways. Plan and longitudinal profile highways. Road classification. Estimated speeds, loads and dimensions vehicles. Organization and safety road traffic. Road junctions and intersections highways with engineering communications. Intersections and junctions otor roads in one level.	5							+							
17	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	6												+		

		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.														
18	Geotechnics in construction	The purpose of studying the discipline is to determine the role of geodesy in construction; obtaining a modern understanding of the shape and size of the Earth; concepts of geoid, ellipsoid; coordinate systems used in geodesy; coordinate systems at construction sites; orientation of lines on the ground. Objectives of the discipline to gain knowledge for the use of maps and plans, the use of information about state geodetic networks; on the methods of creating survey networks; application of geometric leveling and basic types of topographic surveys.	5													+
19	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	5													+

		construction process, constant checks by geodetic methods of the correct installation of building structures in the design position are carried out.														
20	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 and design of geotechnical structures, foundations and foundations of buildings and structures, geotechnical surveys aimed at studying the geological environment, properties and processes are studied.	5			+										
21	Geotechnics I	The discipline studies the physico-chemical and physico-mechanical properties of soils and their change under various factors, the basic concepts of groundwater, their origin, methods of hydrogeological research, soils, geological and engineering-geological processes arising from interaction with the 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	4			+										
22	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			+										

23	Road traffic safety conditions	The discipline is aimed at studying the following points: Basic terms and definitions field road conditions and traffic safety. The main regulatory documents regulating road conditions and traffic safety. Requirements and norms rules technical operation design, maintenance and operation technical means ensure traffic safety. Classification permissible violations of traffic safety.	5									+				
24	Railway track 1	The superstructure the track is considered - rails, sleepers, butt and intermediate fastenings, ballast layer. Types rails, types and types wooden and reinforced concrete sleepers, types ballast materials. The geometric dimensions rails, sleepers, intermediate fastenings, rail joints, fastening elements (wooden and reinforced concrete sleepers), dimensions the ballast prism are given.	5							+							
25	Engineering mechanics 1	The discipline studies the conditions of equilibrium of a solid body, methods for specifying the movement of a point, basic concepts and definitions, methods and principles for calculating structural elements for strength and rigidity for the simplest types of deformations, as well as recommendations for the rational design of engineering structures.	5	+													
26	Engineering mechanics 2	Discipline is an optional component. The study of methods for calculating various structures for strength, rigidity, and stability;	5	+													

		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.														
27	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											+		
28	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. Production technologies of carbon alloys; area, properties and grades carbon alloy steels, non-ferrous alloys polymer materials; processes thermal and thermochemical treatment.	5													+
29	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.														
30	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												+	
31	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.														
32	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 for calculating hydraulic characteristics and structures, methods and	4			+										

		methods of hydraulic calculation of pressure pipelines.														
33	Fundamentals of Artificial Intelligence	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 intelligence systems, expert systems, observational learning, statistical learning methods, probabilistic processing of linguistic information, semantic models, natural language processing systems.	5													
34	Fundamentals of sustainable development and ESG projects in Kazakhstan	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. 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.	5													
35	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.														
36	Applied mechanics in transport	The discipline studies the general laws of mechanical motion of bodies and their equilibrium, methods of calculating the strength and rigidity of typical elements of various structures, the main types of mechanisms, methods of research and calculation of their kinetic and dynamic characteristics.	5	+												
37	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 transport infrastructure facilities with a system of road structures for traffic regulation (traffic lights, parking lots, signs and signs), lighting systems, traffic lights, road signs, signs and road markings.	6					+								
38	Building Mechanics 2	The discipline studies the stress - strain state of rods and rod systems under the influence of various loads, principles and methods of calculating structures for strength, rigidity and stability in order to ensure the reliability of structures with the least consumption of	5	+												

		materials.														
39	Construction works and processes	The discipline studies the theoretical foundations, methods and methods of implementing construction processes that ensure the processing of building materials, semi-finished products, products; qualitative changes in their condition, physical and mechanical properties in order to obtain construction products.	5													+
40	Railway construction technology	The discipline studies the basic provisions of railway construction technology; according to the longitudinal profile of the railway track, it studies the construction of a section of railway roadbed; the construction of the upper structure of the track using modern machines and mechanisms of railway construction.	5				+									
41	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						+							
42	Technology for the construction of highways and airfields	To give students the knowledge, skills and abilities that are the basis for studying all general engineering and technical disciplines, as well as to master general design, computational, theoretical and technical-economic knowledge and solutions that require linking with technological and organizational														

		features of the maintenance and repair of highways.														
43	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 environment.	5												+	+
44	Digital modeling of construction objects BIM	The discipline is aimed at studying the technology of modeling objects, including buildings, railways, bridges, tunnels, and designing "smart" roads in BIM technology 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											+		
45	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		+											
46	Economics and Construction	Economics and Construction	5		+											

	Management	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 significantly increase.														
47	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 profile disciplines Component of choice																
48	Airfields	The discipline studies the basic concepts of airfield coverings. Aerodrome coatings by the nature of resistance to the action of loads from aircraft are divided into: rigid (concrete; reinforced concrete; reinforced concrete; as well as asphalt concrete coatings on a cement-concrete base); non-rigid (of asphalt concrete; treated with organic binders; of crushed stone and gravel materials, soils and local materials treated with inorganic or organic binders).	4							+						

49	Diagnostics of highways	The discipline studies the system of assessing and forecasting the technical and operational condition of highways and making management decisions and the scope of work-assessing the technical condition of highways, taking into account the influence of traffic flows and weather and climatic factors on road structures, determining transport and operational characteristics, determining the degree of malfunctions and their causes, the efficiency of road transport.	5							+						
50	Diagnostics of the railway track	The discipline studies the movement track diagnostics - process measuring and technical inspection railway objects in order to determine their technical condition, identify damage, determine their type, as well as control technical condition and search for a place and determine causes of a malfunction (failure) are part of path monitoring	5							+						
51	Road construction machinery and equipment	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, highways and airfields	6										+			
52	Railway track 2	The discipline studies the basic concepts of connections and	4							+					+	

		intersections railway tracks. Ordinary single railroad switch. Calculation geometric dimensions an ordinary railroad switch. Diagram of the railroad switch and its breakdown. Crossings, ramps, turnout streets, blind intersections. Breakdown normal exit. Crossings, road signs and road obstacles. Rail specification. Beam specification.															
53	Railway track III	The subgrade railways is being studied. Defects deformations the subgrade. Obtain information about the soils from which the subgrade is constructed. The requirements soils are being studied - moisture, compaction standards, dead weight loads, loads from the impact rolling stock. Devices diverting surface ground waters, protective fortifying structures are considered.								+							
54	The roadbed of highways	The subgrade of highways is being studied. Defects deformations the subgrade. Obtain information about the soils from which subgrade is constructed. The requirements soils are being studied - moisture, compaction standards, dead weight loads, loads from the impact rolling stock. Devices diverting surface ground waters, protective fortifying structures are considered.	5							+							
55	Research activity in transport construction 1	The discipline studies the following: Increasing the level of motivation of students to actively participate in research activities. Development of students' creative thinking. Deepening and expanding knowledge of a specialty or profession. Mastering the methods	5									+					

		of conducting scientific research, developing the skills of research work of students. Promotion of various forms of scientific creativity among students in accordance with the principle of unity of education of science practice.															
56	Research activity 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 complexes for modeling transport facilities. Innovative methods for monitoring and analysis of characteristic damage and defects in the structure and foundations of structures.	5									+					
57	Organization and planning of the construction of the highway complex	The discipline studies the acquisition of professional knowledge and practical skills in the exploration and design of the roadbed, assesses economic costs, risks and basic decision-making skills.	5					+									
58	Organization and planning of the construction of the railway complex	The discipline studies advanced technologies and organization of construction and installation works, assessment of economic costs, risks and decision-making skills that reduce material and energy costs in compliance with the requirements of standards and technical regulations, the order of execution of works on the construction of railway facilities and commissioning of facilities.	5					+									
59	Organization of construction	The discipline studies the preparation for construction, the	5					+									

		establishment and maintenance of the order, sequence and timing of work, ensuring the supply of all necessary types of resources, assesses economic costs. The organization of construction is necessary to ensure the commissioning of all facilities on time.														
60	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				+									
61	Fundamentals of organization and planning of construction of transport facilities	The discipline studies the basics of rational planning and design of construction, the project of the organization of construction and production of works of the organization of in-line construction, modeling of construction production, assessment of economic costs, tasks of technical regulation of engineering and production preparation for the construction of transport structures.	5				+									
62	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.	5								+					

		Preparation and submission application Patent Office Republic of Kazakhstan.															
63	Rules of technical operation of highways	The discipline studies the following issues: Rules for the use of road signs. Technical means of traffic management. Socio-economic significance of the operation of highways. A systematic approach to the operation of roads and the management of their functioning. Interaction of cars with the road. A system of parameters and characteristics of the level and operational condition of highways. Classification of methods for the general assessment of the transport and operational condition of highways.	5													+	
64	Rules of technical operation of railways	The discipline studies the following: The order of operation of the upper structure of the track, the roadbed and artificial structures. The order of operation of rails, switches, track and signal signs, intersections and junctions of railway tracks. The order of technical operation of the infrastructure of the railway network. Ensuring the safety of train traffic during the production of track works. Conditions and speeds of passing trains at the place of work.	5													+	
65	Design automotive roads I	The discipline determines ways of development theory and practice designing roads and airfields, methods of tracing, designing a longitudinal section and a plan a road network, considers main provisions and methods designing the reconstruction of an existing	4						+								

		road network, and studies modern systems for computer-aided design of transport structures.														
66	Road design 2	The discipline is studied by methods of designing a longitudinal profile and plan of a highway, methods of designing and calculating road surfaces and pavements, skills in solving problems of increasing the radius of a curve during the reconstruction of an existing highway.	6					+								
67	Railway design 1	The discipline studies the project of construction of a new railway or reconstruction of an existing railway, the development of design and other technical documentation, studies the areas of railway design based on the use of the results of railway research and the use of special methods of design and calculation of individual railway devices	4					+								
68	Railway design 2	The discipline studies the theory and practice of developing and making the right design decisions on a topographic map, taking into account the prospects for the growth of transportation, the prospects for the growth of the design of all permanent structures and new structures and the reconstruction of existing railways	6					+								
69	Travel vehicles and equipment	The discipline studies the design and technical characteristics of machines and equipment for transport construction (for highways and airfields, for railways) methods of calculating the main technical	6									+				

		parameters, organization of operation, evaluation of the effectiveness of the use of machines and the development of measures to improve the efficiency of their use in the road sector.															
70	Construction and reconstruction of highways	The discipline studies the reconstruction of the roadbed, pavement, culverts, intersections and junctions of highways in various natural and climatic conditions, modern methods of organizing work, reconstruction of road service structures, engineering arrangement of highways, rational nature management and environmental protection.	5							+							
71	Railway track maintenance and repair I	The discipline studies the main components of road management system,classification of tracks associated with operational parameters, the operating conditions of the railway network, a systematic approach to analyzing the actual state the railway network and its additional arrangement, taking into account the operational parameters of the railway network section.	5							+							
72	Maintenance and repair of railway track II	The discipline is studied by methods of designing a longitudinal profile and plan of a highway, methods of designing and calculating road surfaces and pavements, skills in solving problems of increasing the radius of a curve during the reconstruction of an existing highway.	5							+							
74	Technological support of construction objects	The discipline studies the main design documentation for carrying	5				+										

		out transport construction and installation works, as well as necessary design documentation, studies it in detail, it is especially important that engineering and technical staff have a clear idea composition design documentation and the procedure for its transfer to construction organizations.														
75	Operation of highways I	The discipline studies modern methods of obtaining materials and products with a given level of operational properties, the properties of modern materials, the basics of technology for the production of structural materials, the construction of elements of highways and airfields, the features of the development of city streets, the features of the construction of highways in mountainous conditions.	5						+							
76	Operation of highways II	The discipline assesses the adoption of engineering decisions in relation to existing roads, considers and selects options for repair work, selects and justifies the geometric and technical parameters of structures, and independently makes technical and economic decisions that require coordination with technological and organizational assessments.	5						+							

5. Curriculum of educational program

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

SATBAYEV UNIVERSITY

«APPROVED»
Decision of the Academic Council
NPJSC«KazNRTU
named after K.Satbayev»
dated 06.03.2025 Minutes № 10

WORKING CURRICULUM

Academic year: 2025-2026 (Autumn, Spring)
Group of educational programs: B074 - "Urban planning, construction work and civil engineering"
Educational program: 6B07305 - "Transport construction"
The awarded academic degree: Bachelor of engineering and technology
Form and duration of study: full time - 4 years

Discipline code	Name of disciplines	Block	Cycle	Total ECTS credits	Total hours	lek/lab/pr Contact hours	in hours SIS (including TSIS)	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	0/0/45	105	E	5								
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E	5								
LNG108	Foreign language		GED, RC	5	150	0/0/45	105	E		5							
LNG104	Kazakh (russian) language		GED, RC	5	150	0/0/45	105	E		5							
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					
HUM120	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					
CIV970	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					
M-2. Module of physical training																	
KFK101	Physical culture I		GED, RC	2	60	0/0/30	30	E	2								
KFK102	Physical culture II		GED, RC	2	60	0/0/30	30	E		2							
KFK103	Physical culture III		GED, RC	2	60	0/0/30	30	E			2						
KFK104	Physical culture IV		GED, RC	2	60	0/0/30	30	E				2					
CYCLE OF BASIC DISCIPLINES (BD)																	
M-6. Module of physical and mathematical training																	
MAT101	Mathematics I		BD, UC	5	150	15/0/30	105	E	5								
PHY468	Physics		BD, UC	5	150	15/15/15	105	E	5								

MAT102	Mathematics II		BD, UC	5	150	15/0/30	105	E		5							MAT301
M-7. Module of basic training																	
GEN429	Engineering and computer graphics		BD, UC	5	150	15/0/30	105	E	5								
SIV170	Introduction to transport construction		BD, UC	4	120	15/0/30	75	R	4								
AAP173	Practical training		BD, UC	2				R		2							
GED414	Geodesy with the basics of topography	1	BD, CCH	5	150	30/15/0	105	E		5							
CIV589	Geotechnics in construction	1	BD, CCH	5	150	15/0/30	105	E		5							
CIV915	Computer graphics in transport construction	1	BD, CCH	6	180	15/15/30	120	E			6						
CIV916	Design of transport facilities	1	BD, CCH	6	180	15/15/30	120	E			6						
SIV446	Road Landscape Design Architecture	1	BD, CCH	6	180	30/15/15	120	E			6						
CIV947	Engineering mechanics 1	2	BD, CCH	5	150	15/0/30	105	E			5						
CIV515	Applied mechanics in transport	2	BD, CCH	5	150	15/0/30	105	E			5						
CIV596	Materials Science and Technology of Structural Materials	3	BD, CCH	5	150	15/15/15	105	E			5						
CIV533	Metrology, standardization and certification of construction products	3	BD, CCH	5	150	15/15/15	105	E			5						
CIV946	Building Mechanics 1		BD, UC	5	150	15/0/30	105	E				5					
CIV100	Building structures		BD, UC	5	150	30/0/15	105	E				5					
ELC186	Electrical engineering	1	BD, CCH	5	150	15/15/15	105	E				5					PHY111, PHY112
ELC573	Fundamentals of electronics and measuring technique	1	BD, CCH	5	150	15/15/15	105	E				5					
SAP149	Occupational health and safety at industry		BD, UC	5	150	15/0/30	105	E					5				
CIV822	Economics and management in construction	1	BD, CCH	5	150	15/0/30	105	E					5				
CIV939	Economics and construction management	1	BD, CCH	5	150	15/0/30	105	E					5				
CSE831	Fundamentals of Artificial Intelligence	1	BD, CCH	5	150	15/0/30	105	E					5				
CIV556	Building Mechanics 2	2	BD, CCH	5	150	15/0/30	105	E					5				
CIV948	Engineering mechanics II	2	BD, CCH	5	150	15/0/30	105	E					5				
CIV945	Technology of building manufacture	3	BD, CCH	5	150	30/0/15	105	E					5				
CIV636	Construction works and processes	3	BD, CCH	5	150	15/0/30	105	E					5				
CIV940	Geotechnics I	4	BD, CCH	4	120	15/15/15	75	E					4				
CIV941	Fundamentals of hydrogeology and engineering geology	4	BD, CCH	4	120	15/15/15	75	E					4				
CIV919	Railway track 1	5	BD, CCH	5	150	15/0/30	105	E					5				
CIV920	Car roads	5	BD, CCH	5	150	15/0/30	105	E					5				
SIV162	The main provisions of scientific work	5	BD, CCH	5	150	30/0/15	105	E					5				
CIV514	Transport systems	5	BD, CCH	5	150	30/15/0	105	E					5				
SIV163	Geotechics II	1	BD, CCH	5	150	15/0/30	105	E						5			
CIV637	Geotechnics in foundation engineering	1	BD, CCH	5	150	15/0/30	105	E						5			
SIV447	Digital modeling of construction objects BIM	1	BD, CCH	6	180	30/15/15	120	E							6		
CIV925	Computer-aided design in transport construction	1	BD, CCH	6	180	15/15/30	120	E							6		
M-8. Module "Technology of linear objects"																	
CIV923	Railway construction technology	1	BD, CCH	5	150	15/0/30	105	E						5			
CIV924	Technology for the construction of highways and airfields	1	BD, CCH	5	150	15/0/30	105	E						5			

MNG563	Fundamentals of sustainable development and ESG projects in Kazakhstan	1	BD, CCH	5	150	30/0/15	105	E						5			
SIV122	Modern methods of calculating pavement		BD, UC	4	120	15/0/30	75	E								4	
M-9. Module "Technical operation rules for linear objects"																	
CIV832	Ensuring traffic safety on transport	1	BD, CCH	5	150	15/0/30	105	E						5			
CIV513	Road traffic safety conditions	1	BD, CCH	5	150	15/0/30	105	E						5			
MNG562	Legal regulation of intellectual property	1	BD, CCH	5	150	30/0/15	105	E						5			
CYCLE OF PROFILE DISCIPLINES (PD)																	
M-10. Module of professional activity																	
AAP102	Production practice I		PD, UC	2				R				2					
AAP183	Production practice II		PD, UC	3				R						3			
CIV610	Railway track 2	1	PD, CCH	4	120	15/0/30	75	E						4			
CIV612	Airfields	1	PD, CCH	4	120	15/0/30	75	E						4			
CIV638	Fundamentals of organization and planning of construction of transport facilities	2	PD, CCH	5	150	15/0/30	105	E						5			
CIV928	Organization of construction	2	PD, CCH	5	150	15/0/30	105	E						5			
CIV548	Organization, planning and management in construction	2	PD, CCH	5	150	30/0/15	105	E						5			
SIV164	Research activity in transport construction 1	2	PD, CCH	5	150	0/0/45	105	E						5			
CIV656	Organization and planning of the construction of the railway complex	1	PD, CCH	5	150	15/0/30	105	E							5		
CIV657	Organization and planning of the construction of the highway complex	1	PD, CCH	5	150	15/0/30	105	E							5		
CIV926	Travel vehicles and equipment	2	PD, CCH	6	180	30/0/30	120	E							6		
CIV927	Road construction machinery and equipment	2	PD, CCH	6	180	30/0/30	120	E							6		
CIV641	Railway track III	3	PD, CCH	5	150	15/0/30	105	E							5		
CIV642	The roadbed of highways	3	PD, CCH	5	150	15/0/30	105	E							5		
M-11. Module "Design of linear objects"																	
CIV605	Design automotive roads 1	1	PD, CCH	4	120	15/0/30	75	E						4			
CIV603	Railway design 1	1	PD, CCH	4	120	15/0/30	75	E						4			
CIV933	Railroad design 2	1	PD, CCH	6	180	30/0/30	120	E							6		
CIV934	Road design 2	1	PD, CCH	6	180	30/0/30	120	E							6		
M-12. Module "Technology of linear objects"																	
CIV652	Railway track maintenance and repair 1	1	PD, CCH	5	150	15/0/30	105	E							5		
CIV653	Operation of highways 1	1	PD, CCH	5	150	15/0/30	105	E							5		
CIV551	Construction and reconstruction of highways	1	PD, CCH	5	150	30/15/0	105	E							5		
SIV165	Research activity in transport construction 2	1	PD, CCH	5	150	0/0/45	105	E							5		
CIV659	Maintenance and repair of railway track II	1	PD, CCH	5	150	15/0/30	105	E								5	
CIV660	Operation of highways II	1	PD, CCH	5	150	15/0/30	105	E								5	
CIV535	Technological support of construction objects	1	PD, CCH	5	150	30/0/15	105	E								5	
M-13. Module "Technical operation rules for linear objects"																	
CIV695	Diagnostics of highways	1	PD, CCH	5	150	15/0/30	105	E								5	
SIV168	Diagnostics of bridges, tunnels and subways	1	PD, CCH	5	150	15/0/30	105	E								5	

SIV167	Patenting in transport construction	1	PD, CCH	5	150	15/0/30	105	E							5	
CIV937	Rules of technical operation of railways	2	PD, CCH	5	150	15/0/30	105	E							5	
CIV938	Rules of technical operation of highways	2	PD, CCH	5	150	15/0/30	105	E							5	
M-14. Module of final attestation																
ECA103	Final examination		FA	8											8	
Additional type of training (ATT)																
AAP500	Military training															
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	0	5	56
BD	Cycle of basic disciplines	0	45	71	116
PD	Cycle of profile disciplines	0	5	55	60
Total for theoretical training:		**51**	**50**	**131**	**232**
FA	Final attestation				8
TOTAL:					**240**

Decision of the Educational and Methodological Council of KazNRTU named after K.Satpayev. Minutes №3 dated 20.12.2024

Decision of the Academic Council of the Institute. Minutes №4 dated 10.12.2024

Signed:

Governing Board member - Vice-Rector for Academic Affairs — Utkelbayeva R. K.

Approved:

Vice Provost on academic development — Kalpeyova Z. K.

Head of Department - Department of Educational Program Management and Academic-Methodological Work — Zhamagaliyeva A. S.

Director of the Institute - Institute of Architecture and Civil engineering named T.K. Basenov — Kaspangaliyev B. .

Department Chair - Civil engineering and building materials — Shayakhmetov S. K.

Representative of the Academic Committee from Employers ___Acknowledged___ — Nusupov J. K.