Joint stock company
«Mukhamedjan Tynyshpayev ALT University»

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

EDUCATIONAL PROGRAM

Name: 6B07336 – RAILWAY CONSTRUCTION

Level of training: bachelor's degree

Code and classification of training area: 6B073 – Architecture and construction

Code and group of the educational program: B126 – Transport construction

Registration date in the Register: 23.05.2025

Registration number: 6B07300195

Almaty, 2025

CONTENTS

1. Information on the consideration, approval and adoption of the program, developers, experts and reviewers	3
2. Regulatory references	5
3. Educational program passport	6
4. Graduate competence model	7
5. Matrix of correlation of learning outcomes for the educational program with academic disciplines/modules	11
6. Structure of the bachelor's educational program	14
7. Working curriculum for the entire period of study	15
8. Catalogue of university component disciplines	17
9. Catalogue of elective component disciplines	26
10. Expert opinions	37
11. Reviewers' conclusions	39
12. Letter of recommendation	41
13. Protocols of consideration and approval	42
14. Approval sheet	46
15. Change registration sheet	47

1. INFORMATION ON THE CONSIDERATION, APPROVAL AND ADOPTION OF THE PROGRAM, DEVELOPERS, EXPERTS AND REVIEWERS

1. DEVELOPED BY:

Associate professor of ALT,
candidate of technical sciences _____ *T.Zh. Tulemissov*

Master of industrial training
of the Almaty route distance branch of
«NC «Kazakhstan railways» JSC –
«Almaty branch of the backbone network» _____ *N.N. Anarbekov*

Associate professor of ALT,
doctor of technical sciences _____ *S.O. Ismagulova*

Senior-lecturer,
master of technical sciences _____ *A.S. Imankulova*

Student of the US-SZhD-23-1k group _____ *B.B. Beibagys*

2. EXPERTS:

First deputy director for operations of the
branch of «NC «Kazakhstan railways» JSC –
«Almaty branch of the backbone network» _____ *A.R. Duyseev*

Head of the track department of the
branch of «NC «Kazakhstan railways» JSC –
«Almaty branch of the backbone network» _____ *R.V. Nurbolat*

3. REVIEWERS:

Director of «GeoTrack» LLP,
candidate of technical sciences _____ *D.K. Nusupov*

Head of the department «Construction
and building materials» Institute of
architecture and construction of KNRTU
named after K.I. Satpayev, professor,
doctor of technical sciences _____ *S.B. Shayakhmetov*

4. CONSIDERED AND RECOMMENDED:

Meeting of the AC (department of TC)
Protocol No. 1, «24» 02. 2025 _____ *G.B. Karibayeva*

Meeting of the Institute's EMB
of Transport and Construction
Protocol No. 8, «17» 03. 2025 _____ *Sh.A. Abdreshov*

Meeting of the EMC of
M. Tynyshpayev ALT University
Protocol No. 4, «20» 03. 2025 _____ *A.K. Kodzhabergenova*

5. APPROVED by the decision of the Academic council dated «27» 03. 2025, Protocol No. 8

6. UPDATED 23.05.2025

2. REGULATORY REFERENCES

The educational program was developed on the basis of the following regulatory legal acts and professional standards:

1. The law of the Republic of Kazakhstan «On education» dated July 27, 2007 No. 319-III (with amendments and additions as of march 27, 2023).

2. The National qualifications framework, approved by the protocol of march 16, 2016 of the Republican tripartite commission on social partnership and regulation of social and labor relations.

3. The sectoral qualifications framework for Education, approved by the minutes of the meeting of the sectoral commission of the ministry of Education and science of the Republic of Kazakhstan on social partnership and regulation of social and labor relations in the field of education and science dated november 27, 2019 No. 3.

4. The State mandatory standard of higher education (order of the Minister of science and higher education of the Republic of Kazakhstan dated july 20, 2022 No. 2 with amendments and additions by order of the acting Minister of science and higher education of the Republic of Kazakhstan dated march 04, 2025 No. 90).

5. Qualification directory of positions of managers, specialists and other employees, approved by order of the Minister of labor and social protection of the population of the Republic of Kazakhstan dated august 12, 2022 No. 309.

6. Rules for organizing the educational process on credit technology of education in organizations of higher and (or) postgraduate education, approved by order of the Minister of the Ministry of education and science of the Republic of Kazakhstan No. 152 dated 04/20/2011. (with additions and amendments dated april 04, 2023 No. 145).

7. Classifier of training areas for higher and postgraduate education, approved by order of the Minister of Education and science of the Republic of Kazakhstan dated october 13, 2018 No. 569 (with amendments and additions as of june 05, 2020).

8. The algorithm for including and excluding educational programs in the register of educational programs of higher and postgraduate education, approved by order of the Minister of education and science of the Republic of Kazakhstan dated december 4, 2018 No. 665 (with additions and amendments as of december 23, 2020 No. 536).

9. RI-ALT-33 «Regulation on the procedure for developing an educational program for higher and postgraduate education».

10. Atlas of new professions: «Virtual designer»

3. EDUCATIONAL PROGRAM PASSPORT

№	Field name	Note
1	Registration number	6B07300195
2	Code and classification of the field of education	6B07 – Engineering, manufacturing and construction industries
3	Code and classification of training areas	6B073 – Architecture and construction
4	Code and group of educational programs	B126 – Transport construction
5	Name of the educational program	6B07336 – Railway construction
6	Type of EP	New
7	Goal of the EP	Training of qualified personnel with professional competencies in the field of design, construction, technical maintenance, repair, and reconstruction of railway track
8	ISCED level	6
9	NQF level	6
10	SQF level	6
11	Distinctive features of the EP	None
	Partner-University (JEP)	-
	Partner-University (DEP)	-
12	Mode of study	Full-time
13	Language of instruction	Kazakh, russian
14	Credit volume	240
15	Awarded degree	bachelor of engineering and technology in the educational program 6B07336 – Railway construction
16	Presence of an appendix to the license for the area of personnel training	KZ12LAA00025205 (010)
17	Presence of ep accreditation	no
	Name of the accreditation body	
	Accreditation validity period	

4. GRADUATE COMPETENCE MODEL

Objectives of the educational program:

1. Formation of a personality capable of self-improvement and professional growth with versatile socio-humanitarian, natural science, special, and core knowledge and interests.

2. Formation of the ability to critically re-evaluate accumulated experience, to change the profile of their professional activity if necessary, to be aware of the social significance of their future profession, and to possess high motivation for professional activity.

3. Formation of the ability to: find a compromise between various requirements (cost, quality, safety, and execution time) in long-term and short-term planning and make optimal decisions in the field of surveying, designing, construction, and reconstruction of railways, as well as current maintenance and repairs of railway track; conduct work in research organizations under the guidance of leading specialists; possess a culture of thinking.

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

5. Facilitating the formation of the graduate's readiness to: perform calculation and design work; develop design and technical documentation; develop methodological materials, proposals, and measures for the design, construction, and reconstruction of railways, and technical maintenance and repairs of railway track.

6. Formation of graduates' readiness to conduct technical and economic analysis, substantiate adopted and implemented decisions in the field of surveying, designing, construction, and reconstruction of railways, technical maintenance, and repairs of railway track; apply the results in practice, strive for self-development and improvement of their qualifications and skills.

7. Facilitating the formation of graduates' readiness for the economical and safe use of natural resources, energy, and materials during the surveying, designing, construction, and reconstruction of railways, technical maintenance, and repairs of railway track.

Learning outcomes:

LO1 – Use fundamental knowledge in physics, mathematics, and construction chemistry when studying core disciplines and solving applied and construction problems.

LO2 – Apply the basic principles and methods of mechanics in solving problems related to strength, stiffness, and stability under various loads.

LO3 – Apply modern construction materials and design skills for the transport industry, considering the main mechanical properties of soils and their influence on building structures, taking into account engineering geological and hydrological conditions.

LO4 – Select methods for constructing spatial forms when designing transport structures for the development of computer models using elements of artificial intelligence and taking into account the principles of digital inclusion.

LO5 – Apply the basics of geodesy, geoinformatics, and computer technologies when determining the rational parameters of the plan and profile of new and reconstructed railways to select the economical option.

LO6 – Demonstrate skills in financial and economic justification and making management decisions based on analysis of alternatives, considering environmentally oriented models and sustainable development strategies.

LO7 – Develop organizational and technological processes for the construction of the roadbed and artificial structures with adherence to labor conditions and the principles of ecologically sustainable development.

LO8 – Use track-laying, construction machines and equipment, their placement and efficiency in technological processes, considering productivity and performed operations during track technical maintenance, for further mechanization, covering aspects of technical diagnostics of tracks.

LO9 – Identify priorities when conducting scientific research in solving theoretical and applied problems in the studied field of transport construction, acquiring skills based on state and foreign languages, knowledge of law, and anti-corruption laws.

LO10 – Classify track, bridges, and tunnels, track junctions and crossings by classes, as well as the design of fastening elements, their dimensions, frog numbers, ballast prism parameters, and roadbed deformations.

LO11 – Generate socio-philosophical, physical-psychological states as a personality for a specialist, problem-solving, and addressing bottlenecks in production during the organization and planning of technical maintenance of transport structures.

Area of professional activity:

Enterprises, organizations, and complexes that provide surveying, designing, construction, and reconstruction of railways, technical maintenance, and repairs of railway track.

Objects of professional activity:

- railway track and track facilities of railway transport;
- artificial structures (bridges, overpasses, viaducts, interchanges, tunnels, subways, culverts, etc.) of railways;
- means of diagnostics and monitoring of railway track and structures.

Types of professional activity:

- organizational and managerial;
- production and technological;
- design and surveying;
- calculation and research and design and construction.

Functions of Professional Activity:

1) Organization of the manufacture of construction materials and structures for transport and communication facilities; organization of surveying, designing, construction, and reconstruction of railways, technical maintenance, and repairs of railway track; use of standard methods for calculating the reliability of railway track structures.

2) Management of production processes, analysis of production activity results; management of work on surveying, designing, construction, and reconstruction of railways, technical maintenance, and repairs of railway track; technical diagnostics of railway track, application of track measuring and flaw detection tools; analysis and assessment of production and non-production costs or resources for surveying, designing, construction, and reconstruction of railways, technical maintenance, and repairs of railway track.

3) Development of new technologies, development of design and technological documentation using computer technologies; calculation of strength and stability under various types of loading of the railway track, development of projects for new and reconstruction (modernization) of existing railways; selection of construction materials for the manufacture of railway track structures, justification of technical decisions; development of technical specifications and technical conditions for projects of new and reconstruction (modernization) of existing railway lines, railway track structures, technological processes of technical maintenance and repairs of railway track, means of technical diagnostics of railway track using modern information technologies and computer programs; development of new railway track structures corresponding to advancements in science and technology and safety requirements.

List of specialist positions:

Head of the capital construction department, head of the production (technical, production and technical) department, head of the logistics department, head of the occupational safety and health department, head of the regulatory and research laboratory for labor, head of the instrumental department, head of the laboratory, head of the quality control department, project manager, project manager, manager, head of the site (workshop), head of the production site, deputy head of the production site, design engineer, process engineer, technologist, engineer for the repair of railway tracks, engineer for the repair of artificial structures, engineer for the inventory of buildings and structures, engineer for metrology, engineer for labor organization, engineer for labor rationing, engineer for pre-production, engineer for safety and labor protection, environmental engineer, environmental engineer, lead engineer, engineer, chief specialist, leading specialist, specialist, cost estimation engineer, quality control engineer (technical supervision), geodesic engineer (in the field of construction and operation of transport facilities), laboratory engineer, site foreman, senior road foreman, road foreman, bridge foreman, master of construction and installation works, work producer (foreman), master of industrial training, foreman for the current maintenance and repair of railway tracks, bridge foreman, foreman of construction and installation works, crawler of railway tracks and artificial structures, technician-designer, site technician, process technician, inventory technician of buildings and structures, metrology technician, labor technician, technician, laboratory technician, laboratory assistant, senior dispatcher, dispatcher.

Professional certificates obtained upon completion of training: not provided

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

In the course of training, students undergo various types of professional practice:

- educational practice (geodetic);
- industrial practice 1;
- industrial practice 2 / pre-diploma practice.

Educational practice (geodetic)

During the educational practice (geodetic), students should acquire practical skills in conducting geodetic measurements on the ground using modern geodetic equipment and geoinformation technologies, operating geodetic instruments, developing topographic plans of the area at various scales, leveling the route with the construction of profiles of a given direction with corresponding construction scales, and solving various engineering and geodetic problems during geodetic measurements on the ground.

Industrial practice 1

During industrial practice 1, the student acquires specific practical knowledge, skills, and abilities related to the educational program.

The objectives of industrial practice 1 are: deepening and consolidating theoretical knowledge obtained during the training process; acquiring skills for the practical application of professional knowledge obtained during theoretical training; learning skills for solving practical and managerial problems; familiarization with the specifics of the bachelor's professional activity in a particular production setting; formation of the specialist's professional position, behavior style, and mastery of professional ethics.

The tasks of industrial practice 1 are the consolidation, deepening, and systematization of knowledge obtained during the study of theoretical basic and core disciplines at a specific enterprise or organization, and the acquisition of initial practical experience.

Industrial practice 2 (Pre-diploma practice)

The content of industrial practice 2 (pre-diploma practice) is determined by the topic of the diploma thesis. during industrial practice 2 (pre-diploma practice), the student collects factual material on the production (professional) activities of the enterprise (organization) and uses it in the development of the diploma thesis. industrial practice 2 (pre-diploma practice) involves research and solving a given problem (the topic of the diploma thesis) based on the materials of a specific enterprise (organization), with the student independently formulating conclusions, proposals, recommendations, etc. when undergoing industrial practice 2 (pre-diploma practice), the student must demonstrate the knowledge and skills of a specialist, organizational abilities, decision-making skills, executive discipline, responsibility, and initiative.

The final certification is carried out in the form of writing and defending a thesis or preparing and passing a comprehensive exam. The purpose of the final assessment is to evaluate the learning outcomes and acquired competencies achieved upon completion of the study of the educational program of higher education.

The thesis aims to identify and evaluate the analytical and research abilities of the graduate and is a generalization of the results of the student's independent study of an urgent problem in the field of his chosen specialty. The comprehensive exam program reflects integrated knowledge and key competencies that meet the requirements of the labor market in accordance with the educational program of higher education.

5. MATRIX OF CORRELATION OF LEARNING OUTCOMES FOR THE EDUCATIONAL PROGRAM WITH ACADEMIC DISCIPLINES/MODULES

№	Name of the discipline	Number of credits	The matrix of correlation of learning outcomes in the educational program with academic disciplines										
			LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10	LO11
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	The history of Kazakhstan	5											+
2.	Philosophy	5											+
3.	Physical culture	8											+
4.	Foreign language	10									+		
5.	Kazakh (Russian) language	10									+		
	The module of socio-political competencies	8											
6.	Sociology	2											+
7.	Cultural studies	2											+
8.	Political science	2											+
9.	Psychology	2											+
10.	Information and communication technologies	5				+	+						
11.	Environmentally sustainable technologies	5						+	+				
12.	Green economy and sustainable entrepreneurship	5						+					
13.	Fundamentals of financial literacy	5					+	+					
14.	Digital inclusion	5				+							
15.	Basics of law and anti-corruption culture	5									+		
16.	Engineering mathematics 1	5	+										
17.	Engineering mathematics 2	5	+										
18.	Construction physics	5	+										
19.	Construction chemicals	4	+										
20.	Engineering geodesy	6				+	+						
21.	Building materials	6		+	+								
22.	Building constructions	4		+	+								
23.	Occupational safety and health	5							+				+
24.	Engineering graphics and computer modeling	4				+							

25.	Basics of Python programming	3				+							
26.	Professionally oriented foreign language	3									+		
27.	Educational practice (geodetic)	2				+	+						
28.	Theoretical mechanics	4	+	+									
29.	Fundamentals of classical mechanics	4	+	+									
30.	Resistance of materials	5	+	+									
31.	Applied mechanics	5	+	+									
32.	Construction mechanics	5	+	+									
33.	Mechanics of structural strength	5	+	+									
34.	Geology and soil mechanics	5			+								
35.	Geoinformation systems in geology	5			+		+						
36.	Bases and foundations	5			+								
37.	Geotechnics in foundation engineering	5			+								
38.	Hydraulics, hydrology, hydrometry	4			+								
39.	Hydraulic engineering calculations and measurements	4			+								
40.	Managerial economics	3						+					
41.	Time management	3						+					
42.	Fundamentals of railway design	5				+	+					+	
43.	Railway surveys and design	5				+	+					+	
44.	Reconstruction of railways	5				+	+					+	
45.	Railway track 1	5		+	+							+	
46.	Railway track 2	5		+	+							+	
47.	Railway track 3	5		+	+							+	
48.	A seamless path	5		+	+							+	
49.	Maintenance and repair of railway track 1	6								+		+	+
50.	Maintenance and repair of railway track 2	5								+		+	+
51.	Production practice 1	5					+		+	+		+	
52.	Production practice 2/ Pre-graduate practice	5					+		+	+		+	
53.	Computer-aided design of railways	4				+							
54.	Automated railway track design systems	4				+							

55.	Bridges and tunnels on railways	4		+	+							+	
56.	Artificial structures on railways	4		+	+							+	
57.	Track, construction machinery and equipment	4								+			
58.	Machines and mechanisms in the travel industry	4								+			
59.	Railway construction technology	6							+	+		+	
60.	Technological processes of railway construction	6							+	+		+	
61.	Organization and planning of railway construction	5							+	+		+	+
62.	Organization of construction production	5							+	+		+	+
63.	Railway track diagnostics	6								+		+	
64.	Monitoring of the technical condition of the railway track	5								+		+	
65.	Information modeling technology in architecture and construction	3				+							
66.	Minor program 1	3	+			+							
67.	Regulatory and technical documentation in railway construction and track facilities	3					+		+	+		+	
68.	Minor program 2	3			+					+	+		
69.	Estimated pricing in architecture and construction	3					+	+					
70.	Minor program 3	3								+		+	
71.	FINAL CERTIFICATION	8	+	+	+	+	+	+	+	+	+	+	+

6. STRUCTURE OF THE BACHELOR'S EDUCATIONAL PROGRAM

No. in order	Naming of discipline cycles	Overall labor intensity	
		in academic hours	in academic credits
1	**Cycle of general education disciplines (GED)**	**1680**	**56**
1)	**Required component**	**1530**	**51**
	The history of Kazakhstan	150	5
	Philosophy	150	5
	Foreign language	300	10
	Kazakh (Russian) language	300	10
	Information and communication technologies	150	5
	The socio-political knowledge module (Sociology, political science, cultural studies, psychology)	240	8
	Physical culture	240	8
2)	**University component and/or optional component**	**150**	**5**
2	**The cycle of basic and profile disciplines (BD, PD)**	**at least 5280**	**at least 176**
1)	**University component and/or optional component**		
2)	**Professional practice**		
3	Additional types of education (ATE)		
1)	**Component of choice**		
4	Final certification	at least 240	at least 8
	Total	**at least 7200**	**at least 240**

7. WORKING CURRICULUM FOR THE ENTIRE PERIOD OF STUDY

АО "ALT Университет имени Мухамеджана Тынышпаева"

УЧЕБНЫЙ ПЛАН

Форма обучения: очная

Срок обучения: 3 года

Прием: 2025 год

Направление подготовки:
6B073 – Архитектура и строительство

Группа образовательных программ:
B126 – Транспортное строительство

Наименование образовательной программы:
6B07336 – Строительство железных дорог

Степень: ***бакалавр техники и технологий***

УТВЕРЖДЕН
Решением Ученого совета
АО "ALT Университет имени М.Тынышпаева"
от 27 марта 2025 г. Протокол № 8
Председатель Ученого совета
_____ М.С. Карамзаметова

№	Код дисциплины	Наименование циклов и дисциплин	Общая трудоемкость		Форма контроля, триместр		Объем учебной нагрузки, часы						Распределение по триместрам									Закрепление за кафедрой
								Контактные				СРО	1 курс			2 курс			3 курс			
			в академических часах	в академических кредитах	Экзамен	КП (КР)	Всего часов	лекции	практические	лабораторные	СРОП		1	2	3	4	5	6	7	8	9	
													10 недель	10 недель	10 недель	10 недель	10 недель	10 недель	10 недель	10 недель	10 недель	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1.	ЦИКЛ ОБЩЕОБРАЗОВАТЕЛЬНЫХ ДИСЦИПЛИН (ООД):																					
1.1.	Обязательный компонент:		1530	51	21		1530	80	440	0	168	842	6	6	13	13	6	7	0	0	0	
M1	Модуль общеобразовательных компетенций																					
1.1.1.	23-0-B-OK-IK	История Казахстана	150	5	4		150	20	20		8	102				5						СГДиФВ
1.1.2.	23-0-B-OK-Fil	Философия	150	5	6		150	20	20		8	102						5				СГДиФВ
1.1.3.	23-0-B-OK-FK	Физическая культура	240	8	1,2, 3,4		240		40		32	168	2	2	2	2						СГДиФВ
M2	Модуль языковых компетенций																					
1.1.4.	23-0-B-OK-IYa	Иностранный язык	300	10	1,2, 3,4,5		300		200		40	60	2	2	2	2	2					LE
1.1.5.	23-0-B-OK-K(R)Ya	Казахский (Русский) язык	300	10	1,2, 3,4,5		300		100		40	160	2	2	2	2	2					LE
M3	Модуль социально-политических компетенций																					
1.1.6.	23-0-B-OK-Sots	Социология	240	8	4		240	5	10		8	37				2						СГДиФВ
	23-0-B-OK-Kul	Культурология			3			5	10		8	37			2							СГДиФВ
	23-0-B-OK-Pol	Политология			6			5	10		8	37						2				СГДиФВ
	23-0-B-OK-Psi	Психология			5			5	10		8	37					2					СГДиФВ
M4	Модуль информационных технологий и искусственного интеллекта																					
1.1.7.	23-0-B-OK-IKT	Информационно-коммуникационные технологии	150	5	3		150	20	20		8	102			5							ИКТ
1.2.	Компонент по выбору:		150	5	1		150	20	20	0	8	102	0	0	0	0	5	0	0	0	0	
M5	Модуль экономико-управленческих компетенций																					
1.2.1.	25-0-B-KV-EUT	Экологические устойчивые технологии	150	5	5		150	20	20		8	102					5					АТСиБЖД
	25-0-B-KV-ZEUP	Зеленая экономика и устойчивое предпринимательство																				ТУиБ
	24-0-B-KV-OFG	Основы финансовой грамотности																				ТУиБ
	25-0-B-KV-Ci	Цифровая инклюзия																				ИКТ
	23-0-B-KV-OPAK	Основы права и антикоррупционной культуры																				СГДиФВ
	ВСЕГО по циклу ООД:		1680	56	22		1680	100	460	0	176	944	6	6	13	13	11	7	0	0	0	
2.	ЦИКЛ БАЗОВЫХ И ПРОФИЛИРУЮЩИХ ДИСЦИПЛИН (БД, ПД):																					
2.1.	БАЗОВЫЕ ДИСЦИПЛИНЫ (БД):																					
2.1.1.	Вузовский компонент:		1560	52	12		1560	100	200	40	165	995	14	18	8	4	0	3	0	5	0	
M6	Модуль естественно-научных компетенций																					
2.1.1.1.	24-0-B-VK-IM1	Инженерная математика 1	150	5	1		150	10	20		15	105	5									ОИ
2.1.1.2.	24-0-B-VK-IM2	Инженерная математика 2	150	5	2		150	10	20		15	105		5								ОИ
2.1.1.3.	25-0-B-VK-SF	Строительная физика	150	5	1		150	10	10	10	15	105	5									ОИ
2.1.1.4.	25-0-B-VK-SKh	Строительная химия	120	4	2		120	10	10	10	15	75		4								ОИ
M7	Профессиональный модуль																					
2.1.1.5.	25-0-B-VK-Igeod	Инженерная геодезия	180	6	3		180	10	20	10	15	125			6							ТС
2.1.1.6.	25-0-B-VK-StrMat	Строительные материалы	180	6	2		180	20	10	10	15	125		6								АСИ
2.1.1.7.	25-0-B-VK-SK	Строительные конструкции	120	4	4		120	10	20		15	75				4						АСИ
2.1.1.8.	25-0-B-VK-OTBZhd	Охрана труда и безопасность жизнедеятельности	150	5	8		150	10	20		15	105								5		АТСиБЖД
M4	Модуль информационных технологий и искусственного интеллекта																					
2.1.1.9.	25-0-B-VK-IGKM	Инженерная графика и компьютерное моделирование	120	4	1		120	10	20		15	75	4									ТС
2.1.1.10.	25-0-B-VK-OPP	Основы программирования Python	90	3	2		90		10		15	65		3								ИКТ
M8	Практикоориентированный модуль																					
2.1.1.11.	25-0-B-VK-POIYa	Профессионально-ориентированный иностранный язык	90	3	6		90		40		15	35						3				LE
2.1.1.12.	23-0-B-VK-UPr(g)	Учебная практика *(геодезическая)*	60	2	3		60								2							ТС
2.1.2.	Компонент по выбору:		930	31	7		930	70	100	30	105	625	4	5	5	5	5	3	4	0	0	
M6	Модуль естественно-научных компетенций																					
2.1.2.1.	25-0-B-VK/KV-TMeh	Теоретическая механика	120	4	1		120	10	20		15	75	4									ТС
	25-0-B-KV-OKMeh	Основы классической механики																				
2.1.2.2.	25-0-B-KV-SMat	Сопротивление материалов	150	5	2		150	10	10	10	15	105		5								ТС
	25-0-B-KV-PMeh	Прикладная механика																				
2.1.2.3.	25-0-B-KV-SMeh	Строительная механика	150	5	3		150	10	20		15	105			5							ТС
	25-0-B-KV-MPS	Механика прочности сооружений																				
M7	Профессиональный модуль																					
2.1.2.4.	25-0-B-KV-GMG	Геология и механика грунтов	150	5	4		150	10	10	10	15	105				5						АСИ
	25-0-B-KV-GISG	Геоинформационные системы в геологии																				
2.1.2.5.	25-0-B-KV-OF	Основания и фундаменты	150	5	5		150	10	20		15	105					5					АСИ
	25-0-B-KV-GFs	Геотехника в фундаментостроении																				
2.1.2.6.	25-0-B-KV-GGG	Гидравлика, гидрология, гидрометрия	120	4	7		120	10	10	10	15	75							4			АСИ
	25-0-B-KV-GIRI	Гидротехнические расчеты и измерения																				
M5	Модуль экономико-управленческих компетенций																					
2.1.2.7.	23-0-B-KV-UE	Управленческая экономика	90	3	6		90	10	10		15	55						3				ТУиБ
	23-0-B-KV-TM	Тайм-менеджмент																				
	ИТОГО по БД:		2490	83	19	0	2490	170	300	70	270	1620	18	23	13	9	5	6	4	5	0	

2.2.	ПРОФИЛИРУЮЩИЕ ДИСЦИПЛИНЫ (ПД):																							
2.2.1.	Вузовский компонент:		1680	66	11		1680	100	180	0	135	965	0	0	0	5	10	15	10	6	10			
M7	Профессиональный модуль																							
2.2.1.1.	25-B-VK-OPZhD	Основы проектирования железных дорог	150	5	4		150	10	20		15	105				5								ТС
2.2.1.2.	25-B-VK-IPZhD	Изыскания и проектирование железных дорог	150	5	5		150	10	20		15	105					5							ТС
2.2.1.3.	25-B-KV-RZhD	Реконструкция железных дорог	150	5	6		150	10	20		15	105						5						ТС
M8	Практикоориентированный модуль																							
2.2.1.4.	25-B-VK-ZhdP1	Железнодорожный путь 1	150	5	5		150	10	20		15	105					5							ТС
2.2.1.5.	25-B-VK-ZhdP2	Железнодорожный путь 2	150	5	6		150	10	20		15	105						5						ТС
2.2.1.6.	25-B-VK-ZhdP3	Железнодорожный путь 3	150	5	7		150	10	20		15	105							5					ТС
2.2.1.7.	25-B-VK-BP	Бесстыковой путь	150	5	7		150	10	20		15	105							5					ТС
2.2.1.8.	25-B-VK-TORZhdP1	Техническое обслуживание и ремонт железнодорожного пути 1	180	6	8		180	20	20		15	125								6				ТС
2.2.1.9.	25-B-VK-TORZhdP2	Техническое обслуживание и ремонт железнодорожного пути 2	150	5	9		150	10	20		15	105									5			ТС
2.2.1.10.	25-0-B-VK-PPr1	Производственная практика 1	150	5	6		150											5						ТС
2.2.1.11.	25-0-B-VK-PPr2/PdPr	Производственная практика 2/ Преддипломная практика	150	5	9		150														5			ТС
2.2.2.	Компонент по выбору:		1110	37	9		1110	110	140	0	135	725	0	0	0	0	0	0	13	16	8			
M4	Модуль информационных технологий и искусственного интеллекта																							
2.2.2.1.	25-B-KV-APZhD	Автоматизированное проектирование железных дорог	120	4	8		120	10	20		15	75								4				ТС
	25-B-KV-SAPZhdP	Системы автоматизированного проектирования железнодорожного пути																						
M7	Профессиональный модуль																							
2.2.2.2.	25-B-KV-MTZhD	Мосты и тоннели на железных дорогах	120	4	7		120	10	20		15	75							4					ТС
	25-B-KV-ISZhD	Искусственные сооружения на железных дорогах																						
2.2.2.3.	25-B-KV-PSMO	Путевые, строительные машины и оборудования	120	4	8		120	20	10		15	75								4				АТСиБЖД
	25-B-KV-MMPH	Машины и механизмы в путевом хозяйстве																						
M8	Практикоориентированный модуль																							
2.2.2.4.	25-B-KV-TZhDS	Технология железнодорожного строительства	180	6	7		180	20	20		15	125							6					ТС
	25-B-KV-TPSZhD	Технологические процессы строительства железных дорог																						
2.2.2.5.	25-B-KV-OPZhdS	Организация и планирование железнодорожного строительства	150	5	8		150	10	20		15	105								5				ТС
	25-0-B-KV-OSP	Организация строительного производства																						АСИ
2.2.2.6.	25-B-KV-DZhdP	Диагностика железнодорожного пути	150	5	9		150	10	20		15	105									5			ТС
	25-B-KV-KTSZhdP	Контроль технического состояния железнодорожного пути																						
M9	Модуль инфраструктурных программ / Модуль дополнительной образовательной программы																							
2.2.2.7.	25-0-B-KV-TIMAS	Технология информационного моделирования в архитектуре и строительстве	90	3	7		90	10	10		15	55							3					АСИ, ТС
	24-0-B-KV-MN1	Минорная программа 1																						АСИ, ТС
2.2.2.8.	25-B-KV-NTDZhD	Нормативно-техническая документация в железнодорожном строительстве и путевом хозяйстве	90	3	8		90	10	10		15	55								3				ТС
	24-0-B-KV-MN2	Минорная программа 2																						ТС
2.2.2.9.	25-0-B-KV-SCAS	Сметное ценообразование в архитектуре и строительстве	90	3	9		90	10	10		15	55									3			АСИ, ТС
	24-0-B-KV-MN3	Минорная программа 3																						АСИ, ТС
	ИТОГО по ПД:		2790	93	20	0	2790	210	320	0	270	1690	0	0	0	5	10	15	23	22	18			
	ВСЕГО по циклу БД, ПД:		5280	176	39	0	5280	380	620	70	540	3310	18	23	13	14	16	21	27	27	18			
3.	ДОПОЛНИТЕЛЬНЫЕ ВИДЫ ОБУЧЕНИЯ (ДВО):																							
M10	Модуль личностных компетенций																							
3.1.	24-0-B-KV-DVO-SO	Служение обществу	30	1	1		30		10		5	15	1											ТС
	24-0-B-KV-DVO-BK	Бизнес коммуникации																						
	ИТОГО ПО ТЕОРЕТИЧЕСКОМУ КУРСУ ОБУЧЕНИЯ (ТКО):		6990	233	62	0	6990	480	1090	70	721	4269	25	29	26	27	26	28	27	27	18			
4.	24-0-B-VK-IA	ИТОГОВАЯ АТТЕСТАЦИЯ	240	8																	8			ТС
	ИТОГО ЗА ВЕСЬ ПЕРИОД ОБУЧЕНИЯ:		7230	241	62	0	6990	480	1090	70	721	4269	25	29	26	27	26	28	27	27	26			

СОГЛАСОВАНО:

И.о. Проректора по АД _____ Коджабергенова А.К.

РАЗРАБОТАНО:

Директор института ТиС _____ Абдрешов Ш.А.

Заведующая кафедрой ТС _____ Карибаева Г.Б.

First deputy director for operations of the branch of «NC «Kazakhstan railways» JSC – «Almaty branch of the backbone network»

_____ A.R. Duyseev

«___» 03 2025

Director of the institute of Transport and construction of «M. Tynyshpayev ALT University» JSC

_____ Sh.A. Abdreshov

«19» 03 2025

8. CATALOGUE OF UNIVERSITY COMPONENT DISCIPLINES

EDUCATIONAL PROGRAM **6B07336 – Railway construction**

Education level: bachelor's degree **Duration of study: 3 years** **Year of admission: 2025**

Cycle	Component	Discipline name	Total workload		Trimester	Learning outcomes	Brief description of the discipline	Prerequisites	Postrequisites
			in academic hours	in academic credits					
1	2	3	4	5	6	7	8	9	10
BD	VK	Engineering mathematics 1	150	5	1	LO1	The discipline "Engineering mathematics 1" studies the basic concepts of higher mathematics and its applications. The course sections include elements of linear algebra and analytical geometry, an introduction to mathematical analysis, and differential calculus of functions of one and several variables. The purpose of the course is to master the mathematical apparatus for solving theoretical and applied problems of a specific profile, to gain an understanding of mathematical modeling, and to develop analytical and systems thinking, which makes it possible to effectively solve engineering problems. The discipline uses interactive teaching methods and performing computational and graphical work.	Basic school knowledge in mathematics	Engineering mathematics 2, Construction chemicals, Information and communication technologies, Information modeling technology in architecture and construction, Digital inclusion, Basics of Python programming, Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Building materials, Final certification
BD	VK	Engineering mathematics 2	150	5	2	LO1	The formation of students' mathematical knowledge and skills necessary for the study of related natural science disciplines, disciplines	Basic school knowledge in mathematics, Engineering mathematics 1, Construction	Information and communication technologies, Information modeling technology in

							of the professional cycle and skills of mathematical modeling and research in professional activities. The course sections include integral calculus of functions of one and several variables, ordinary differential equations, and series theory. Special attention is paid to the application of mathematical methods to solve engineering problems.	physics, Engineering graphics and computer modeling, Theoretical mechanics, Fundamentals of classical mechanics	architecture and construction, Digital inclusion, Construction mechanics, Mechanics of structural strength, Final certification
BD	VK	Construction physics	150	5	1	LO1	Formation of knowledge, skills and competencies necessary for the development, design and operation of energy-efficient, comfortable and durable buildings and structures. Studies the physical processes and phenomena occurring in building structures and buildings, as well as their interaction with the environment, the basics of building and architectural acoustics, building climatology, lighting engineering, thermal engineering.	Basic school knowledge in physics	Engineering mathematics 2, Construction chemicals, Building materials, Information and communication technologies, Information modeling technology in architecture and construction, Digital inclusion, Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Final certification
BD	VK	Construction chemicals	120	4	2	LO1	The formation of knowledge in the field of building chemistry is associated with the development of science and technology aimed at improving building materials and their application processes. Construction chemistry studies and develops chemical materials, mixtures, and substances that affect the properties of building structures, ensuring their strength, durability, resistance to external influences, and energy efficiency.	Basic school knowledge of chemistry, Engineering mathematics 1, Construction physics	Building constructions, Geology and soil mechanics, Geoinformation systems in geology, Bases and foundations, Geotechnics in foundation engineering, Hydraulics, hydrology, hydrometry, Hydraulic engineering calculations and measurements, Environmentally sustainable technologies, Occupational safety and health, Final certification
BD	VK	Engineering geodesy	180	6	3	LO4,5	Forms professional competencies that determine the readiness and ability of the bachelor to use basic knowledge in the field of geodesy, allows you to make geodetic measurements related to the solution of typical construction tasks, a detailed layout of structures, to control the geometric shapes of the erected structure, perform executive surveying results of individual stages of	Engineering graphics and computer modeling, Basics of Python programming	Fundamentals of railway design, Railway surveys and design, Reconstruction of railways, Computer-aided design of railways, Automated railway track design systems, Information modeling technology in architecture and construction, Final certification

							construction and installation work, gives skills for the application of basic geodetic instruments for specific production conditions.		
BD	VK	Building materials	180	6	2	LO2,3	Apply modern building materials, demonstrate the main indicators of quality, modern methods of production of building materials for the transport industry, the main laws and dependence on the physical and mechanical properties, production technology and conditions of formation, methods of finishing, mastering technological processes of construction production, production of building materials, products and structures on the artificial structures under construction..	Engineering mathematics 1, Construction physics	Building constructions, Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Geology and soil mechanics, Geoinformation systems in geology, Bases and foundations, Geotechnics in foundation engineering, Railway track 1,2,3, Bridges and tunnels on railways, Artificial structures on railways, Final certification
BD	VK	Building constructions	120	4	4	LO2,3	The discipline studies the design, analysis and application of various types of structures such as buildings, bridges and transport structures. It covers materials, mechanical properties and strength calculation methods. Knowledge in this area is necessary to create safe and sustainable facilities that meet modern standards and requirements.	Construction chemicals, Building materials, Theoretical mechanics, Fundamentals of classical mechanics, Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength	Bases and foundations, Geotechnics in foundation engineering, Railway track 1,,2,3, A seamless path, Bridges and tunnels on railways, Artificial structures on railways, Final certification
BD	VK	Occupational health and safety	150	5	8	LO7,11	Formation of knowledge and skills necessary to ensure safe working and living conditions. The legal and organizational foundations of occupational safety, methods of occupational risk assessment and management, means of individual and collective protection, emergency prevention, as well as measures to prevent injuries and occupational diseases are studied. Special attention is paid to the creation of a safe working environment, compliance with labor protection standards and requirements, as well as the formation of a safety culture in professional activities.	Construction chemicals, Environmentally sustainable technologies, Green economy and sustainable entrepreneurship, Railway construction technology, Technological processes of railway construction, Production practice 1	Maintenance and repair of railway track 2, Railway track diagnostics, Monitoring of the technical condition of the railway track, Production practice 2/ Pre-graduate practice, Final certification
BD	VK	Engineering graphics	120	4	1	LO4	The course covers the principles of technical	Basic school knowledge in	Engineering mathematics 2,

		and computer modeling					drawing and engineering graphics, as well as modern 3D modeling methods using specialized software, aimed at developing skills in designing and visualizing technical objects, creating digital models and diagrams, drafting, modeling structures, and analyzing their parameters for solving engineering problems.	mathematics, drawing and computer science	Engineering geodesy, Educational practice (geodetic), Information and communication technologies, Digital inclusion, Fundamentals of railway design, Railway surveys and design, Final certification
BD	VK	Basics of Python programming	90	3	2	LO4	The discipline studies the syntax and semantics of the Python language, algorithmization and program design, program structuring and solving problems related to artificial intelligence, learns machine learning, data processing and intelligent system development methods, and analyzes the use of AI in various fields, forming professional competencies in programming and the basics of artificial intelligence.	Engineering mathematics 1	Engineering geodesy, Educational practice (geodetic), Information and communication technologies, Digital inclusion, Computer-aided design of railways, Automated railway track design systems, Information modeling technology in architecture and construction, Final certification
BD	VK	Professionally oriented foreign language	90	3	6	LO9	Formation and development of professional communicative competence in a foreign language necessary for professional activity, proficiency in a professional foreign language for written and oral information exchange, development of skills in reading and understanding professional literature on their specialty in a foreign language, development of the ability to express their thoughts orally and in writing in situations of professional and business communication.	The history of Kazakhstan, Kazakh (russian, foreign) language, Physical culture, Sociology, Cultural studies, Psychology, Basics of law and anti-corruption culture, Environmentally sustainable technologies, Green economy and sustainable entrepreneurship, Fundamentals of financial literacy	Minor program 2, Final certification
BD	VK	Educational practice (geodetic)	60	2	3	LO4,5	Educational practice (geodesy) is a key stage of education for students of architectural, construction and related specialties. It is aimed at consolidating theoretical knowledge in the discipline of Engineering Geodesy and acquiring practical skills in working with geodetic instruments and processing the data obtained.	Engineering graphics and computer modeling, Basics of Python programming	Fundamentals of railway design, Railway surveys and design, Reconstruction of railways, Computer-aided design of railways, Automated railway track design systems, Information modeling technology in architecture and construction, Final certification
PD	VK	Fundamentals of	150	5	4	LO	This discipline covers the basic principles	Information and	Railway surveys and design,

		railway design				4,5,10	and methods of designing railway lines and junctions, including route determination, the development of plans and profiles, calculations of the earthwork and artificial structures, as well as the fundamentals of construction process organization, ensuring an understanding of the key stages in the creation of railway infrastructure.	communication technologies, Engineering graphics and computer modeling, Engineering geodesy, Educational practice (geodetic)	Reconstruction of railways, Computer-aided design of railways, Automated railway track design systems, Railway track 1,2,3, Bridges and tunnels on railways, Artificial structures on railways, Managerial economics, Time management, Estimated pricing in architecture and construction, Minor program 1,2, Final certification
PD	VK	Railway surveys and design	150	5	5	LO 4,5,10	Studies the discipline as a basis for research and development of road projects in accordance with the SNiP for this category of road, the main operational and energy indicators of the railway route laid on the map in horizontal lines with the placement of artificial structures and the choice of a rational line option using computer technology (Excel, AutoCAD).	Engineering graphics and computer modeling, Engineering geodesy, Educational practice (geodetic), Fundamentals of railway design	Railway track 2,3, Reconstruction of railways, Computer-aided design of railways, Automated railway track design systems, Railway construction technology, Technological processes of railway construction, Managerial economics, Time management, Estimated pricing in architecture and construction, Regulatory and technical documentation in railway construction and track facilities, Minor program 1,2, Production practice 1, Production practice 2/ Pre-graduate practice, Final certification
PD	VK	Reconstruction of railways	150	5	6	LO 4,5,10	Studying the main technical parameters and means of technical equipment, the plan and profile of an existing railway line, their reconstruction to comply with building codes and regulations when increasing train speeds and traffic volume, with the selection of a phased capacity expansion scheme for the	Engineering geodesy, Educational practice (geodetic), Fundamentals of railway design, Railway track 1, Railway surveys and design	Railway track 3, Computer-aided design of railways, Automated railway track design systems, Minor program 1,2, Production practice 1, Production practice 2/ Pre-graduate practice, Final

							railway based on economic and technical indicators.		certification
PD	VK	Railway track 1	150	5	5	LO 2,3,10	The discipline studies the purpose of the railway track and its elements, the requirements for the track depending on the classification of lines, as well as the design and features of rails, sleepers, fasteners and ballast layer. The geometrical parameters of the track, types of materials and elements of the upper structure of the track are considered.	Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Building materials, Building constructions, Fundamentals of railway design	Hydraulics, hydrology, hydrometry, Hydraulic engineering calculations and measurements, Railway track 2,3, A seamless path, Bridges and tunnels on railways, Artificial structures on railways, Reconstruction of railways, Railway construction technology, Technological processes of railway construction, Organization and planning of railway construction, Organization of construction production, Maintenance and repair of railway track 1,2, Minor program 1,2, Production practice 1, Production practice 2/ Pre-graduate practice, Final certification
PD	VK	Railway track 2	150	5	6	LO 2,3,10	The discipline studies the classification of junctions and intersections of rail tracks, the purpose and design of switches, their elements, materials and manufacturing technology. The requirements for the elements, work under load, design principles, standards and tolerances for content, as well as the areas of application of various types of switches are considered.	Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Building materials, Building constructions, Railway track 1, Fundamentals of railway design, Railway surveys and design	Railway track 3, A seamless path, Bridges and tunnels on railways, Artificial structures on railways, Railway construction technology, Technological processes of railway construction, Organization and planning of railway construction, Organization of construction production, Maintenance and repair of railway track 1,2, Minor program 1,2, Production practice 1, Production practice

									2/ Pre-graduate practice, Final certification
PD	VK	Railway track 3	150	5	7	LO 2,3,10	Studying the main technical parameters and means of technical equipment, the plan and profile of an existing railway line, their reconstruction to comply with building codes and regulations when increasing train speeds and traffic volume, with the selection of a phased capacity expansion scheme for the railway based on economic and technical indicators.	Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Building materials, Building constructions, Geology and soil mechanics, Geoinformation systems in geology, Bases and foundations, Geotechnics in foundation engineering, Fundamentals of railway design, Railway track 1,2, Railway surveys and design, Reconstruction of railways, Production practice 1	Organization and planning of railway construction, Organization of construction production, Maintenance and repair of railway track 1,2, Minor program 2, Production practice 2/ Pre-graduate practice, Final certification
PD	VK	A seamless path	150	5	7	LO 2,3,10	This discipline studies the design and operational features of seamless railway tracks, examining their advantages and disadvantages, laying and repair technologies, as well as issues of ensuring track stability and interaction with rolling stock.	Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Building materials, Building constructions, Railway track 1,2, Production practice 1	Maintenance and repair of railway track 1,2, Minor program 2, Production practice 2/ Pre-graduate practice, Final certification
PD	VK	Maintenance and repair of railway track 1	180	6	8	LO 8,10,11	The discipline is designed to study the main components of the track management system, the classification of tracks depending on operational parameters, operating conditions of the railway track, the nature of deformations occurring in it, a systematic approach to analyzing the actual condition of the railway track and its additional facilities, taking into account the operational parameters of the railway line section.	Hydraulics, hydrology, hydrometry, Hydraulic engineering calculations and measurements, Railway track 1,2,3, A seamless path, Bridges and tunnels on railways, Artificial structures on railways, Railway construction technology, Technological processes of railway	Railway track diagnostics, Monitoring of the technical condition of the railway track, Minor program 3, Production practice 2/ Pre-graduate practice, Final certification

								construction, Production practice 1	
PD	VK	Maintenance and repair of railway track 2	150	5	9	LO 8,10,11	The discipline is designed to study the theoretical foundations and modern progressive technologies of track repair, types of railway track repairs, methods of designing technological processes for certain types of track repair and complex complexes of railway track repairs, methods of calculating the needs for material, technical and labor resources for railway track maintenance and repair.	Hydraulics, hydrology, hydrometry, Hydraulic engineering calculations and measurements, Railway track 1,2,3, A seamless path, Bridges and tunnels on railways, Artificial structures on railways, Railway construction technology, Technological processes of railway construction, Track, construction machinery and equipment, Machines and mechanisms in the travel industry, Occupational safety and health, Regulatory and technical documentation in railway construction and track facilities, Minor program 2, Production practice 1	Final certification, Basic and profile disciplines of the master's degree
PD	VK	Production practice 1	150	5	6	LO 5,7,8,10	The main objectives of industrial practice 1 are: consolidation of theoretical knowledge and practical skills in the chosen educational program in an industrial environment, acquisition of organizational work experience, obtaining a working specialty, formation of practical skills and competencies in the process of mastering the bachelor's program. It is conducted in the practice bases at enterprises according to this educational program.	Railway track 1,2, Railway surveys and design, Reconstruction of railways	Maintenance and repair of railway track 1,2, Occupational safety and health, Regulatory and technical documentation in railway construction and track facilities, Production practice 2 / Pre-graduate practice, Final certification
PD	VK	Production practice 2 / Pre-graduate practice	150	5	9	LO 5,7,8,10	The purpose of the 2 / Pre-graduate internship for bachelors is to ensure the relationship between the theoretical	Railway track 1,2,3, A seamless path, Railway surveys and design, Reconstruction of	Maintenance and repair of railway track 1, Final certification

							knowledge gained during the assimilation of the chosen educational program and practical activities. The objectives of this practice are to consolidate and deepen the theoretical knowledge acquired by students in during the learning process, collecting information for writing a final qualifying thesis, studying best practices at the enterprise, as well as gaining experience in independent research, mastering various methods of scientific work. It is conducted in the practice bases at enterprises according to this educational program.	railways, Occupational safety and health, Regulatory and technical documentation in railway construction and track facilities, Production practice 1	
PD	VK	FINAL CERTIFICATION	240	8	9	LO1-LO11	The objectives of the thesis are to identify the degree of assimilation by the bachelor of the content of the educational program, to check his readiness for independent activity in the direction of the educational program, to consolidate and deepen practical work skills. A comprehensive exam is also provided.		
		Total:	**3480**	**116**					

Head of the department of «Transport construction» **G.B. Karibaeva**

First deputy director for operations of the branch of «NC «Kazakhstan railways» JSC – «Almaty branch of the backbone network»

_____ A.R. Duyseev

«19» 03 2025

Director of the institute of Transport and construction of «M. Tynyshpayev ALT University» JSC

_____ Sh.A. Abdreshov

«19» 03 2025

9. CATALOGUE OF ELECTIVE COMPONENT DISCIPLINES

EDUCATIONAL PROGRAM **6B07336 – Railway construction**

Education level: bachelor's degree **Duration of study: 3 years** **Year of admission: 2025**

Cycle	Component	Discipline name	Total workload		Trimester	Learning outcomes	Brief description of the discipline	Prerequisites	Postrequisites
			in academic hours	in academic credits					
1	2	3	4	5	6	7	8	9	10
GES	KV	Environmentally sustainable technologies	150	5	5	LO6,7	The discipline "Environmentally sustainable technologies" studies modern methods and innovative solutions aimed at minimizing the negative impact of human activities on the environment. The course examines the principles of sustainable development, energy-saving technologies, renewable energy sources, waste management strategies, and environmentally sound production processes.	The history of Kazakhstan, Kazakh (russian, foreign) language, Sociology, Cultural studies, Construction chemicals	Philosophy, Political science, Professionally oriented foreign language, Occupational safety and health, Final certification
		Green economy and sustainable entrepreneurship				LO6	The discipline "Green Economy and Sustainable Entrepreneurship" is devoted to the study of environmentally oriented economic models and business strategies aimed at sustainable development. The course examines the concepts of the green economy, ESG (Environmental, Social, Governance) approaches, circular economy, sustainable business models and their impact on global markets.	The history of Kazakhstan, Kazakh (russian, foreign) language, Sociology, Cultural studies	Philosophy, Political science, Professionally oriented foreign language, Managerial economics, Time management, Estimated pricing in architecture and construction, Occupational safety and health, Organization and planning of railway construction, Organization of construction production, Final certification
		Fundamentals of financial literacy				LO5,6	The discipline is aimed at developing the ability to make informed financial decisions,	The history of Kazakhstan, Kazakh (russian, foreign)	Philosophy, Political science, Professionally oriented foreign

							plan income and expenditures, assess risks and effectively manage their resources in a market economy. It studies the basic knowledge in the sphere of finance and rational management of monetary resources, the concepts of financial system, budget, banking products, crediting, savings, investments, insurance, taxation and protection against financial fraud are considered.	language, Sociology, Cultural studies	language, Managerial economics, Time management, Estimated pricing in architecture and construction, Organization and planning of railway construction, Organization of construction production, Final certification
		Digital inclusion				LO4	The discipline "Digital Inclusion" is devoted to the study of the principles of ensuring equal access to digital technologies and information for all social groups, including people with disabilities. The course examines barriers to digital inequality, strategies for overcoming them, technologies for adapting the digital environment, and government initiatives to develop an inclusive digital society.	Engineering mathematics 1,2, Construction physics, Information and communication technologies, Basics of Python programming, Engineering graphics and computer modeling	Information modeling technology in architecture and construction, Final certification
		Basics of law and anti-corruption culture				LO9	The discipline outlines the fundamental concepts of law, the constitutional structure of the state power of the Republic of Kazakhstan, the rights and freedoms of citizens enshrined in the Constitution, the mechanism and protection of legitimate human interests in case of their violation. The discipline forms students' improvement of public and individual legal awareness and legal culture, as well as a system of knowledge and citizenship on combating corruption as an antisocial phenomenon.	The history of Kazakhstan, Kazakh (russian, foreign) language, Sociology, Cultural studies	Philosophy, Political science, Professionally oriented foreign language, Final certification
BD	KV	Theoretical mechanics	120	4	1	LO1,2	Formation of scientific engineering thinking. To familiarize with the basic concepts, laws and theorems that make it possible to compose equations describing the behavior of mechanical systems, the ability to record a specific phenomenon in mathematical form, the use of basic methods of mechanics in the study of motion and equilibrium of mechanical systems in the study of	Basic school knowledge in mathematics and physics	Engineering mathematics 2, Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Building constructions, Final certification

							disciplines of the professional cycle.		
		Fundamentals of classical mechanics				LO1,2	The discipline aims to develop skills in solving problems and the ability to analyze and solve tasks in the field of statics and dynamics of rigid bodies and oscillatory motion, studying the main mathematical models used in theoretical mechanics, kinematic characteristics of the motion of material points and systems, solving statics problems using equilibrium conditions of force systems, and dynamics based on Newton's second law with the application of fundamental theorems of dynamics.	Basic school knowledge in mathematics and physics	Engineering mathematics 2, Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Building constructions, Final certification
BD	KV	Resistance of materials	150	5	2	LO1,2	Formation of fundamental knowledge in the field of calculations of structural elements for strength, stiffness and stability, mastering the calculation and experimental foundations and practical methods of calculation of structures under the condition of reliability, durability, efficiency, considering the mechanical properties of structural materials and the ability to design by strength criteria correctly evaluating the limiting state, conducting verification and design calculations, using modern educational and information technology.	Engineering mathematics 1, Construction physics, Theoretical mechanics, Fundamentals of classical mechanics	Construction mechanics, Mechanics of structural strength, Building constructions, , Railway track 1,2,3, A seamless path, Bridges and tunnels on railways, Artificial structures on railways, Final certification
		Applied mechanics				LO1,2	This discipline develops practical skills in applying the laws of theoretical mechanics and strength of materials to calculate the strength, stiffness, and stability of machine elements and engineering structures, as well as to analyze their motion and interaction under various types of loads, with the aim of further designing reliable and efficient technical systems.	Engineering mathematics 1, Construction physics, Theoretical mechanics, Fundamentals of classical mechanics	Construction mechanics, Mechanics of structural strength, Building constructions, , Railway track 1,2,3, A seamless path, Bridges and tunnels on railways, Artificial structures on railways, Final certification
BD	KV	Construction mechanics	150	5	3	LO1,2	Formation of skills in designing standard structures related to the choice of a design scheme, determining the most loaded structural elements and calculating internal	Engineering mathematics 1,2, Construction physics, Theoretical mechanics, Fundamentals of classical	Building constructions, Railway track 1,2,3, A seamless path, Bridges and tunnels on railways, Artificial structures

							forces and stresses. Studies methods for calculating forces in statically definable and indeterminate rod systems under the action of constant and temporary loads, determining displacement in rod systems to ensure the strength and reliability of structures in combination with high efficiency.	mechanics, Resistance of materials, Applied mechanics, Building materials	on railways, Minor program 1, Final certification
		Mechanics of structural strength				LO1,2	Formation of skills in the field of work analysis and calculation of structures made of various materials under various influences using modern computing equipment. Studies the features of the laws of stress and strain distribution in structural elements under various conditions of external load, principles and methods of static and dynamic calculation of engineering structures for strength, rigidity, stability.	Engineering mathematics 1,2, Construction physics, Theoretical mechanics, Fundamentals of classical mechanics, Resistance of materials, Applied mechanics, Building materials	Building constructions, Railway track 1,2,3, A seamless path, Bridges and tunnels on railways, Artificial structures on railways, Minor program 1, Final certification
BD	KV	Geology and soil mechanics	150	5	4	LO3	The discipline studies the basic principles and methods of geology necessary for assessing geological and hydrogeological conditions during the design, construction and operation of engineering structures, including the assessment of the physical and mechanical properties of soils and rocks, as well as the influence of geological factors on the construction and operation of facilities.	Construction chemicals, Building materials	Bases and foundations, Geotechnics in foundation engineering, Hydraulics, hydrology, hydrometry, Hydraulic engineering calculations and measurements, Railway track 3, Bridges and tunnels on railways, Artificial structures on railways, Final certification
		Geoinformation systems in geology				LO3,5	He studies geographic information systems (GIS) in geology, describes methods for processing and analyzing geospatial data. The application of GIS for mapping, modeling and forecasting of geological processes is considered.	Construction chemicals, Building materials	Bases and foundations, Geotechnics in foundation engineering, Hydraulics, hydrology, hydrometry, Hydraulic engineering calculations and measurements, Railway track 3, Bridges and tunnels on railways, Artificial structures on railways, Final certification
BD	KV	Bases and foundations	150	5	5	LO3	Formation of knowledge about the basic laws of soil behavior under load, the theory of	Construction chemicals, Building materials, Building	Hydraulics, hydrology, hydrometry, Hydraulic

							stress-strain state and their interaction with structures. Studies the main methods for determining the sediment of foundations, the stability of slopes and slopes, as well as the morphology, dynamics and regional features of the upper horizons of the Earth's crust (lithosphere) and their relationship with engineering structures	constructions, Geology and soil mechanics, Geoinformation systems in geology	engineering calculations and measurements, Railway track 3, Bridges and tunnels on railways, Artificial structures on railways, Final certification
		Geotechnics in foundation engineering				LO3	Formation of knowledge about the basic laws of soil behavior under load, the theory of stress-strain state and their interaction with structures. He studies the basic methods for determining the sedimentation of foundations, the stability of slopes and slopes, as well as the morphology, dynamics and regional features of the upper horizons of the Earth's crust (lithosphere) and their relationship with engineering structures. It is important to correctly determine the physical, mechanical, and hydrological properties of the soils at the construction site (density, strength, subsidence, groundwater level, seismic activity, and other characteristics).	Construction chemicals, Building materials, Building constructions, Geology and soil mechanics, Geoinformation systems in geology	Hydraulics, hydrology, hydrometry, Hydraulic engineering calculations and measurements, Railway track 3, Bridges and tunnels on railways, Artificial structures on railways, Final certification
BD	KV	Hydraulics, hydrology, hydrometry	120	4	7	LO3	The course of the discipline "Hydraulics, hydrology, hydrometry" includes the study of the movement and equilibrium of liquids, the laws and characteristics of their manifestation, water processes and modes of water flows, methods for determining water parameters. The theoretical set of knowledge is applicable in the design of transport structures, as well as in hydraulic engineering construction.	Construction chemicals, Geology and soil mechanics, Geoinformation systems in geology, Bases and foundations, Geotechnics in foundation engineering, Railway track 1	Maintenance and repair of railway track 1,2, Final certification
		Hydraulic engineering calculations and measurements				LO3	The discipline "Hydraulic calculations and measurements" studies methods for calculating water flow rates, head, filtration and stability of culverts in the design of transport structures. The course covers	Construction chemicals, Geology and soil mechanics, Geoinformation systems in geology, Bases and foundations, Geotechnics in	Maintenance and repair of railway track 1,2, Final certification

							methods for measuring hydrological characteristics, analysis of field studies, modeling of processes in river beds, calculation of culverts and protective structures.	foundation engineering, Railway track 1	
BD	KV	Managerial economics	90	3	6	LO6	Formation of the conceptual apparatus and development of skills of economic analysis using modern models and patterns of economic science, consideration of economic problems and challenges facing the head of the firm. The study of this discipline will allow students to obtain and develop knowledge in the field of analytical research of economic, technological and technical parameters of the enterprise, as well as allow you to master the skills of using special methods of economic justification of management decisions and assessment of their consequences.	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Fundamentals of railway design, Railway surveys and design	Estimated pricing in architecture and construction, Organization and planning of railway construction, Organization of construction production, Final certification
		Time-management				LO6	The discipline studies a system of methods, tools and approaches that are aimed at effective time management in order to achieve set goals. The course is designed to improve skills in organizing and optimizing the use of working time, increasing productivity, reducing stress, planning, delegation, using tools and technologies, as well as knowing your time and energy rhythms in order to use your time effectively.	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Fundamentals of railway design, Railway surveys and design	Estimated pricing in architecture and construction, Organization and planning of railway construction, Organization of construction production, Final certification
PD	KV	Computer-aided design of railways	120	4	8	LO4	This discipline studies the application of modern computer technologies and software for the design, planning, and management of railway infrastructure, being a key part of educational programs related to transport construction.	Basics of Python programming, Engineering geodesy, Educational practice (geodetic), Fundamentals of railway design, Railway surveys and design, Reconstruction of railways, Minor program 1	Final certification, Basic and profile disciplines of the master's degree
		Automated railway track design systems				LO4	The discipline studies specialized software systems used to automate the design and calculation of railway tracks and	Basics of Python programming, Engineering geodesy, Educational practice (geodetic),	Final certification, Basic and profile disciplines of the master's degree

							infrastructure elements, allowing to speed up design processes, increase accuracy, reduce errors, and apply modern CAD systems both for new projects and to optimize existing solutions.	Fundamentals of railway design, Railway surveys and design, Reconstruction of railways, Minor program 1	
PD	KV	Bridges and tunnels on railways	120	4	7	LO 2,3,10	Purpose of the discipline is to form knowledge on acquiring skills in the maintenance and repair of bridges and tunnels on railways. Studies regulatory and technical documents, guidelines, various calculation methods for bridge and tunnel structures, ways to maintain them, defects and deformations of bridges and tunnels, and individual parts of structures to eliminate them to ensure uninterrupted operation of the line.	Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Geology and soil mechanics, Geoinformation systems in geology, Bases and foundations, Geotechnics in foundation engineering, Building materials, Building constructions, Fundamentals of railway design, Railway track 1,2	Maintenance and repair of railway track 1,2, Final certification
		Artificial structures on railways				LO 2,3,10	This discipline includes the study of various structures and facilities that ensure the functioning of the railway track and infrastructure, which play a key role in ensuring the safety, reliability, and durability of railway transportation.	Resistance of materials, Applied mechanics, Construction mechanics, Mechanics of structural strength, Geology and soil mechanics, Geoinformation systems in geology, Bases and foundations, Geotechnics in foundation engineering, Building materials, Building constructions, Fundamentals of railway design, Railway track 1,2	Maintenance and repair of railway track 1,2, Final certification
PD	KV	Track, construction machinery and equipment	120	4	8	LO8	The purpose of the discipline is to study the structures of track and construction machinery and equipment. Forms knowledge on the technical capabilities of small-scale mechanization, energy supply of track and construction, loading and unloading machines and mechanisms when used for updating, repairing and current maintenance	Railway construction technology, Technological processes of railway construction	Maintenance and repair of railway track 2, Final certification

							of the upper structure of the track and small artificial structures.		
		Machines and mechanisms in the travel industry				LO8	The purpose of the discipline: to prepare students for production activities in the field of mechanization and automation of repair, construction and current maintenance of railway tracks using track machines and mechanisms, the study of types, technical and dimensional parameters and design of track machines and mechanisms, their scope of application	Railway construction technology, Technological processes of railway construction	Maintenance and repair of railway track 2, Final certification
PD	KV	Railway construction technology	180	6	7	LO 7,8,10	The study of the basic principles of technology and mechanization of railway construction, the composition of construction works and processes, methods of designing and developing technological processes for the construction of railway tracks, laying tracks, ballasting tracks, and the construction of contact network supports for electrified sections of the backbone network.	Railway surveys and design, Railway track 1,2	Occupational safety and health, Organization and planning of railway construction, Organization of construction production, Maintenance and repair of railway track 1,2, Track, construction machinery and equipment, Machines and mechanisms in the travel industry, Regulatory and technical documentation in railway construction and track facilities, Minor program 2, Final certification
		Technological processes of railway construction				LO 7,8,10	The discipline studies the technological processes performed during the construction of railways, methods and means for the effective performance of work, including preparation, laying of tracks, construction of structures, organization, planning, control of construction operations, as well as safety and compliance with regulatory requirements.	Railway surveys and design, Railway track 1,2	Occupational safety and health, Organization and planning of railway construction, Organization of construction production, Maintenance and repair of railway track 1,2, Track, construction machinery and equipment, Machines and mechanisms in the travel industry, Regulatory and technical documentation in railway construction and track facilities, Minor program 2, Final certification

PD	KV	Organization and planning of railway construction	150	5	8	LO 7,8,10,11	The discipline studies advanced technologies and the organization of construction and installation works aimed at reducing material and energy costs while complying with standards and technical regulations. The stages of preparatory and basic work, the procedure for putting facilities into operation, as well as the calculation of resource requirements and the timing of its provision are considered.	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time management, , Railway track 1,2,3, Railway construction technology, Technological processes of railway construction	Estimated pricing in architecture and construction, Minor program 3, Final certification
		Organization of construction production				LO 7,8,10,11	The formation of students' professional skills on the basic principles and methods of organizing road works, organizational and technical training and calendar planning of road works, as well as gaining knowledge in the field of production and economic activities of enterprises when choosing rational options for organizational and planning solutions that ensure increased economic efficiency of production. Studies the principles and methods of project management, time control and planning, and resource allocation.	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time management, , Railway track 1,2,3, Railway construction technology, Technological processes of railway construction	Estimated pricing in architecture and construction, Minor program 3, Final certification
PD	KV	Railway track diagnostics	150	5	9	LO8,10	This discipline studies the methods and technologies for assessing the condition of railway infrastructure, covering aspects of technical diagnostics of tracks, flaw detection, as well as the analysis of the condition of various elements of the railway track to ensure its safety and reliability.	Maintenance and repair of railway track 1, Occupational safety and health, Minor program 1,2	Final certification, Basic and profile disciplines of the master's degree
		Monitoring of the technical condition of the railway track				LO8,10	The discipline studies methods and tools for assessing the condition of the railway track, identifying defects, and predicting its reliability. It covers visual and instrumental inspection methods, track maintenance standards, and the planning of repair works to ensure the safe movement of trains.	Maintenance and repair of railway track 1, Occupational safety and health, Minor program 1,2	Final certification, Basic and profile disciplines of the master's degree

Infrastructure programs module / Additional educational program module									
PD	KV	Information modeling technology in architecture and construction	90	3	7	LO4	The purpose of the course "Information Modeling Technology in Architecture and Construction" is to provide students with the basics of theoretical and practical knowledge and skills in the use of information modeling technologies (BIM) used in the design, construction and operation of buildings and transport facilities, as well as to improve the effectiveness of interaction between participants in the construction process.	Engineering mathematics 1,2, Construction physics, Information and communication technologies, Digital inclusion, Engineering graphics and computer modeling, Basics of Python programming, Engineering geodesy, Educational practice (geodetic)	Final certification, Basic and profile disciplines of the master's degree
		Minor program 1				LO1,4	The first of the three disciplines, which allows you to form additional professional competencies in various subject areas.	Construction mechanics, Mechanics of structural strength, Railway track 1,2, Fundamentals of railway design, Railway surveys and design, Reconstruction of railways	Computer-aided design of railways, Automated railway track design systems, Railway track diagnostics, Monitoring of the technical condition of the railway track
PD	KV	Regulatory and technical documentation in railway construction and track facilities	90	3	8	LO 5,7,8,10	This discipline studies the system of standards, norms, and rules governing the design, construction, repair, and maintenance of railway tracks and related structures, with particular attention paid to the study of GOSTs, SNiPs, technical specifications, and instructions that ensure the safety, reliability, and quality of railway infrastructure.	Railway surveys and design, Railway construction technology, Technological processes of railway construction, Production practice 1	Maintenance and repair of railway track 2, Production practice 2/ Pre-graduate practice, Final certification
		Minor program 2				LO 3,8,9	The second of the three disciplines, which allows you to form additional professional competencies in various subject areas.	Professionally oriented foreign language, Railway track 1,2,3, A seamless path, Fundamentals of railway design, Railway surveys and design, Reconstruction of railways, Railway construction technology, Technological processes of railway construction	Maintenance and repair of railway track 2, Railway track diagnostics, Monitoring of the technical condition of the railway track
PD	KV	Estimated pricing in architecture and construction	90	3	9	LO5,6	The purpose of the course is to determine the volume, cost, and complexity of the upcoming work, as well as to monitor the	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy,	Final certification, Basic and profile disciplines of the master's degree

							completion of work and the consumption of materials. The means of cost estimation are the current estimated regulatory documents of the Republic of Kazakhstan, which contain information on labor costs, the time of use of machines, mechanisms, necessary materials, products and structures, both in quantitative and monetary measures, distributed by type of work	Managerial economics, Time management, Fundamentals of railway design, Railway surveys and design, Organization and planning of railway construction, Organization of construction production	
		Minor program 3				LO8,10	The third of the three disciplines, which allows you to form additional professional competencies in various subject areas.	Organization and planning of railway construction, Organization of construction production, Maintenance and repair of railway track 1	Final certification, Basic and profile disciplines of the master's degree
		Total:	**2190**	**73**					

Head of the department of «Transport construction» **G.B. Karibaeva**

10. EXPERT OPINIONS

1) Expert opinion on the educational program 6B07336 – Railway construction

The educational program 6B07336 – Railway construction submitted for expert review is relevant. This is because it is aimed at training railway civil engineers who are capable of working in the context of digital transformation and sustainable development of the transport industry. The program's goal is to train highly qualified specialists in the field of surveying, design, construction, reconstruction, maintenance, and repair of railway tracks. This goal fully meets the modern requirements of the labor market and the strategic objectives for the development of transport infrastructure.

The competency model for the graduate is clearly structured and covers all key types of professional activity: production and technological, organizational and managerial, design and surveying, design and engineering.

The ability to use computer models with elements of artificial intelligence and considering the principles of digital inclusion reflects the transition to BIM technologies and automated design.

The integration of skills in financial and economic justification and compliance with the principles of ecologically sustainable development is critically important for project financing in accordance with international standards.

The focus on technical track diagnostics directly addresses the industry's need for specialists in the operation and maintenance of high-speed and high-traffic lines.

Analysis of the structure and content of the curriculum demonstrates a balanced combination of fundamental, general engineering, and specialized disciplines.

The specialist's fundamental training is ensured by mastering engineering mathematics, construction physics and chemistry, theoretical mechanics, strength of materials, and structural mechanics.

The specialist's profile training is based on studying sections on railway surveying and design, railway track structure, and the structures of bridges and tunnels on railways. This ensures a systemic understanding of the entire track infrastructure complex.

The inclusion of disciplines such as «Fundamentals of python programming», "Automated railway design" and "Information modeling technology in architecture and construction" provides the graduate with a competitive advantage in the labor market, corresponding to the "Virtual designer" concept.

The educational program 6B07336 – Railway construction has been developed at a high professional level. The content and learning outcomes fully comply with modern requirements for railway civil engineers. It is recommended for approval and implementation.

The expert,
First deputy director
for operations of the
branch of «National company
«Kazakhstan temir zholy» JSC
«Almaty magistral network department» **A.R. Duyseev**

2) Expert opinion on the educational program 6B07336 – Railway construction

The educational program 6B07336 – Railway construction demonstrates a complete focus on the practical needs of railway construction and track maintenance. Graduates will be able to occupy a wide range of in-demand engineering positions in the railway transport track infrastructure.

The functions of professional activity presented in the educational program cover a wide range of production areas.

The educational program includes the organization of design, construction, technical maintenance, and repair of the track.

The presence of functions for technical diagnostics of the railway track, the application of track-measuring and defectoscopy tools, has practical value in the current maintenance of the railway track.

Design and engineering functions include the development of design and technological documentation, calculation of track strength and stability, as well as the justification of technical solutions. This eliminates the need for lengthy additional training for young specialists in the workplace.

An analysis of practice-oriented training shows that the strong block of practical training, including educational (geodetic), industrial, and pre-diploma practices, is particularly approved.

Educational practice (geodetic) is aimed at obtaining practical skills in geodetic measurements using modern geoinformation systems, which is the basis for any surveying and construction work.

Industrial practice is aimed at obtaining skills in the practical use of professional knowledge, solving managerial tasks, and mastering professional ethics.

The program contains disciplines directly related to production: "Track, construction machines and equipment", "Railway construction technology", "Organization and planning of railway construction", "Technical maintenance and repair of railway track", "Diagnostics of railway track"

For maximum effectiveness of the educational program, close cooperation with railway enterprises is recommended for updating the topics of diploma works and providing bases for industrial practices.

The educational program 6B07336 – Railway construction fully meets the expectations and requirements of Employers in the field of transport construction. It ensures the training of specialists with the necessary engineering, managerial, and digital competencies.

The expert,
Head of the track department
of the branch of «National company
«Kazakhstan temir zholy» JSC
«Almaty magistral network department» **R.V. Nurbolat**

КАДРЛАР БӨЛІМІ
ОТДЕЛ КАДРОВ

11. REVIEWERS' CONCLUSIONS

1) Review of the educational program 6B07336 – Railway construction

The educational program 6B07336 – Railway construction submitted for review has a clear structure that corresponds to the State Compulsory Standard of Higher Education. The program volume is 240 academic credits over 3 years of study, which corresponds to modern trends in accelerated and intensive bachelor's training. The program is focused on forming a wide range of competencies: from fundamental engineering to specialized, digital, and socio-managerial.

Strong integration of digital skills is noted by the inclusion of disciplines such as "Information and Communication technologies", "Digital inclusion" and "Fundamentals of Python programming" in the basic cycle. This ensures the graduate's readiness to work with modern automated design systems and elements of artificial intelligence.

The disciplines of the general education, basic, and profiling cycles are clearly structured in a logical sequence.

The presence of minor programs 1,2,3, providing the opportunity to choose additional educational trajectories, allows students to form unique competencies. For example, they can delve into issues related to: information modeling technology in architecture and construction, regulatory and technical documentation, estimate pricing.

In the catalogs of university component and elective component disciplines, the disciplines are clearly separated to form competencies in the field of railway design, construction, and operation. The catalogs contain exhaustive descriptions of courses, prerequisites, and post-requisites, which is a high standard of methodological work.

The educational program 6B07336 – Railway construction is modern, methodologically sound, and meets all requirements for the training of bachelors in the field of transport construction. It demonstrates high potential for training competitive specialists and is recommended for implementation.

The reviewer,
Director of «GeoTrack» LLP **D.K. Nusupov**

2) Review of the educational program 6B07336 – Railway construction

The educational program 6B07336 – Railway construction submitted for review is distinguished by an innovative approach, integrating classical engineering knowledge with modules on "Green economy and sustainable entrepreneurship" and "Fundamentals of financial literacy". This is consistent with the global trend towards the greening and economic efficiency of infrastructure projects. The presence of disciplines "Managerial economics" and "Time management" directly targets the graduate for organizational and managerial activity, which is especially valued by Employers.

The engineering and technical content of the cycle of basic and profiling disciplines is logically constructed and ensures the formation of all necessary competencies for working with professional activity objects, which include the railway track, track infrastructure, and artificial structures.

It should be noted that the disciplines "Railway construction technology" and "Technological processes of railway construction" provide the graduate with knowledge of the full technological cycle of work performed.

The inclusion of the disciplines "Hydraulics, hydrology, hydrometry", "Geotechnics in foundation engineering" and "Diagnostics of railway track" guarantees that the graduate will be able to solve problems to ensure the durability and safety of transport structures.

The educational program is aimed at training personnel necessary for the implementation of large infrastructure projects. The learning outcomes – the ability to find a compromise between various requirements (cost, quality, safety) and to make optimal decisions – are key for a modern engineer-manager. The list of potential positions fully corresponds to the content of the educational program.

The educational program 6B07336 – Railway construction is competitive, innovative, and fully meets the current requirements of the labor market in the field of transport construction and is recommended for implementation in the educational process.

The reviewer,
Head of the Department
«Construction and construction materials» of Satbayev Kazakh national research technical university,
doctor of technical sciences, professor **S.B. Shayakhmetov**



12. LETTER OF RECOMMENDATION

Branch of «National company «Kazakhstan temir zholy» JSC –
«Almaty magistral network department»

«ALT University named
after M. Tynyshpayev» JSC

LETTER OF RECOMMENDATION

The branch of «National company «Kazakhstan temir zholy» JSC – «Almaty magistral network department» expresses full support and highly evaluates the bachelor's educational program 6B07336 – Railway construction, developed by JSC «ALT University named after Mukhamedzhan Tynyshpayev».

Our organization, being a regional structural subdivision of the magistral network of JSC «NC «KTZ», is in urgent need of highly qualified engineering personnel for the railway transport track infrastructure. We have carefully reviewed the content of the presented program and believe that it fully meets, and in a number of parameters, surpasses modern industry requirements.

Practical focus and completeness of competencies. The program trains specialists who possess competencies across the entire lifecycle of the railway track: from surveying and design to current maintenance and repair. The inclusion of disciplines such as "Diagnostics of railway track" and "Technical maintenance and repair of railway track" is critically important for ensuring the safety and reliability of the operational magistral network.

Innovativeness and digitalization. The industry is undergoing a digital transformation, and we need engineers who are proficient in modern technologies. The presence of modules on programming (Python), computer modeling, and automated design in the curriculum guarantees that graduates will be ready to work with geoinformation systems.

Readiness for managerial work. In addition to technical skills, the program forms managerial and economic competencies, including financial and economic justification and the organization of construction production. This allows the graduate to quickly adapt to positions such as work supervisor and mid-level manager.

Our organization confirms its readiness to accept students of this educational program for industrial and pre-diploma practices and to consider graduates as priority candidates for employment in key engineering positions.

Based on the foregoing, the educational program 6B07336 – Railway construction is recommended for approval and implementation in the educational process.

Director of the branch
of «National company
«Kazakhstan temir zholy» JSC –
«Almaty magistral network department» **A.T. Zheksembiyev**

13. PROTOCOLS OF CONSIDERATION AND APPROVAL

«ALT University named after Mukhamedzhan Tynyshpayev» JSC

PROTOCOL No. 1

of the meeting of the Academic committee for the educational program 6B07336 – Construction of railways, and leading lecturers of the «Transport construction» department

Almaty city «24» february 2025

Chairman: Chairman of the Academic committee for the educational program 6B07336 – Construction of railways, assistant professor Tulemissov T.Zh.
Secretary: assistant-lecturer Kusman B.K.
Were present:
Members of the Academic committee, leading faculty (PPS) of the department: Head of the «Transport construction» department, assistant professor Karibayeva G.B.; professors: Makhmetova N.M., Khasenov S.S.; associate professors: Bektanov B.K., Zhadrayev R.Zh., Ibraimov A.K., Bikhozhayeva G.S., Alimkulov M.M.; assistant-professors: Ismagulova S.O., Sansyzbayev K.K., Tulemissov T.Zh., Aukazhiyeva Zh.M., Kaipova A.Ye.; senior-lecturers: Ablyazova A.M., Imankulova A.S., Kunanbayev A.K.; assistant-lecturers: Kusman B.Q., Kenzebeva A.A., Ashimkhan N.M., Rymkul Ye.Ye.; specialist Dairanova A.A.
Employer Representative: Member of the Academic committee, master of production training of the Almaty track distance of the branch of «National company «Kazakhstan temir zholy» JSC – «Almaty magistral network department» Anarbekov N.N.
Student: Member of the Academic committee, student of group US-SZhD-23-1 Baybagys B.B.
Absent: assistant professor Shaimerdenova A.A.; senior-lecturers Pentayeva S.B., Kuandykov B.N.

AGENDA:

1. Review and update of the educational program 6B07336 – Construction of railways.
2. Consideration of the possibility of including disciplines in the Curriculum, in the Catalog of University component disciplines, and in the Catalog of elective component disciplines for the 2025 intake.

On the first issue:
HEARD: The Chairman of the Academic committee for the educational program 6B07336 – Construction of railways, Tulemissov T.Zh., who proposed discussing the review and update of the educational program 6B07336 – Construction of railways.

The Competency model of the graduate (Section 4) is an integral part of the educational program. It includes the following components:

- Objectives of the educational program;
- Learning Outcomes;
- Scope, objects, types, and functions of professional activity;
- List of specialist positions;
- Professional certificates received upon graduation (if provided);
- Requirements for the prior level of education.

The members of the Academic committee were asked to express their opinions.

SPOKE: The Employer Representative, Member of the Academic committee for the educational program 6B07336 – Construction of railways, master of production training of the Almaty track distance of the branch of «National company «Kazakhstan temir zholy» JSC – «Almaty magistral network department» Anarbekov N.N., who noted that the Competency model of the graduate for the educational program under consideration is relevant and meets the requirements of the labor market, and proposed to keep it without changes.
SPOKE: Members of the Academic committee for the educational program 6B07336 – Construction of railways: Ismagulova S.O., Imankulova A.S. and Beybagys B.B., who confirmed the relevance of the Competency model of the graduate for the educational program under consideration. It was proposed to keep the current Competency model of the Graduate for the educational program 6B07336 – Construction of railways without changes.

RESOLVED:

1. Approve the current Competency model of the graduate for the educational program 6B07336 – Construction of railways.
2. Submit the Competency model of the graduate for the educational program 6B07336 – Construction of railways for consideration at the meeting of the Educational and methodological bureau of the «Transport and construction» institute.

On the second issue:
HEARD: The Chairman of the Academic committee for the educational program 6B07336 – Construction of railways, Tulemissov T.Zh., who proposed discussing the inclusion of new disciplines in the Curriculum, in the Catalog of university component disciplines, and in the Catalog of elective component disciplines for the 2025 intake.
Proposals on the inclusion of new disciplines have been received on this issue. It is also proposed to reduce the period of study to three years under the educational program 6B07336 – Construction of railways. This step is aimed at: 1) Increasing attractiveness among applicants, "Saving time", students will receive diplomas faster and can start a career; 2) Reducing costs (reducing the number of academic years, reducing living expenses, tuition, etc.; 3) Increasing competitiveness (completing studies quickly, finding a job quickly); 4) The possibility of continuing education in the magistracy.
The Chairman of the Academic committee for the educational program 6B07336 – Construction of railways, Tulemissov T.Zh., announced the results of the received proposals and agreements with Employers, as set out in the expert opinions, reviews, and recommendation letter, and also announced the proposals of the faculty (professor-teaching staff) of the «Transport Construction» department and the students.
It is proposed to include the following disciplines in the curriculum and catalogs of the educational program 6B07336 – Construction of railways: «Fundamentals of Python Programming», «Digital inclusion», «Information modeling technology in architecture and construction», «Automated railway design», «Hydraulics, hydrology, hydrometry», «Geotechnics in foundation engineering», «Railway track», «Railway construction technology», «Railway track diagnostics», and «Technical maintenance and repair of railway track». Change the name of the discipline «Computer and engineering modeling» to «Engineering graphics and computer modeling».
SPOKE: The employer representative, member of the Academic committee for the educational program 6B07336 – Construction of railways, master of production training of the Almaty track distance of the branch of «National company «Kazakhstan temir zholy» JSC – «Almaty magistral network department» Anarbekov N.N., who noted the relevance and timeliness of introducing the listed disciplines into the curriculum of the educational program.
SPOKE: Member of the Academic committee, student of group US-SZhD-23-1 Baybagys B.B., who noted the particular relevance of introducing the proposed disciplines «Fundamentals of Python programming» and «Professionally-oriented foreign language».

RESOLVED:

1. Take the information into consideration.

2. Take into account the proposals and recommendations of the Employers and Students.

3. Include the following disciplines in the Curriculum, the Catalog of University component disciplines, and the Catalog of Elective component disciplines of the educational program 6B07336 – Construction of railways for the 2025 intake: «Fundamentals of Python Programming», «Digital inclusion», «Information modeling technology in architecture and construction», «Automated railway design», «Hydraulics, hydrology, hydrometry», «Geotechnics in foundation engineering», «Railway track», «Railway construction technology», «Railway track diagnostics», and «Technical maintenance and repair of railway track». Change the name of the discipline «Computer and engineering modeling» to «Engineering graphics and computer modeling».

4. After editing the proposed changes, transfer the Curriculum, the Catalog of university component disciplines, and the Catalog of elective component disciplines of the educational program 6B07336 – Construction of railways for the 2025 intake for consideration at the meeting of the Educational and methodological bureau of the «Transport and construction» institute.

Chairman **T.Zh. Tulemissov**

Secretary **B.K. Kusman**

«ALT University named after Mukhamedzhan Tynyshpayev» JSC

Institute of «Transport and construction»

PROTOCOL No. 8

of the meeting of the Educational and methodological bureau of the institute of «Transport and Construction»

Almaty city «17» march 2025

Chairman: Chairman of the Educational and methodological bureau of the institute «Transport and construction», doctor of PhD Abdreshov Sh.A.

Secretary: candidate of technical sciences, associate professor Murzalina G.B.

Were present: Members of the Educational and methodological bureau and the Academic committee for the bachelor's educational program 6B07336 – Railway construction.

Employer Representative: Member of the Academic committee, master of production training of the Almaty track distance of the branch of «National company «Kazakhstan temir zholy» JSC – «Almaty magistral network department» Anarbekov N.N.

Student: Member of the Academic committee, student of group US-SZhD-23-1 Baybagys B.B.

AGENDA:

1. Consideration of the Working curriculum, Catalogs of disciplines for the university component and the elective component, Passport and Competence model of the graduate of the bachelor's educational program 6B07336 – Railway construction.

HEARD: The Chairman of the Academic committee for the bachelor's educational program 6B07336 – Railway construction, Tulemissov T.Zh., who presented for consideration the Working curriculum, Catalogs of disciplines for the university component and the elective component, Passport and Competence model of the graduate of the bachelor's educational program 6B07336 – Railway construction. He reported that all comments and suggestions from Employers were taken into account during the joint work. It is proposed to recommend the Working curriculum, Catalogs of disciplines for the university component and the elective component, Passport and Competence model of the graduate of the bachelor's educational program 6B07336 – Railway construction for consideration and approval at the meetings of the Educational and methodological council and the Academic council of ALT University.

SPOKE: Members of the Academic committee for the bachelor's educational program 6B07336 – Railway construction.

RESOLVED:

1. To recommend the Working curriculum, Catalogs of disciplines for the university component and the elective component, Passport and Competence model of the graduate of the bachelor's educational program 6B07336 – Railway construction for consideration and approval at the meetings of the Educational and methodological council and the Academic council of ALT University.

Chairman **Sh.A. Abdreshov**

Secretary **G.B. Murzalina**

14. APPROVAL SHEET

№	Initials and Surname	Place of Work	Position	Date	Signature
1.	Карешбаева Г.Б.	каф. „ТС"	зав каф.	18.03.25	
2.	Тобылбаев М.	каф. АБ и ВАС	И.о зав. каф.	18.03.25	
3	Кулмаков К.С	каф. „АСИ"	зав. каф.	18.03.25	
4	Кожумова Д.Т	Head of dep. ICT depart	Head of depart	18.03.25	
5	Мурашева Р.Ю	каф ТУиБ	зав. каф	18.03.25	
6	Абдигалиулова А.	„SHD" depart	Head of departm.	18.03.25	
7	Колкобаева Г.Ш.	„LE" depart	Head of departm.	18.03.25	
8	Ахметова Р.Т.	depart	Head of dep.	18.03.25	
9	Бижанова А.Ж.	Institute E&DT	Director	19.03.25	
10	Мусабаева Б.С.	Institute LB	Director	19.03.25	
11	Абдрешова	инженер ПС	Инженер	19.03	

15. CHANGE REGISTRATION SHEET

№	Section and point of the document	Type of change (replace, annul/cancel, add)	Notice number and date	The change has been made	
				Date	Last name and initials, signature, position