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: 6B07179 – ENGINEERING AND MANAGEMENT OF TRANSPORT HIGHWAYS

Level of training: bachelor's degree

Code and classification of training area: 6B071 – Engineering and engineering affairs

Code and group of the educational program: B165 – Transmission system and infrastructure

Registration date in the Register: 04.06.2025

Registration number: 6B07100147

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	27
10. Expert opinions	42
11. Reviewers' conclusions	44
12. Letter of recommendation	46
13. Protocols of consideration and approval	47
14. Approval sheet	51
15. Change registration sheet	52

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*

The Chief engineer of the Almaty
track distance of the branch
«NC «Kazakhstan railways» JSC
«Almaty branch of the backbone network» _____ *D.Kh. Abdullaev*

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

Associate professor,
candidate of technical sciences _____ *M.M. Alimkulov.*

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

2. EXPERTS:

Head of the infrastructure development sector
of the branch of «NC «Kazakhstan railways» JSC
«Almaty branch of the backbone network» _____ *M.S. Bekbosunov*

Head of the technical department of the
branch of «NC «Kazakhstan railways» JSC
«Almaty branch of the backbone network» _____ *Sh.K. Ashimov*

3. REVIEWERS:

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

Associate professor of the School
of Transport engineering and logistics
of the KNRTU named after K.I. Satpayev,
candidate of technical sciences _____ *K.K. Dzholdasova*

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. INTRODUCED FOR THE FIRST TIME

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	6B07100147
2	Code and classification of the field of education	6B07 – Engineering, manufacturing and construction industries
3	Code and classification of training areas	6B071 – Engineering and engineering affairs
4	Code and group of educational programs	B165 – Transmission system and infrastructure
5	Name of the educational program	6B07179 – Engineering and management of transport highways
6	Type of EP	New
7	Goal of the EP	The goal is to train highly qualified specialists with in-depth theoretical knowledge and practical skills in the field of design, construction, operation and management of transport routes, capable of solving complex engineering problems and ensuring the sustainable development of transport infrastructure.
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 6B07179 – Engineering and management of transport highways
16	Presence of an appendix to the license for the area of personnel training	KZ87LAA00036465 (005)
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 an individual capable of self-improvement and professional growth with versatile socio-humanitarian, natural science, special, and specialized knowledge and interests.

2. Formation of the ability to critically rethink accumulated experience, to change the profile of their professional activity if necessary, to recognize 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 deadlines) in long-term and short-term planning and make optimal decisions in the field of design, construction, reconstruction, maintenance and repairs of transport structures, operation and management of transport main lines; 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 a goal and choose the ways to achieve it.

5. Assisting in 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, reconstruction, maintenance and repairs of transport structures, operation and management of transport main lines.

6. Formation of graduates' readiness to conduct technical and economic analysis, substantiate accepted and implemented decisions in the field of design, construction, reconstruction, maintenance and repairs of transport structures, operation and management of transport main lines; application of results in practice, striving for self-development and enhancement of their qualifications and skills.

7. Assisting in the formation of graduates' readiness for economical and safe use of natural resources, energy, and materials in the design, construction, reconstruction, maintenance and repairs of transport structures, operation and management of transport main lines.

Learning outcomes:

LO1 – Demonstrate fundamental mathematical and mechanical knowledge for the quantitative assessment and substantiation of design solutions during the construction and calculation of transport main lines, ensuring their reliability and efficiency.

LO2 – Apply engineering graphics, basics of programming for the visualization and automation of design tasks using artificial intelligence, consider the principles of digital inclusion, and use a professional foreign language in international communication.

LO3 – Apply knowledge of the geological and mechanical properties of soils, principles of foundation calculation and geotechnical solutions using geoinformation systems in the design and construction of transport engineering structures.

LO4 – Demonstrate a systematic understanding of transport infrastructure and transport logistics, applying basic and innovative project management methods, skills in organizing construction production, and implementing effective management of infrastructure projects.

LO5 – Understand the properties of building materials and the behavior of structures, principles of reconstruction and design of artificial structures on transport main lines, as well as the basics of the general course on transport structures and engineering geodesy.

LO6 – Understand the principles of organization and planning of transport main line construction, Time-management, green economy, and sustainable entrepreneurship, basics of financial literacy, as well as the basics of law and anti-corruption culture.

LO7 – Use computer-aided design systems, BIM technologies, and artificial intelligence to create and modernize transport main lines, monitor their condition, ensuring the development of effective and sustainable infrastructure solutions.

LO8 – Develop main line construction technologies considering regulatory requirements, electrotechnical calculations, environmental sustainability, and safety requirements for the creation of modern transport infrastructure.

LO9 – Design transport main lines taking into account utility networks, estimated cost, development of design documentation using CAD, and analysis of economic aspects of management for making informed decisions.

Area of professional activity:

Enterprises, organizations, and complexes that provide for the surveying, design, construction, reconstruction, maintenance and repairs of transport structures, operation and management of transport main lines.

Objects of professional activity:

- transport main lines;
- artificial structures (bridges, overpasses, elevated roads, interchanges, tunnels, subways, culverts, etc.) of transport infrastructure;
- means of diagnostics and monitoring of transport 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, planning, and control of the execution of construction and installation, repair, and reconstruction work on transport main lines and structures; operational and strategic management of production processes; ensuring and control of the quality of construction materials, structures, and completed work in accordance with regulatory requirements; development and implementation of measures to ensure labor protection and life safety requirements on transport main lines; planning and management of material and technical, financial, and human resources of transport infrastructure;

2) Development of a feasibility study (FS) and design and estimate documentation (DED) for the construction, reconstruction, maintenance, and repairs of transport structures; execution of geodetic, geological, hydrological, hydrometric, and meteorological surveys necessary for the design of transport main lines; development and substantiation of design solutions taking into account technical feasibility, economic efficiency, and environmental requirements.

3) Organization of work on maintenance, running repair, and upkeep of transport main lines to ensure their safe and uninterrupted operation; conducting diagnostics and assessment of the technical condition of transport structure elements and structures; analysis and optimization of traffic flow patterns, development of schemes for organizing the movement of vehicles, including the use of intelligent transport systems (ITS); application of geoinformation systems (GIS) and other modern technologies for diagnostics, monitoring, and forecasting the condition of transport infrastructure facilities.

4) Data analysis related to the operation of transport infrastructure facilities and forecasting their development; study and application of new technologies, materials, and structures, as well as innovative methods in the field of transport main line engineering; conducting calculations, modeling of traffic flows and technological processes to assess the effectiveness of design and management decisions; development of new technologies, design and technological documentation using modern computer technologies and artificial intelligence.

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, head of the road maintenance section, deputy head of the road maintenance section, design engineer, process engineer, technologist, railway repair engineer, highway repair engineer, artificial structures repair engineer, buildings and structures inventory engineer, metrology engineer, labor organization engineer, rationing engineer labor preparation engineer, occupational safety and health engineer, 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), engineer for the operation of highways, 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 a railway track, foreman for the current maintenance and repair of a highway, bridge foreman, foreman of construction and installation works, detourer of railway tracks and artificial structures, design technician, 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.

Final certification is conducted in the form of writing and defending a diploma thesis or preparing for and passing a comprehensive examination. The goal of final certification is to assess the learning outcomes and acquired competencies achieved upon completion of the higher education program.

The diploma thesis aims to identify and evaluate the analytical and research abilities of the graduate and represents a synthesis of the results of the student's independent study of a relevant problem in the field of the chosen specialization. The comprehensive examination program reflects integrated knowledge and key competencies that meet the requirements of the labor market in accordance with the higher education program.

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
1	2	3	4	5	6	7	8	9	10	11	12
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.	Technical mechanics	6	+								
20.	Engineering geodesy	6		+			+				
21.	Building materials	6					+				
22.	Building constructions	4					+				
23.	Occupational safety and health	5								+	
24.	Engineering graphics and computer	4		+							

	modeling										
25.	Basics of Python programming	3	+	+							
26.	Professionally oriented foreign language	3		+							
27.	Educational practice (geodetic)	2		+			+				
28.	Introduction to transport infrastructure	6				+	+				
29.	General course of transport routes	6					+				
30.	Geology and soil mechanics	5			+						
31.	Geoinformation systems in geology	5		+	+						
32.	Bases and foundations	5			+						
33.	Geotechnics in foundation engineering	5			+						
34.	Electrical engineering and the basics of electronics	3								+	
35.	Electrotechnical calculations of construction facilities	3								+	
36.	Transport logistics	3				+					
37.	Interaction of modes of transport	3				+					
38.	Artificial structures on transport routes	6			+		+				
39.	Engineering transport structures	6			+		+				
40.	Managerial economics	3						+			+
41.	Time-management	3						+			+
42.	Fundamentals of transportation corridor design	5	+		+	+					
43.	Engineering networks and communications	5									+
44.	Introduction to project and process management	3	+		+	+					
45.	Design and calculation of railway lines	6	+		+	+					
46.	Design and calculation of highways	5	+		+	+					
47.	IT in transport engineering	5		+							+
48.	Maintenance and repair of railway lines	5					+			+	
49.	Maintenance and repair of highways	5					+			+	
50.	Production practice 1	5					+			+	
51.	Production practice 2/ Pre-graduate practice	5					+			+	
52.	Computer-aided design of transportation corridors	5	+	+	+				+		+
53.	Automated highway design systems	5	+	+	+				+		+

54.	Organization and planning of construction of transport highways	6			+	+		+			
55.	Organization of construction production	6			+	+		+			
56.	Infrastructure project management	5	+		+	+					
57.	Innovative project management methods	5	+		+	+					
58.	Highway construction technology	6			+	+		+		+	
59.	Technological processes of highway construction	6			+	+		+		+	
60.	Reconstruction of transport routes	6					+		+		
61.	Modernization of transport highways	6					+		+		
62.	Monitoring the condition of transport highways	5							+		
63.	Engineering structures monitoring systems	5							+		
64.	BIM technologies in the construction of infrastructure facilities	3			+				+		
65.	Minor program 1	3			+				+		
66.	Regulatory and technical documentation in transport construction	3								+	+
67.	Minor program 2	3								+	+
68.	The basics of cost accounting	3						+			+
69.	Minor program 3	3						+			+
70.	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:
6B071 – Инженерия и инженерное дело

Группа образовательных программ:
B165 - Магистральные сети и инфраструктура

Наименование образовательной программы:
6B07179 – Инжиниринг и управление транспортных магистралей

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.О. Жармагамбетова

№	Код дисциплины	Наименование циклов и дисциплин	Общая трудоемкость		Форма контроля, триместр		Объем учебной нагрузки, часы						Распределение по триместрам									Закрепление за кафедрой
								Контактные					1 курс			2 курс			3 курс			
			в академических часах	в академических кредитах	Экзамен	КП (КР)	Всего часов	лекции	практические	лабораторные	СРОП	СРО	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-Sotz	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 экономическо-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:		1620	54	12		1620	110	210	30	165	1045	20	14	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-B-VK-TehMeh	Техническая механика	180	6	1		180	20	20		15	125	6									ТС
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	90	100	10	105	625	0	6	3	5	11	6	0	0	0	
M7	Профессиональный модуль																					
2.1.2.1.	25-B-KV-OKTM	Введение в транспортную инфраструктуру	180	6	2		180	20	20		15	125		6								ТС
	25-B-KV-OKTM	Общий курс транспортных магистралей																				
2.1.2.2.	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																				
2.1.2.3.	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																				
2.1.2.4.	25-B-KV-EOE	Электротехника и основы электроники	90	3	3		90	10	10		15	55			3							ЭЭ
	25-0-B-KV-EROS	Электротехнические расчеты объектов строительства																				

2.1.2.5.	25-B-KV-TL	Транспортная логистика	90	3	6		90	10	10		15	55						3				ТУиБ
	25-B-KV-VVT	Взаимодействие видов транспорта																				
2.1.2.6.	25-0-B-KV-ISTM	Искусственные сооружения на транспортных магистралях	180	6	5		180	20	20		15	125					6					ТС
	25-0-B-KV-ITS	Инженерные транспортные сооружения																				
M9	Модуль экономическо-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:		2550	85	19	0	2550	200	310	40	270	1670	20	20	11	9	11	9	0	5	0	
2.2.	ПРОФИЛИРУЮЩИЕ ДИСЦИПЛИНЫ (ПД):																					
2.2.1.	Вузовский компонент:		1470	49	10		1470	90	150	0	120	810	0	0	3	5	6	10	5	10	10	
M7	Профессиональный модуль																					
2.2.1.1.	25-B-VK-OPTM	Основы проектирования транспортных магистралей	150	5	4		150	10	20		15	105				5						ТС
2.2.1.2.	25-B-VK-ISK	Инженерные сети и коммуникации	150	5	7		150	10	20		15	105							5			ТС
2.2.1.3.	25-B-VK-VUPP	Введение в управление проектами и процессами	90	3	3		90	10	10		15	55			3							ТС
M8	Практикоориентированный модуль																					
2.2.1.4.	25-B-VK-PRZhL	Проектирование и расчет железнодорожных линий	180	6	5		180	20	20		15	125					6					ТС
2.2.1.5.	25-B-VK-PRAD	Проектирование и расчет автомобильных дорог	150	5	6		150	10	20		15	105						5				АСИ
2.2.1.6.	25-B-KV-ITTI	IT в транспортном инжиниринге	150	5	8		150	10	20		15	105							5			ТС
2.2.1.7.	25-B-VK-TORZhD	Техническое обслуживание и ремонт железнодорожных линий	150	5	8		150	10	20		15	105							5			ТС
2.2.1.8.	25-B-VK-TORAD	Техническое обслуживание и ремонт автомобильных дорог	150	5	9		150	10	20		15	105								5		АСИ
2.2.1.9.	25-0-B-VK-PPr1	Производственная практика 1	150	5	6		150											5				ТС
2.2.1.10.	25-0-B-VK-PPr2/PdPr	Производственная практика 2/ Преддипломная практика	150	5	9		150													5		ТС
2.2.2.	Компонент по выбору:		1260	42	9		1260	120	150	0	135	855	0	0	0	0	0	0	20	13	9	
M4	Модуль информационных технологий и искусственного интеллекта																					
2.2.2.1.	25-B-KV-APTM	Автоматизированное проектирование транспортных магистралей	150	5	8		150	10	20		15	105							5			ТС
	25-B-KV-SAPTM	Системы автоматизированного проектирования транспортных магистралей																				
M7	Профессиональный модуль																					
2.2.2.2.	25-B-KV-OPSTM	Организация и планирование строительства транспортных магистралей	180	6	9		180	20	20		15	125								6		ТС
	25-0-B-KV-OSP	Организация строительного производства																				
2.2.2.3.	25-B-KV-UIP	Управление инфраструктурными проектами	150	5	8		150	10	20		15	105							5			ТС
	25-B-KV-IMUP	Инновационные методы управления проектами																				
M8	Практикоориентированный модуль																					
2.2.2.4.	25-B-KV-TSM	Технология строительства магистралей	180	6	7		180	20	20		15	125						6				ТС
	25-B-KV-TPSM	Технологические процессы строительства магистралей																				
2.2.2.5.	25-B-VK-RTM	Реконструкция транспортных магистралей	180	6	7		180	20	20		15	125						6				ТС
	25-B-KV-MTM	Модернизация транспортных магистралей																				
2.2.2.6.	25-B-KV-MSTM	Мониторинг состояние транспортных магистралей	150	5	7		150	10	20		15	105						5				ТС
	25-0-B-KV-SMIS	Системы мониторинга инженерных сооружений																				
M9	Модуль инфраструктурных программ / Модуль дополнительной образовательной программы																					
2.2.2.7.	25-0-B-KV-BimTSIO	BIM технологии в строительстве инфраструктурных объектов	90	3	7		90	10	10		15	55						3				ТС
	24-0-B-KV-MN1	Минорная программа 1																				
2.2.2.8.	25-B-KV-NTDTS	Нормативно-техническая документация в транспортном строительстве	90	3	8		90	10	10		15	55							3			ТС
	24-0-B-KV-MN2	Минорная программа 2																				
2.2.2.9.	25-0-B-KV-OSD	Основы сметного дела	90	3	9		90	10	10		15	55								3		ТС
	24-0-B-KV-MN3	Минорная программа 3																				
	ИТОГО по ПД:		2730	91	19	0	2730	210	300	0	255	1665	0	0	3	5	6	10	25	23	19	
	ВСЕГО по циклу БД, ПД:		5280	176	38	0	5280	410	610	40	525	3335	20	20	14	14	17	19	25	28	19	
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	61	0	6990	510	1080	40	706	4294	27	26	27	27	28	26	25	28	19	
4.	24-0-B-VK-IA	ИТОГОВАЯ АТТЕСТАЦИЯ	240	8																	8	АСИ, ТС
	ИТОГО ЗА ВЕСЬ ПЕРИОД ОБУЧЕНИЯ:		7230	241	61	0	6990	510	1080	40	706	4294	27	26	27	27	28	26	25	28	27	

СОГЛАСОВАНО:

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_____ **M.S. Bekbosunov**

«19» 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 **6B07179 – Engineering and management of transport highways**

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
БД	ВК	Engineering mathematics 1	150	5	1	PO1	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, Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Information and communication technologies, BIM technologies in the construction of infrastructure facilities, Minor program 1, Digital inclusion, Basics of Python programming, Building materials, Final certification
БД	ВК	Engineering mathematics 2	150	5	2	PO1	The formation of students' mathematical knowledge and skills necessary for the study of	Basic school knowledge in mathematics, Engineering	Electrical engineering and the basics of electronics,

							related natural science disciplines, disciplines 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.	mathematics 1, Construction physics, Engineering graphics and computer modeling, Technical mechanics	Electrotechnical calculations of construction facilities, Information and communication technologies, BIM technologies in the construction of infrastructure facilities, Minor program 1, Digital inclusion, 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, Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Building materials, Information and communication technologies, BIM technologies in the construction of infrastructure facilities, Minor program 1, Digital inclusion, Final certification
BD	VK	Technical mechanics	180	6	1	LO1	Technical mechanics studies the behavior of deformable solid bodies under the influence of external forces. This discipline encompasses the analysis of static equilibrium, kinematic laws of motion, and dynamic behavior of mechanical systems. The acquired knowledge is a fundamental basis for engineering design, ensuring the calculation of the strength, stiffness, and stability of structures, as well as the analysis of their operational characteristics.	Basic school knowledge in mathematics and physics	Engineering mathematics 2, Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Bases and foundations, Building constructions, Artificial structures on transport routes, Engineering transport structures, Final certification
BD	VK	Engineering geodesy	180	6	3	LO2,5	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	Engineering graphics and computer modeling, Basics of Python programming	Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and

							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 construction and installation work, gives skills for the application of basic geodetic instruments for specific production conditions.		calculation of highways, Reconstruction of transport routes, Modernization of transport highways, Computer-aided design of transportation corridors, Automated highway design systems, BIM technologies in the construction of infrastructure facilities, Minor program 1, Final certification
BD	VK	Building materials	180	6	2	LO5	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, Geology and soil mechanics, Geoinformation systems in geology, Bases and foundations, Geotechnics in foundation engineering, Artificial structures on transport routes, Engineering transport structures, Final certification
BD	VK	Building constructions	120	4	4	LO5	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.	Technical mechanics, Building materials, Technical mechanics	Bases and foundations, Geotechnics in foundation engineering, Artificial structures on transport routes, Engineering transport structures, Final certification
BD	VK	Occupational health and safety	150	5	8	LO8	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	Environmentally sustainable technologies, Green economy and sustainable entrepreneurship, Electrical engineering and the basics of	Maintenance and repair of highways, Monitoring the condition of transport highways, Engineering structures monitoring systems,

							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.	electronics, Electrotechnical calculations of construction facilities, Highway construction technology, Technological processes of highway construction, Production practice 1	Production practice 2/ Pre-graduate practice, Final certification
BD	VK	Engineering graphics and computer modeling	120	4	1	LO2	The course covers the principles of technical 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.	Basic school knowledge in mathematics, drawing and computer science	Engineering mathematics 2, Engineering geodesy, Educational practice (geodetic), Information and communication technologies, Digital inclusion, IT in transport engineering, Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Final certification
BD	VK	Basics of Python programming	90	3	2	LO1,2	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 transportation corridors, Automated highway design systems, IT in transport engineering, BIM technologies in the construction of infrastructure facilities, Minor program 1, Final certification
BD	VK	Professionally	90	3	6	LO2	Formation and development of	The history of Kazakhstan,	Transport logistics, Interaction

		oriented foreign language					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.	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	of modes of transport, Regulatory and technical documentation in transport construction, Minor program 2, Final certification
BD	VK	Educational practice (geodetic)	60	2	3	LO2,5	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 transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Reconstruction of transport routes, Modernization of transport highways, Computer-aided design of transportation corridors, Automated highway design systems, BIM technologies in the construction of infrastructure facilities, Minor program 1, Final certification
PD	VK	Fundamentals of transportation corridor design	150	5	4	LO1,3,4	The course studies the basic principles and methods of designing highways and transport structures, covering key aspects of creating safe, efficient and sustainable transport systems, laying the foundation for in-depth study of specialized areas of transport engineering, and prepares specialists for the development of modern, functional and efficient transport infrastructure.	Information and communication technologies, Engineering graphics and computer modeling, Introduction to transport infrastructure, General course of transport routes, Engineering geodesy, Educational practice (geodetic)	Design and calculation of railway lines, Design and calculation of highways, Reconstruction of transport routes, Modernization of transport highways, Computer-aided design of transportation corridors, Automated highway design systems, Artificial structures on transport routes,

									Engineering transport structures, Managerial economics, Time-management, The basics of cost accounting, Transport logistics, Interaction of modes of transport, BIM technologies in the construction of infrastructure facilities, Minor program 1, Regulatory and technical documentation in transport construction, Minor program 2, Final certification
PD	VK	Engineering networks and communications	150	5	7	LO9	The discipline studies the design, construction, operation and maintenance of life support systems of buildings, structures and territories that provide comfortable and safe conditions for people and the functioning of various objects, and is fundamental for specialists in the field of construction, architecture, housing and communal services and related industries, providing the necessary knowledge for the creation of a modern and sustainable infrastructure.	Introduction to transport infrastructure, General course of transport routes, Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities	Final certification, Basic and profile disciplines of the master's degree
PD	VK	Introduction to project and process management	90	3	3	LO1,3,4	The course provides with a basic knowledge and understanding of the principles and methods of effective project management and business process optimization, covering key knowledge areas including integration, scope, timing, cost, quality, resource, communications, risk, procurement and stakeholder management, as well as introducing key project management terminology such as project, program, project portfolio, life cycle and stakeholders.	Engineering graphics and computer modeling, Introduction to transport infrastructure, General course of transport routes, Engineering geodesy, Educational practice (geodetic), Fundamentals of transportation corridor design	Reconstruction of transport routes, Modernization of transport highways, Computer-aided design of transportation corridors, Automated highway design systems, Managerial economics, Time-management, The basics of cost accounting, Transport logistics, Interaction of modes of transport, Regulatory and

									technical documentation in transport construction, Production practice 1, Production practice 2/ Pre-graduate practice, Final certification
PD	VK	Design and calculation of railway lines	180	6	5	LO1,3,4	The course provides fundamental knowledge and skills to address complex issues in the design, construction and operation of railway, covering the principles of creating safe, durable and cost-effective highways, incorporating safety requirements into the design stage and the correct placement of road features such as signs and barriers.	Engineering graphics and computer modeling, Introduction to transport infrastructure, General course of transport routes, Engineering geodesy, Educational practice (geodetic), Fundamentals of transportation corridor design	Reconstruction of transport routes, Modernization of transport highways, Computer-aided design of transportation corridors, Automated highway design systems, Highway construction technology, Technological processes of highway construction, Managerial economics, Time-management, The basics of cost accounting, Transport logistics, Interaction of modes of transport, Regulatory and technical documentation in transport construction, BIM technologies in the construction of infrastructure facilities, Minor program 1, Regulatory and technical documentation in transport construction, Minor program 2, Production practice 1, Production practice 2/ Pre-graduate practice, Final certification
PD	VK	Design and calculation of highways	150	5	6	LO1,3,4	The course studies the design, construction, and operation of highways and urban streets, including detailed design of road elements, calculation of earthworks volumes, strength and stability of	Engineering graphics and computer modeling, Introduction to transport infrastructure, General course of transport routes,	Reconstruction of transport routes, Modernization of transport highways, Computer-aided design of transportation corridors,

							structures, drainage systems, use of modern technologies and software, organization of construction works, environmental impact assessment, and issues related to road operation and maintenance, providing a comprehensive understanding of the processes involved in the creation and maintenance of transport highways.	Engineering geodesy, Educational practice (geodetic), Fundamentals of transportation corridor design	Automated highway design systems, Highway construction technology, Technological processes of highway construction, Managerial economics, Time-management, The basics of cost accounting, Regulatory and technical documentation in transport construction, BIM technologies in the construction of infrastructure facilities, Minor program 1, Regulatory and technical documentation in transport construction, Minor program 2, Production practice 1, Production practice 2/ Pre-graduate practice, Final certification
PD	VK	IT in transport engineering	150	5	8	LO2,9	The course studies the use of information technologies to solve problems of planning, design, construction, operation and management of transport systems, covering a wide range of topics related to the use of IT at all stages of the life cycle of transport facilities and processes.	Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Information and communication technologies, Engineering graphics and computer modeling, Basics of Python programming, Monitoring the condition of transport highways, Engineering structures monitoring systems, Transport logistics, Interaction of modes of transport	Final certification, Basic and profile disciplines of the master's degree
PD	VK	Maintenance and repair of railway lines	150	5	8	LO5,8	The course studies methods for maintaining the operational suitability of railways, including damage diagnostics, reinforcement	Electrical engineering and the basics of electronics, Electrotechnical calculations of	The basics of cost accounting, Minor program 3, Production practice 2 / Pre-graduate

							of the railway superstructure, restoration of engineering structures, and organization of repair works considering traffic intensity and climatic conditions, aimed at training specialists for effective maintenance and repair of railways and transport routes, ensuring their safety and cost-efficiency.	construction facilities, Artificial structures on transport routes, Engineering transport structures, Highway construction technology, Technological processes of highway construction, Monitoring the condition of transport highways, Engineering structures monitoring systems, Production practice 1	practice, Final certification
PD	VK	Maintenance and repair of highways	150	5	9	LO5,8	The discipline studies methods of maintaining the operational suitability of roads, including diagnostics of damage, strengthening of road surfaces, restoration of artificial structures and organization of repair work taking into account the intensity of traffic and climatic conditions, training specialists for the effective maintenance and repair of highways while ensuring safety and cost-effectiveness.	Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Artificial structures on transport routes, Engineering transport structures, Highway construction technology, Technological processes of highway construction, Monitoring the condition of transport highways, Engineering structures monitoring systems, Occupational safety and health, Regulatory and technical documentation in transport construction, 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	LO5,8	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	Design and calculation of railway lines, Design and calculation of highways	Reconstruction of transport routes, Modernization of transport highways, Monitoring the condition of transport highways, Engineering structures monitoring systems, Maintenance and repair of railway lines, Maintenance and

							bachelor's program. It is conducted in the practice bases at enterprises according to this educational program.		repair of highways, Occupational safety and health, Regulatory and technical documentation in transport construction, Production practice 2 / Pre-graduate practice, Final certification
PD	VK	Production practice 2 / Pre-graduate practice	150	5	9	LO5,8	The purpose of the 2 / Pre-graduate internship for bachelors is to ensure the relationship between the theoretical 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.	Design and calculation of railway lines, Design and calculation of highways, Reconstruction of transport routes, Modernization of transport highways, Monitoring the condition of transport highways, Engineering structures monitoring systems, Maintenance and repair of railway lines, Occupational safety and health, Regulatory and technical documentation in transport construction, Production practice 1	Final certification, Basic and profile disciplines of the master's degree
PD	VK	FINAL CERTIFICATION	240	8	9	LO1-LO9	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:	**3330**	**111**					

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

Head of the infrastructure development sector of the branch of «NC «Kazakhstan railways» JSC – «Almaty branch of the backbone network»
_____ **M.S. Bekbosunov**
«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 **6B07179 – Engineering and management of transport highways**

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
ООД	КВ	Environmentally sustainable technologies	150	5	5	РО8	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, Introduction to transport infrastructure, The general course of the highways	Philosophy, Political science, Professionally oriented foreign language, Occupational safety and health, Final certification
		Green economy and sustainable entrepreneurship				РО6,9	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, Introduction to transport infrastructure, The general course of the highways	Philosophy, Political science, Professionally oriented foreign language, Managerial economics, Time management, The basics of cost accounting, Occupational safety and health, Transport logistics, Interaction of modes of transport, Organization and planning of the construction of highways, Organization of

									construction production, Infrastructure project management, Innovative project management methods, Final certification
		Fundamentals of financial literacy				LO6,9	The discipline is aimed at developing the ability to make informed financial decisions, 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.	The history of Kazakhstan, Kazakh (russian, foreign) language, Sociology, Cultural studies, Introduction to transport infrastructure, General course of transport routes	Philosophy, Political science, Professionally oriented foreign language, Managerial economics, Time-management, The basics of cost accounting, Transport logistics, Interaction of modes of transport, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, Final certification
		Digital inclusion				LO2	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	BIM technologies in the construction of infrastructure facilities, Minor program 1, Final certification
		Basics of law and anti-corruption culture				LO6	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	The history of Kazakhstan, Kazakh (russian, foreign) language, Sociology, Cultural studies	Philosophy, Political science, Professionally oriented foreign language, Final certification

							awareness and legal culture, as well as a system of knowledge and citizenship on combating corruption as an antisocial phenomenon.		
BD	KV	Introduction to transport infrastructure	180	6	2	LO4,5	The course is aimed at providing fundamental knowledge about the structure, functioning, and development of transport systems, covering various modes of transport, their role in the economy, principles of design and operation, and modern trends in infrastructure.	Kazakh (Russian) language, Foreign language	Kazakh (Russian) language, Foreign language, Environmentally sustainable technologies, Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Artificial structures on transport routes, Engineering transport structures, Engineering networks and communications, Transport logistics, Interaction of modes of transport, Fundamentals of transportation corridor design, Introduction to project and process management, Design and calculation of railway lines, Design and calculation of highways, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, Final certification
		General course of transport routes				LO5	The course covers the principles of design, construction, and operation of transport highways (automobile and railway), including the study of their types,	Kazakh (Russian) language, Foreign language	Kazakh (Russian) language, Foreign language, Environmentally sustainable technologies, Green economy

							structural elements, route alignment, engineering structures, as well as issues of safety, environmental impact, regulatory frameworks, and modern technologies in infrastructure development.		and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Artificial structures on transport routes, Engineering transport structures, Engineering networks and communications, Transport logistics, Interaction of modes of transport, Fundamentals of transportation corridor design, Introduction to project and process management, Design and calculation of railway lines, Design and calculation of highways, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, Final certification
BD	KV	Geology and soil mechanics	150	5	4	LO3	The discipline is aimed at developing professional competencies in the field of engineering geology and soil mechanics to solve practical problems in assessing and analyzing the engineering and geological conditions of the construction of city streets and road infrastructure.	Technical mechanics, Building materials	Bases and foundations, Geotechnics in foundation engineering, Artificial structures on transport routes, Engineering transport structures, Final certification
		Geoinformation systems in geology				LO2,3	The discipline teaches the skills of engineering and geodetic calculations and methods of working with modern geodetic instruments to carry out marking work on the ground, control the production and quality of	Technical mechanics, Building materials	Bases and foundations, Geotechnics in foundation engineering, Artificial structures on transport routes, Engineering transport structures, Final

							work performed at each stage of the construction process, and monitor geological and hydrogeological processes.		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 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	Technical mechanics, Building materials, Building constructions, Geology and soil mechanics, Geoinformation systems in geology	BIM technologies in the construction of infrastructure facilities, Minor program 1, Final certification
		Geotechnics in foundation engineering				LO3	The discipline considers the formation and development of areas of plastic deformation in a homogeneous base of a buried flexible strip foundation when it is loaded within the framework of a model of a mixed problem of the theory of elasticity and the theory of soil plasticity.	Technical mechanics, Building materials, Building constructions, Geology and soil mechanics, Geoinformation systems in geology	BIM technologies in the construction of infrastructure facilities, Minor program 1, Final certification
BD	KV	Electrical engineering and the basics of electronics	90	3	3	LO8	he discipline considers electrical circuits of direct, alternating and three-phase currents, the principle of operation and purpose of the transformer and electrical machines, methods of measuring electrical quantities, application and general rules of operation of semiconductor devices and circuits. Teaching methods - analysis of specific situational tasks, group discussions.	Engineering mathematics 1, Engineering mathematics 2, Construction physics, Technical mechanics, Basics of Python programming, Engineering graphics and computer modeling,	Engineering networks and communications, IT in transport engineering, Artificial structures on transport routes, Engineering transport structures, Occupational safety and health, Highway construction technology, Technological processes of highway construction, Maintenance and repair of railway lines, Maintenance and repair of highways, Monitoring the condition of transport highways, Engineering structures monitoring systems, BIM technologies in the construction of infrastructure facilities, Minor program 1, Final certification

		Electrotechnical calculations of construction facilities				LO8	The discipline considers the electrical circuits of direct, alternating and three-phase currents, the principle of operation and purpose of the transformer and electrical machines, power supply and electrical lighting of building raincoats. Training methods - analysis of specific situational tasks, group discussions.	Engineering mathematics 1, Engineering mathematics 2, Construction physics, Technical mechanics, Basics of Python programming, Engineering graphics and computer modeling,	Engineering networks and communications, IT in transport engineering, Artificial structures on transport routes, Engineering transport structures, Occupational safety and health, Highway construction technology, Technological processes of highway construction, Maintenance and repair of railway lines, Maintenance and repair of highways, Monitoring the condition of transport highways, Engineering structures monitoring systems, BIM technologies in the construction of infrastructure facilities, Minor program 1, Final certification
BD	KV	Transport logistics	90	3	6	LO4	Transport logistics is a discipline that studies the organization, management and optimization of the processes of movement of material values (cargo) from the supplier to the consumer. It covers planning, implementation and control of transportation, storage and other related activities. The discipline "Transport logistics" plays a key role in the training of specialists capable of solving complex tasks related to the movement of material flows, which is an integral part of the functioning of modern business.	The history of Kazakhstan, Kazakh (Russian) language, Foreign language, Professionally oriented foreign language, Sociology, Cultural studies, Political science, Psychology, Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Introduction to transport infrastructure, General course of transport routes, Fundamentals of transportation corridor design, Introduction to project and process management, Design and calculation of railway	IT in transport engineering, Computer-aided design of transportation corridors, Automated highway design systems, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, BIM technologies in the construction of infrastructure facilities, Minor program 1, Regulatory and technical documentation in transport construction, Minor program 2, The basics of cost accounting, Minor program 3, Final certification

								lines	
		Interaction of modes of transport				LO4	The discipline studies theoretical and practical aspects of the organization and management of transport processes involving two or more modes of transport. It examines the principles of effective interaction of various modes of transport in a single transport system to ensure optimal delivery of goods and passengers. This discipline is closely related to such areas of knowledge as logistics, supply chain management, transport economics and transport law. The acquired knowledge and skills will be useful to specialists working in transport companies, logistics centers, industrial enterprises and other organizations related to the transportation of goods and passengers.	The history of Kazakhstan, Kazakh (Russian) language, Foreign language, Professionally oriented foreign language, Sociology, Cultural studies, Political science, Psychology, Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Introduction to transport infrastructure, General course of transport routes, Fundamentals of transportation corridor design, Introduction to project and process management, Design and calculation of railway lines	IT in transport engineering, Computer-aided design of transportation corridors, Automated highway design systems, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, BIM technologies in the construction of infrastructure facilities, Minor program 1, Regulatory and technical documentation in transport construction, Minor program 2, The basics of cost accounting, Minor program 3, Final certification
BD	KV	Artificial structures on transport routes	180	6	5	LO3,5	The course studies the design, construction, operation, and maintenance of engineering structures on transport routes (automobile, railway, and other types of transport) that ensure safe, efficient, and continuous movement across various obstacles, and is fundamental for the training of transport engineers and construction specialists, providing essential knowledge for the creation and maintenance of key elements of transport infrastructure.	Technical mechanics, Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Introduction to transport infrastructure, General course of transport routes, Geology and soil mechanics, Geoinformation systems in geology, Building materials, Building constructions, Fundamentals of transportation corridor design	Maintenance and repair of railway lines, Maintenance and repair of highways, Monitoring the condition of transport highways, Engineering structures monitoring systems, Final certification
		Engineering transport structures				LO3,5	The discipline studies the design, construction, operation and reconstruction of various structures that ensure the functioning	Technical mechanics, Electrical engineering and the basics of electronics,	Maintenance and repair of railway lines, Maintenance and repair of highways, Monitoring

							of transport systems, covers a wide range of objects such as bridges, tunnels, roads, overpasses, flyovers, retaining walls, culverts and other artificial structures that are an integral part of the transport infrastructure.	Electrotechnical calculations of construction facilities, Introduction to transport infrastructure, General course of transport routes, Geology and soil mechanics, Geoinformation systems in geology, Building materials, Building constructions, Fundamentals of transportation corridor design	the condition of transport highways, Engineering structures monitoring systems, Final certification
BD	KV	Managerial economics	90	3	6	LO6,9	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, Introduction to transport infrastructure, General course of transport routes, Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways	The basics of cost accounting, Transport logistics, Interaction of modes of transport, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, Final certification
		Time-management				LO6,9	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, Introduction to transport infrastructure, General course of transport routes, Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways	The basics of cost accounting, Transport logistics, Interaction of modes of transport, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, Final certification
PD	KV	Computer-aided design of transportation	150	5	8	LO 1,2,3,7,9	The discipline studies CAD software systems for the design of highways, including the creation of digital terrain models, tracing,	Basics of Python programming, Engineering geodesy, Educational practice	Final certification, Basic and profile disciplines of the master's degree

		corridors					profile design, calculation of excavation volumes, construction of artificial structures and the formation of design documentation, in order to increase the efficiency, accuracy and speed of development of design solutions.	(geodetic), Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Reconstruction of transport routes, Modernization of transport highways, Transport logistics, Interaction of modes of transport, BIM technologies in the construction of infrastructure facilities, Minor program 1	
		Automated design systems for transport highways				LO 1,2,3,7,9	The discipline studies the use of modern software packages for road design, including the creation of digital models, tracing, calculation of earthwork volumes and design of artificial structures, aimed at improving the accuracy, efficiency and speed of development of design solutions in transport construction.	Basics of Python programming, Engineering geodesy, Educational practice (geodetic), Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Reconstruction of transport routes, Modernization of transport highways, Transport logistics, Interaction of modes of transport, BIM technologies in the construction of infrastructure facilities, Minor program 1	Final certification, Basic and profile disciplines of the master's degree
PD	KV	Organization and planning of construction of transport highways	180	6	9	LO3,4,6	The discipline studies the methods of organizing construction production during the construction of highways and railways, including the development of design documentation, drawing up plans, managing resources, quality and safety of work, as well as interaction with subcontractors, developing the competencies of specialists for the effective planning and implementation of construction processes.	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Introduction to transport infrastructure, General course of transport routes, Highway construction technology, Technological	Final certification, Basic and profile disciplines of the master's degree

								processes of highway construction, Infrastructure project management, Innovative project management methods, Transport logistics, Interaction of modes of transport	
		Organization of construction production				LO3,4,6	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, Introduction to transport infrastructure, General course of transport routes, Highway construction technology, Technological processes of highway construction, Infrastructure project management, Innovative project management methods, Transport logistics, Interaction of modes of transport	Final certification, Basic and profile disciplines of the master's degree
PD	KV	Infrastructure project management	150	5	8	LO1,3,4	The discipline studies the management of projects for the creation and development of infrastructure facilities, covering planning, financing, organization of construction, risk management and interaction with stakeholders, developing in specialists the competencies for the successful implementation of complex projects on time, within budget and in compliance with quality and safety requirements	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Introduction to transport infrastructure, General course of transport routes, Highway construction technology, Technological processes of highway construction, Transport logistics, Interaction of modes of transport	Organization and planning of construction of transport highways, Organization of construction production, Final certification
		Innovative project				LO1,3,4	The course studies modern approaches and	Green economy and	Organization and planning of

		management methods					tools to improve the efficiency of project activities, including flexible methodologies (Agile, Scrum), lean manufacturing (Lean), data visualization, artificial intelligence and innovative solutions, developing the competencies in specialists for successful project management, increasing adaptability and stakeholder satisfaction	sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Introduction to transport infrastructure, General course of transport routes, Highway construction technology, Technological processes of highway construction, Transport logistics, Interaction of modes of transport	construction of transport highways, Organization of construction production, Final certification
PD	KV	Highway construction technology	180	6	7	LO 3,4,6,8	The discipline studies engineering and technical processes in the construction of roads and railways, including site preparation, earthworks, road surface construction, construction of artificial structures and the use of modern materials, forming in specialists the knowledge for organizing construction production, quality control, safety and compliance with environmental requirements.	Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Design and calculation of railway lines, Design and calculation of highways	Occupational safety and health, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, Maintenance and repair of railway lines, Maintenance and repair of highways, Regulatory and technical documentation in transport construction, Minor program 2, Final certification
		Technological processes of highway construction				LO 3,4,6,8	The discipline studies the methods and sequence of construction works during the construction of highways and railways, including site preparation, earthworks, construction of road surfaces, construction of bridges and overpasses, laying of the track superstructure for railways, as well as quality control technologies at all stages of construction.	Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Design and calculation of railway lines, Design and calculation of highways	Occupational safety and health, Organization and planning of construction of transport highways, Organization of construction production, Infrastructure project management, Innovative project management methods, Maintenance and repair of railway lines, Maintenance and repair of highways, Regulatory and technical documentation in

									transport construction, Minor program 2, Final certification
PD	KV	Reconstruction of transport routes	180	6	7	LO5,7	The discipline studies engineering and technical measures aimed at improving the technical characteristics, capacity and safety of existing roads and railways, including strengthening the road surface, widening the roadway, constructing interchanges, replacing worn-out structures, and improving lighting and drainage systems.	Engineering geodesy, Educational practice (geodetic), Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Production practice 1	Computer-aided design of transportation corridors, Automated highway design systems, Regulatory and technical documentation in transport construction, Minor program 2, Production practice 2/ Pre-graduate practice, Final certification
		Modernization of transport highways				LO5,7	The discipline studies modern approaches and technologies for the modernization of transport highways, including methods for increasing throughput, improving operational characteristics, reducing the negative impact on the environment and increasing traffic safety, aimed at creating efficient and environmentally friendly transport systems.	Engineering geodesy, Educational practice (geodetic), Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Production practice 1	Computer-aided design of transportation corridors, Automated highway design systems, Regulatory and technical documentation in transport construction, Minor program 2, Production practice 2/ Pre-graduate practice, Final certification
PD	KV	Monitoring the condition of transport highways	150	5	7	LO7	The discipline studies methods of assessing and monitoring the condition of transport highways, including motorways and railways, examines methods of diagnosing pavements, roadbeds, artificial structures, as well as systems for collecting, processing and analyzing monitoring data, technologies for predicting wear, identifying defects and taking timely measures to ensure the safety and durability of transport infrastructure.	Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Artificial structures on transport routes, Engineering transport structures, Production practice 1	IT in transport engineering, Maintenance and repair of railway lines, Maintenance and repair of highways, Occupational safety and health, Production practice 2/ Pre-graduate practice, Final certification
		Engineering structures monitoring systems				LO7	The discipline studies modern methods and technologies for monitoring the technical condition of engineering structures, including buildings, bridges and tunnels, covering types of sensors, data collection and transmission systems, as well as methods for analyzing and interpreting measurement results to identify defects, predict their development and ensure safe operation of facilities.	Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Artificial structures on transport routes, Engineering transport structures, Production practice 1	IT in transport engineering, Maintenance and repair of railway lines, Maintenance and repair of highways, Occupational safety and health, Production practice 2/ Pre-graduate practice, Final certification

Infrastructure programs module / Additional educational program module									
PD	KV	BIM technologies in the construction of infrastructure facilities	90	3	7	LO3,7	The discipline studies BIM technologies (building information modeling) in the design, construction and operation of infrastructure facilities, the creation and management of information models, the collaboration of project participants in a single digital environment, as well as the use of BIM for analysis.	Engineering mathematics 1,2, Construction physics, Basics of Python programming, Information and communication technologies, Digital inclusion, Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Engineering geodesy, Educational practice (geodetic), Bases and foundations, Geotechnics in foundation engineering, Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Transport logistics, Interaction of modes of transport	Final certification, Basic and profile disciplines of the master's degree
		Minor program 1				LO3,7	The first of the three disciplines, which allows you to form additional professional competencies in various subject areas.	Engineering mathematics 1,2, Construction physics, Basics of Python programming, Information and communication technologies, Digital inclusion, Electrical engineering and the basics of electronics, Electrotechnical calculations of construction facilities, Engineering geodesy, Educational practice (geodetic), Bases and foundations, Geotechnics in foundation engineering, Fundamentals of transportation corridor design, Design and calculation of railway lines,	Final certification, Basic and profile disciplines of the master's degree

								Design and calculation of highways, Transport logistics, Interaction of modes of transport	
PD	KV	Regulatory and technical documentation in transport construction	90	3	8	LO8,9	The discipline studies a set of regulatory documents governing the design, construction and operation of transport facilities, building codes and regulations (SNiP), state standards (GOST), technical regulations and other guidelines. Particular attention is paid to the procedure for developing, coordinating and applying regulatory and technical documentation to ensure quality, safety and compliance with requirements in transport construction.	Professionally oriented foreign language, Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Reconstruction of transport routes, Modernization of transport highways, Highway construction technology, Technological processes of highway construction, Transport logistics, Interaction of modes of transport	Maintenance and repair of highways, Production practice 2/ Pre-graduate practice, Final certification
		Minor program 2				LO8,9	The second of the three disciplines, which allows you to form additional professional competencies in various subject areas.	Professionally oriented foreign language, Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Reconstruction of transport routes, Modernization of transport highways, Highway construction technology, Technological processes of highway construction, Transport logistics, Interaction of modes of transport	Maintenance and repair of highways, Production practice 2/ Pre-graduate practice, Final certification
PD	KV	The basics of cost accounting	90	3	9	LO6,9	The course studies the principles and methods of determining the cost of construction, reconstruction, and repair of facilities, covering regulatory frameworks, calculation of work volumes, material costs, labor wages, equipment operation, overheads, and profit, while developing	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Fundamentals of transportation corridor design,	Final certification, Basic and profile disciplines of the master's degree

							students' skills in preparing cost estimates, analyzing project costs, justifying investments, and controlling expenditures in construction projects.	Design and calculation of railway lines, Design and calculation of highways, Maintenance and repair of railway lines, Transport logistics, Interaction of modes of transport	
		Minor program 3				LO6,9	The third of the three disciplines, which allows you to form additional professional competencies in various subject areas.	Green economy and sustainable entrepreneurship, Fundamentals of financial literacy, Managerial economics, Time-management, Fundamentals of transportation corridor design, Design and calculation of railway lines, Design and calculation of highways, Maintenance and repair of railway lines, Transport logistics, Interaction of modes of transport	Final certification, Basic and profile disciplines of the master's degree
		Total:	**2340**	**78**					

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

10. EXPERT OPINIONS

1) Expert opinion on the educational program 6B07179 – Engineering and management of transport highways

General assessment of relevance and objectives.

The educational program 6B07179 – Engineering and management of transport highways is highly relevant and timely, driven by the strategic priority for developing transport and logistics infrastructure in the country. The goal of the educational program—training highly qualified engineers in the field of design, construction, reconstruction, maintenance, and management of transport highways —is fully aligned with the current and projected needs of the labor market in the road construction and transport industries.

Analysis of the competency model and content.

Focus on digitalization: The inclusion of disciplines focused on digital technologies and artificial intelligence is particularly noteworthy : "Fundamentals of Python programming" , "IT in transport engineering" , "Computer-aided design systems for transport highways" , and, most importantly, "BIM Technologies in the construction of infrastructure objects". This directly correlates with the global trend of implementing BIM technologies in design and construction.

Comprehensiveness of professional functions: The learning outcomes and professional activity functions cover the entire life cycle of a transport highway , from design and survey and production/technological activities to organizational and management activities.

Use of Intelligent transport systems: The graduate's functional scope clearly outlines the application of intelligent transport systems for analyzing and optimizing traffic flow modes , which is a critically important skill for a modern engineer-manager.

Management competencies: The inclusion of modules such as "Managerial economics" , "Time management" , "Green Economy and sustainable entrepreneurship" enables the training of specialists capable of making sound technical and economic decisions and managing resources, rather than just executors.

Conclusions and Recommendations:

The program demonstrates a high degree of practical focus and innovativeness. The list of positions a graduate can hold (from design engineer and estimating engineer to site manager and project manager) confirms the breadth of their training and demand in the labor market.

I believe that the educational program 6B07179 – Engineering and management of transport highways is well-developed , meeting the challenges of the digital economy and the modern requirements of the transport industry. The educational program 6B07179 – Engineering and management of transport highways is recommended for approval and implementation in the educational process for the training of bachelors.

The expert,
Head of the infrastructure development sector of the branch of «National company «Kazakhstan temir zholy» JSC – "Almaty magistral network department» **M.S. Bekbosunov**

2) Expert opinion on the educational program 6B07179 – Engineering and management of transport highways

Compliance with regulatory requirements and standards.

The presented educational program 6B07179 – Engineering and management of transport highways has been developed in full compliance with the requirements of the State Compulsory Standard of Higher Education of the Republic of Kazakhstan, the National qualifications framework, and the Sectoral qualifications framework. The volume of 240 academic credits over a three-year study period fully complies with the bachelor's norms for engineering specializations.

Analysis of the competency model and learning logic.

Competency-based approach: The graduate's competency model is clearly structured, and the learning outcomes ensure a balance between fundamental engineering training, managerial, and digital skills. Fundamental training is confirmed by the presence of strong basic disciplines: “Engineering mathematics 1 and 2” , “Building physics” , “Technical mechanics” , “Building materials” , and “Building structures”.

Integration of digital technologies: disciplines such as “Engineering graphics and computer modeling” , “Fundamentals of Python programming” , “Computer-aided design” , and “BIM technologies” form the graduate's ”Virtual designer” competencies , which corresponds to the “Atlas of new professions”.

Matrix of correlation between learning outcomes and disciplines: The matrix clearly demonstrates that each learning outcome is supported by multiple disciplines, ensuring its comprehensive mastery. For example, the learning outcome – systemic understanding of transport infrastructure and project management , is supported by disciplines ranging from “Introduction to project management” to “Organization of construction production”.

Logic of curriculum structure: The working curriculum demonstrates a logical sequence : mastering fundamental knowledge (mathematics, physics, mechanics) in the junior years , transitioning to basic engineering disciplines (geodesy, soils, materials) , and concluding with specialization modules on the design, construction, reconstruction, and management of transport highways.

Conclusion:

The educational program 6B07179 – Engineering and management of transport highways is modern, interdisciplinary, and possesses high academic potential. It ensures the training of specialists ready for calculation and research, design and construction, and organizational and management activities.

The educational program 6B07179 – Engineering and management of transport highways complies with all academic requirements , is aimed at training competitive personnel , and is recommended for approval and implementation in the educational process of higher education institutions.

The expert,
Head of the technical department
of the branch of «National company
«Kazakhstan temir zholy» JSC –
“Almaty magistral network department» **Sh.K. Ashimov**

КАДРЛАР БӨЛІМІ / ОТДЕЛ КАДРОВ

11. REVIEWERS' CONCLUSIONS

1) Review of the educational program
6B07179 – Engineering and management of transport highways

Relevance and demand for graduates.

Specialists with competencies in the engineering and management of transport highways are key to the implementation of national infrastructure projects. Our organization confirms the high staffing demand for graduates whose training covers design, construction, maintenance, repairs, and management of production processes. The educational program 6B07179 – Engineering and management of transport highways clearly defines the scope of activity: enterprises, organizations, and complexes that provide the full cycle of work with transport highways, including artificial structures (bridges, tunnels, etc.).

Assessment of professional competencies and practical training.

List of positions: The attached list of positions (design engineer, site manager, project manager, estimating engineer, geodesic engineer, etc.) fully reflects the real need for specialists with higher education. Graduates will be able to apply for managerial and key engineering positions after gaining the necessary production experience.

Practical focus: The inclusion of three types of practical training (educational geodesic, production, and pre-diploma) is an important advantage of the educational program. The clear description of the goals and objectives of the practical training (acquiring skills in geodesic measurements, deepening knowledge, collecting material for the diploma thesis) guarantees that students will acquire real practical experience.

Key skills: We particularly value the inclusion of disciplines such as "Fundamentals of estimation", "Regulatory and technical documentation in transport construction", as well as courses on labor protection and life safety. This ensures the specialist's readiness to work with design and estimate documentation and to comply with critically important industry standards.

The educational program 6B07179 – Engineering and management of transport highways is developed with the requirements of Employers in mind, integrates modern geoinformation systems and BIM technologies, and forms the necessary set of professional and managerial competencies in graduates. We are ready to consider graduates of this educational program as priority candidates for employment. The educational program 6B07179 – Engineering and management of transport highways is recommended for implementation in the educational process for the training of bachelors.

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

2) Review of the educational program
6B07179 – Engineering and management of transport highways

Structure and interdisciplinary approach

The educational program 6B07179 – Engineering and management of transport highways demonstrates a well-thought-out structure , successfully combining the traditional engineering base with modern specialized disciplines. The total credit volume of 240 hours and its distribution across the cycles of general education, basic, and specialized disciplines corresponds to the established norms.

Interdisciplinary Connection: The integration of engineering and management is of particular value. The presence of disciplines "Transport logistics" and "Interaction of transport modes" allows transport highways to be viewed not as isolated objects, but as elements of a global transport system , which aligns with the learning outcomes.

Assessment of the content of academic disciplines

The inclusion of disciplines that form "soft skills" and universal competencies , such as "Green economy and sustainable entrepreneurship" , "Digital inclusion" , and "Fundamentals of financial literacy" , is a progressive step that prepares a specialist with a broad outlook , capable of economical and safe use of natural resources.

The specialized disciplines are clearly production-oriented, which is a key factor for transport highway enterprises : "Design and calculation of railway lines" , "Design and calculation of automobile roads" , "Reconstruction of transport highways" , "Modernization of transport highways" , "Monitoring the condition of transport highways" , "Technical maintenance and repair of railway lines" , and "Technical maintenance and repair of automobile roads".

Catalog of disciplines: The brief descriptions of disciplines in the University component Catalog and the Elective component Catalog clearly reflect their goals , and the list of prerequisites and postrequisites confirms the logical sequence of studying the disciplines.

The educational program 6B07179 – Engineering and management of transport highways is distinguished by its high quality of development , corresponds to modern trends in technical education , and reflects the interdisciplinary nature of training an engineer-manager.

I believe that the educational program 6B07179 – Engineering and management of transport highways is fully ready for implementation in the educational process and will contribute to the training of highly qualified specialists.

The reviewer,
associate professor of the School
of Transport engineering and logistics
of the K.I. Satpayev Kazakh
national research technical university
candidate of technical sciences **K.K. Dzholdasova**

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 gives a high recommendation for the approval and implementation in the educational process of the bachelor's educational program 6B07179 – Engineering and management of transport highways , developed by «ALT University named after Mukhamedzhan Tynyshpayev» JSC.

The educational program 6B07179 – Engineering and management of transport highways is strategically important and innovative for the following reasons:

Alignment with global challenges: The educational program 6B07179 – Engineering and management of transport highways is aimed at training specialists capable of making optimal decisions in long-term planning in the field of design, construction, and operation of transport highways. This reflects the state objective of ensuring the reliability and efficiency of transport infrastructure.

Technological superiority: the educational program 6B07179 – Engineering and management of transport highways integrates advanced digital tools and technologies , such as geoinformation systems , BIM technologies , computer-aided design systems , and artificial intelligence. This approach guarantees that graduates will possess the competencies necessary for working with modern means of diagnostics and monitoring of transport structures.

Professional level: The training of the specialist covers the entire spectrum of their calculation and research, and organizational and management activities. Graduates will be ready to develop technical and economic feasibility studies and design and estimate documentation , as well as to manage infrastructure projects.

Conclusion:

Based on the analysis of the goals, learning outcomes, and content of the curriculum, we highly evaluate the quality of this educational program. We are confident that its implementation will significantly increase the level of training of engineering and technical personnel, who are in demand in the engineering, manufacturing, construction, and transport industries.

The bachelor's educational program 6B07179 – Engineering and management of transport highways is recommended for approval and implementation in the educational process of higher education institutions.

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

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 6B07179 – Engineering and management of transport highways, and leading lecturers of the «Transport construction» department

Almaty city «24» february 2025

Chairman: Chairman of the Academic committee for the educational program 6B07179 – Engineering and management of transport highways, 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, the chief engineer of the Almaty track distance of the branch of «National company «Kazakhstan temir zholy» JSC – «Almaty branch of the backbone network» Abdullaev D.Kh.

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 6B07179 – Engineering and management of transport highways.
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 6B07179 – Engineering and management of transport highways, 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, the chief engineer of the Almaty track distance of the branch of «National company «Kazakhstan temir zholy» JSC – «Almaty branch of the backbone network» Abdullaev D.Kh., 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., Alimkulov M.M. 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 6B07179 – Engineering and management of transport highways without changes.

RESOLVED:

1. Approve the current Competency model of the graduate for the educational program 6B07179 – Engineering and management of transport highways.

2. Submit the Competency model of the graduate for the educational program 6B07179 – Engineering and management of transport highways 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 6B07179 – Engineering and management of transport highways, 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 6B07179 – Engineering and management of highways. 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 6B07179 – Engineering and management of transport highways, 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 6B07179 – Engineering and management of transport highways: «Technical mechanics», «Engineering graphics and computer modeling», «Fundamentals of Python programming», «Digital inclusion», «Geoinformation systems in geology», «Geotechnics in foundation engineering», «IT in transport engineering», «Computer-aided design of transport highways», «BIM technologies in the construction of infrastructure objects», «General course of transport highways», «Introduction to transport infrastructure», «Transport logistics», «Interaction of transport modes», «Artificial Structures on Transport Highways», «Fundamentals of transport highway design», «Engineering Networks and Utilities», «Introduction to project and process management», «Design and calculation of railway lines», «Design and calculation of automobile roads», «Technical maintenance and repair of railway lines», «Design and calculation of automobile roads», «Organization and planning of transport highway construction», «Management of infrastructure projects», «Highway construction technology», «Reconstruction of transport highways», «Monitoring the condition of transport highways», and «Regulatory and technical documentation in transport construction».

SPOKE: The employer representative, member of the Academic committee for the educational program 6B07179 – Engineering and management of transport highways, the chief engineer of the Almaty track distance of the branch of «National company «Kazakhstan temir zholy» JSC – «Almaty branch of the backbone network» Abdullaev D.Kh., 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 6B07179 – Engineering and management of transport highways for the 2025 intake: «Technical mechanics», «Engineering graphics and computer modeling», «Fundamentals of Python programming», «Digital inclusion», «Geoinformation systems in geology», «Geotechnics in foundation engineering», «IT in transport engineering», «Computer-aided design of transport highways», «BIM technologies in the construction of infrastructure objects», «General course of transport highways», «Introduction to transport infrastructure», «Transport logistics», «Interaction of transport modes», «Artificial Structures on Transport Highways», «Fundamentals of transport highway design», «Engineering Networks and Utilities», «Introduction to project and process management», «Design and calculation of railway lines», «Design and calculation of automobile roads», «Technical maintenance and repair of railway lines», «Design and calculation of automobile roads», «Organization and planning of transport highway construction», «Management of infrastructure projects», «Highway construction technology», «Reconstruction of transport highways», «Monitoring the condition of transport highways», and «Regulatory and technical documentation in transport construction».

After development, to transfer the Curriculum, the Catalog of University component disciplines, and the Catalog of elective component disciplines for the 2025 intake of the educational program 6B07179 – Engineering and management of transport highways 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 6B07179 – Engineering and management of transport highways.

Employer Representative: Member of the Academic committee, the chief engineer of the Almaty track distance of the branch «National company «Kazakhstan temir zholy» JSC – «Almaty magistral network department» Abdullaev D.Kh.

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 6B07179 – Engineering and management of transport highways.

HEARD: The Chairman of the Academic committee for the bachelor's educational program 6B07179 – Engineering and management of transport highways, 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 6B07179 – Engineering and management of transport highways. 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 6B07179 – Engineering and management of transport highways 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 6B07179 – Engineering and management of transport highways.

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 6B07179 – Engineering and management of transport highways 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.	Карибаева П.Б.	каф. „ТС"	зав. каф.	18.03.25	
2.	Тогизбай К	каф. ЭТ и ВАД	и.о. зав. каф	18.03.25	
3	Кулешов К.С	каф. „ЭСС"	зав. каф.	18.03.25	
4	Ергекова А.Т.	каф. „Э"	зав. каф	18.03.25	
5	Кассымова Д.	ЭТ depart.	Head. of dep.	18.03.25	
6	Муканова Р.Ж.	каф ТЭиТ	зав. каф	18.03.25	
7	Abdiraiymova A.	„SED" departm	Head of depart	18.03.25	
8	Kalkabayeva G.U	„LE" departm	Head of depart	18.03.25	
9.	Akhmetova P.T.	department	Head of	18.03.25	
10	Toigozhinova A.Zh	Institute E&DT	Director	19.03.25	
11	Mussayeva G.S	Institute LB	Director	19.03.25	
12	Абуразакова	секрет. ТС	секретарь	19.03.25	

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