



**МИНИСТЕРСТВО ОБРАЗОВАНИЯ
РЕСПУБЛИКИ БЕЛАРУСЬ**

**Белорусский национальный
технический университет**

Кафедра «Английский язык № 2»

О. Ю. Муха

СТРОИТЕЛЬСТВО АВТОМОБИЛЬНЫХ ДОРОГ

HIGHWAY ENGINEERING

Пособие

**Минск
БНТУ
2026**

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HIGHWAY ENGINEERING

*Рекомендовано учебно-методическим объединением по образованию
в области строительства и архитектуры в качестве пособия для студентов
специальности 7-07-0732-03 «Строительство транспортных коммуникаций»
(профилизация «Автомобильные дороги»)*

Минск
БНТУ
2026

УДК 811.111:625.7/8(075.8)

ББК 81.2Англ:39.311я7

М92

Р е ц е н з е н т ы:

кафедра иностранных языков УО «Белорусский государственный университет информатики и радиоэлектроники» (зав. кафедрой, канд. филол. наук,

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Муха, О. Ю.

М92 Строительство автомобильных дорог = Highway Engineering : пособие для студентов специальности 7-07-0732-03 «Строительство транспортных коммуникаций» профилизации «Автомобильные дороги») / О. Ю. Муха. – Мн. : БНТУ, 2026. – 129 с.: ил.

ISBN 978-985-31-0148-5.

Пособие направлено на формирование навыков профессионально ориентированной устной и письменной речи на базе тематически упорядоченного лексико-грамматического материала дисциплины «Иностранный язык (английский)» для специальности 7-07-0732-03 «Строительство транспортных коммуникаций» (профилизация «Автомобильные дороги»). Основу пособия составляют 13 разделов, построенных по единому принципу и направленных на формирование навыков устной и письменной речи по специальности. В пособии также содержится справочный материал по аннотированию и реферированию текстов, созданию электронной и стендовой презентаций.

Пособие предназначено учащимся, студентам, магистрантам, аспирантам, специалистам в области дорожного строительства, преподавателям технических вузов.

УДК 811.111:625.7/8(075.8)

ББК 81.2Англ:39.311я7

ISBN 978-985-31-0148-5

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ПРЕДИСЛОВИЕ

Пособие предназначено для проведения практических занятий по английскому языку со студентами специальности 7-07-0732-03 «Строительство транспортных коммуникаций» (профилизация «Автомобильные дороги»). Цель пособия – совершенствование и систематизация знаний и умений студентов, обогащение их словарного запаса в пределах профессионально-ориентированной лексики, формирование навыков правильного понимания, перевода и реферирования текстов по специальности.

Пособие состоит из тринадцати уроков, посвященных основным принципам строительства и эксплуатации дорог, раздела по грамматике, включающего наиболее характерные для технической литературы грамматические явления, аутентичных текстов для дополнительного чтения и словаря профессиональных терминов, дополненных словосочетаниями.

В каждом уроке наряду с текстами предлагаются упражнения на понимание текстов, а также разнообразные языковые и речевые упражнения. Большое внимание уделяется работе с профессиональной лексикой – нахождению синонимов, антонимов, словообразованию. Используются задания на понимание смысла через толкование соответствующих терминов, упражнения на перевод с русского языка на английский и наоборот. Речевые упражнения позволяют проверить общее понимание прочитанного, закрепить приобретенные лексические навыки и предполагают обучение говорению на базе прочитанного текста. В конце каждого урока предусмотрены задания на развитие навыков монологической речи.

Автор учебного пособия выражает благодарность коллеге и старшему преподавателю кафедры «Английский язык № 2» Белорусского национального технического университета Л. М. Янушкевич за значительный вклад по усовершенствованию данного пособия.

UNIT I. THE HISTORY OF ROADS AND HIGHWAYS

Pre-reading tasks

1. Study the vocabulary.

ancient ['eɪnf(ə)nt] древний

automobile ['ɔ:təməbi:l] автомобиль, автомашина

cobblestone ['kɒb(ə)lstəʊn] булыжник, булыжный камень¹

condition [kən'dɪʃ(ə)n] состояние, условие

ditch [dɪtʃ] канава, ров, кювет²

side ditch кювет

flat плоский

highway ['haɪweɪ] шоссе, автомагистраль

path путь, дорожка, тропа, тропинка

pavement ['reɪvm(ə)n] 1) дорожное покрытие; дорожная одежда³; 2) тротуар (*BrE*); 3) мостовая⁴ (*AmE*)

route [ru:t] маршрут, путь, направление

solid ['sɒlɪd] 1) твердый; 2) крепкий, прочный

solid base твердое основание

straight [streɪt] прямой

to carry 1) нести, носить; 2) везти, (пере)возить;

Roads carry millions of automobiles. По дорогам проезжают миллионы автомобилей.

to drain [dreɪn] осушать; отводить воду

to follow (sth/sb) следовать за чем-л./кем-л.

to investigate [ɪn'vestɪgeɪt] исследовать, изучать

to manufacture [mænʃʊ'fæktʃə] производить, изготавливать

to mean [mi:n] (**meant, meant** [ment]) 1) значить; 2) иметь в виду

¹ Булыжник, булыжный камень – относительно небольшой (12–28 см) природный камень твердой породы округлой формы. В дорожном строительстве применяется для мощения мостовых, укрепления откосов, устройства оснований под дорожные одежды, ² Кювет – это водоотводная канава, проходящая вдоль обочины дороги.

³ Дорожная одежда – это многослойная конструкция в пределах проезжей части автомобильной дороги, воспринимающая нагрузку от автотранспортного средства и передающая ее на грунт.

⁴ Мостовая – твердое дорожное покрытие (одежда) городских улиц и некоторых дорог (мощеная дорога) из различных строительных материалов.

to protect защищать

to search искать

to slope иметь наклон

to throw [θrəʊ] (**threw** [θru:], **thrown** [θrəʊn]) бросать, кидать

trail след, тропа, тропинка

truck грузовик, грузовой автомобиль

vehicle ['vi:ik(ə)l] автомобиль, транспортное средство

wheeled vehicle колесное транспортное средство

wagon ['wæg(ə)n] фургон, повозка

2. Match the equivalents.

- | | |
|-----------------------|--|
| 1) clearing | a) городская территория |
| 2) origin | b) жизненно важная артерия |
| 3) rural area | c) окружающая земля |
| 4) ship | d) перевозить, отправлять (груз и т. п.)
любым видом транспорта |
| 5) solid base | e) полоса земли |
| 6) strip of land | f) происхождение |
| 7) surrounding ground | g) сельская местность |
| 8) urban area | h) твердое основание |
| 9) vital lifeline | i) участок земли, очищенный от деревьев
и кустарника |

3. Read the proper names.

Carthaginians¹ [ˌkɑ:θə'dʒɪniənz]

China ['tʃaɪnə]

Chinese [ˌtʃaɪ'ni:z]

Egyptians [ɪ'dʒɪptj(ə)nz]

England ['ɪŋɡlənd]

Etruscans² [ɪ'trʌsk(ə)nz]

¹ *Карфагеняне* (группа народов в западном Средиземноморье, переселившихся в Северную Африку и основавших там колонии в XII–VII вв. до н. э.)

² *Этруски* – цивилизация, населявшая в I тысячелетии до н. э. северо-запад Апеннинского полуострова (современная Тоскана) и создавшая развитую культуру, предшествовавшую римской и оказавшую на нее большое влияние. Древние римляне заимствовали у культуры этрусков строительную технологию.

Europe ['jʊərəp]
India ['ɪndiə]
Persia ['pɜːʃə]
Romans [rəʊmənz]
Rome [rəʊm]
the Roman Empire [ðə 'rəʊmən 'empaɪə]
the Near East¹ [ðə 'niə ,iːst]
the Old Silk Trade Route² [ðə ,əʊld ,sɪlk 'treɪd , ruːt]
Turkistan³ ['tɜːkɪstæn]

Reading task

4. Read the text carefully and do the tasks that follow.

Road is a strip of land that provides routes for travel by automobiles and other wheeled vehicles. Roads usually connect urban areas with each other and rural areas with urban areas.

Roads and highways are vital lifelines. Farmers use them to ship their products to markets. Trucks can carry manufactured products from one area to another. Good roads carry millions of automobiles that travel on business and for pleasure.

Roads are so old that we are not sure of the origin of the word *road*. Most experts think it came from the Middle English⁴ word *rode* meaning “a mounted journey”. This may have come from the Old English⁵ *rad*, from the word *ridan*, meaning “to ride”.

In England, hundreds of years ago, certain main roads were higher than the surrounding ground. This was because earth was thrown from

¹ *Ближний Восток* – историческое название региона, расположенного большей частью в Западной (Передней) Азии и частично в Северной Африке, на границе с Южной и Восточной Европой. Название этому ближайшему к ним восточному региону было дано европейцами.

² *Великий Шелковый Путь* – караванная дорога, связывавшая Восточную Азию со Средиземноморьем в Античности и в Средние века. В первую очередь использовался для вывоза шелка из Китая, с чем и связано его название.

³ *Туркестан* – исторический регион Центральной Азии, населенный народами тюркского происхождения.

⁴ *Middle English* is a form of the English language that was spoken after the Norman Conquest of 1066, until the late 15th century.

⁵ *Old English* is the earliest recorded form of the English language, spoken in England and southern and eastern Scotland in the early Middle Ages.

the side ditches towards the center. Because they were higher they were called highways. These roads were under protection of the king's men¹ and were opened to all travelers.

The first roads in the world probably followed trails and paths made by animals. People followed these trails to hunt for animals. People also made their own trails and paths in searching for water, food and fuel. Explorers followed these trails as they investigated new lands.

Early roads were built in the Near East soon after the wheel was invented. This was about 3000 B.C. As trade developed between villages, towns and cities, other paths or trade routes were made. One such early system of roads was the Old Silk Trade Route which ran over 6,000 miles (9,700 kilometers), connecting China with Rome and Europe. Merchants used this ancient route to carry Chinese silk across Turkistan, India and Persia.

The Egyptians, Carthaginians and Etruscans all built roads. But the first really great road builders were the Romans. They knew how to lay a solid base and how to make a pavement of flat stones. The Romans knew that the road must slope slightly from the center toward both sides to drain off water. The Roman road builders knew also that there must be ditches along the sides of the road to carry water away. Roman roads were built mainly to get soldiers from one part of the Empire to another. These roads ran in almost straight lines and passed over hills instead of cutting around them. The Romans built more than 50,000 miles (80,000 kilometers) of roads in the Empire and some of them are still in use.

From the 500's to the 1800's most roads in Europe were merely clearings in the forests. Cobblestone paving was used in some urban areas. There was little reason to build good roads, because most of the travel was on the horseback. The cleared way was sometimes quite wide so that robbers hiding in the woods could not leap out suddenly upon unsuspecting travelers. Later, when more wheeled vehicles, such as wagons, came into use, the roads of Europe still remained in poor condition.

Comprehension check

5. Decide if the statements are true or false according to the text.

1. Roads connect urban areas with each other and rural areas with urban areas.

¹ *the king's men* войско короля

2. The origin of the word “road” is clearly known and has no ambiguity.
3. The first roads in the world likely followed trails made by animals.
4. The Old Silk Trade Route was only about 1,000 miles long.
5. The Romans were known as the first great road builders, constructing over 50,000 miles of roads in their Empire.
6. Most roads in Europe from the 500’s to the 1800’s were well-paved.
7. Roman roads were designed to slope slightly from the center to drain off water.
8. The main purpose of Roman roads was for trade between cities rather than for military movement.

Vocabulary practice

6. Fill in the correct word from the box.

cobblestone	construction	country	ditches
hunting	straight	ways	

Roadmaking originated in the period of early human settlements. People chose the most convenient and the shortest 1) _____ to approach their 2) _____ and fishing grounds, making footpaths. The first artificially constructed tracks were made in mountainous and forested 3) _____.

Road 4) _____ was extensively developed during the Roman Empire. Their roads were 5) _____. Materials used in the construction of Roman roads were gravel, 6) _____ and hewn stone¹. 7) _____ helped roads to drain, even when roads were not elevated much.

7. Give the English equivalents to the Russian words.

1. Early roads were built in the Near East after the (*изобретения*) of the (*колеса*). 2. The Romans knew that the road (*должна слегка наклоняться*) from the centre towards both sides. 3. The center of the highways was higher than (*окружающая земля, чтобы отводить воду*) from the surface. 4. The road pavement was made of (*плоских камней*) with (*прочным основанием*). 5. The Roman roads were (*прямые*) with (*канавами по сторонам дороги*).

¹ hewn stone [hju:n] тесаный камень

Language focus

8. Find 8 pairs of synonyms.

Car, chief, journey, main, path, carry, connect, join, manufacture, produce, ship, to, towards, trip, vehicle, way.

9. Find 5 pairs of antonyms.

Bottom, curved, narrow, soft, solid, straight, build, ruin, top, wide.

10. Form the verbs from the following nouns and translate them.

MODEL: *concrete* (бетон) – *to concrete* (бетонировать)

Design, form, hunt, load, place, slope, shape.

11. Form the adverbs from the following adjectives and translate them.

MODEL: *main* (главный) – *mainly* (главным образом)

complete, mere, probable, recent, slight, sudden

Speak on:

- a) the appearance of the first roads in the world;
- b) Roman road builders.

UNIT II. OUTSTANDING HIGHWAY ENGINEERS

Pre-reading tasks

1. Study the vocabulary.

course [kɔ:s] слой

broken stone щебень, битый камень

cross-section поперечное сечение; поперечный профиль (дороги)

drainage ['dreɪnɪdʒ] дренаж

formation земляное полотно¹

highway engineer инженер-дорожник, дорожный инженер

impermeable [ɪm'pɜ:miəb(ə)l] непроницаемый, непромокаемый

layer слой

maintenance ['meɪnt(ə)nəns] обслуживание, поддержание, содержание; текущий ремонт

continuous maintenance непрерывное техническое обслуживание

structural ['strʌktʃ(ə)r(ə)l] конструкционный

surface ['sɜ:fɪs] поверхность

road surface дорожное покрытие

surfacing ['sɜ:fɪsɪŋ] дорожное покрытие²

granular surfacing ['grænjʊlə 'sɜ:fɪsɪŋ] покрытие из мелкого каменного материала (щебня, гравия)

to carry out проводить, выполнять

to compact [kəm'pækt] уплотнять

to elevate ['elɪveɪt] поднимать, повышать

to facilitate [fə'sɪlɪteɪt] облегчать, помогать, способствовать

to remove удалять, убирать, устранять

to support the load выдерживать нагрузку

trench траншея, канава

void пустота, пора

¹ *Земляное полотно* – сооружение, предназначенное для размещения конструктивных слоев дорожной одежды и других элементов дороги. Возводится из местных или привозных грунтов с обеспечением устойчивости самого земляного полотна, его обочин, откосов и естественных подстилающих грунтов.

² *Дорожное покрытие* – верхний, наиболее прочный слой дорожной одежды, принимающий непосредственное воздействие нагрузки, атмосферных факторов и определяющий основные транспортно-эксплуатационные качества дороги.

2. Match the equivalents.

1) commercial travel	a) боком, на ребро
2) demand	b) вырытый
3) edgewise	c) грунтовое основание
4) develop	d) дюйм
5) excavated	e) идти; проходить, проезжать
6) impassable	f) коммерческие перевозки
7) improvement	g) лежащий ниже
8) inch	h) надлежащий
9) pass	i) непроходимый
10) proper	j) нехватка, дефицит, недостаток
11) relatively	k) одинаковая толщина
12) scarcity	l) одинаковый (по размеру)
13) stress	m) относительно, сравнительно
14) subgrade ¹	n) подходящий
15) suitable	o) подчеркивать
16) thoroughly	p) разработать
17) underlying	q) спрос, требование, потребность
18) uniform thickness	r) тщательно
19) uniform-sized	s) усовершенствование
20) well-drained	t) хорошо дренированный

3. Read the proper names.

Bristol² ['brɪst(ə)l]

Britain ['brɪt(ə)n]

France [frɑːns]

John McAdam³ ['dʒɒn mək'ædəm]

Limoges⁴ [lɪ'məʊʒ]

Pierre Tresaguet⁵ ['piə trezə'ge]

Scotland ['skɒtlənd]

¹ In highway engineering, *subgrade* is the native material underneath a constructed road. It is also called *formation level*.

² *Бристоль* – город на юго-западе Великобритании

³ *Джон Макадам* (1756–1836) – шотландский инженер-дорожник, который разработал технологию строительства дорог с щебеночным покрытием.

⁴ *Лимож* – город и коммуна на юго-западе Франции

⁵ *Пьер Трезегэ* (1716–1796) – французский инженер, известный своими идеями в области современного дорожного строительства.

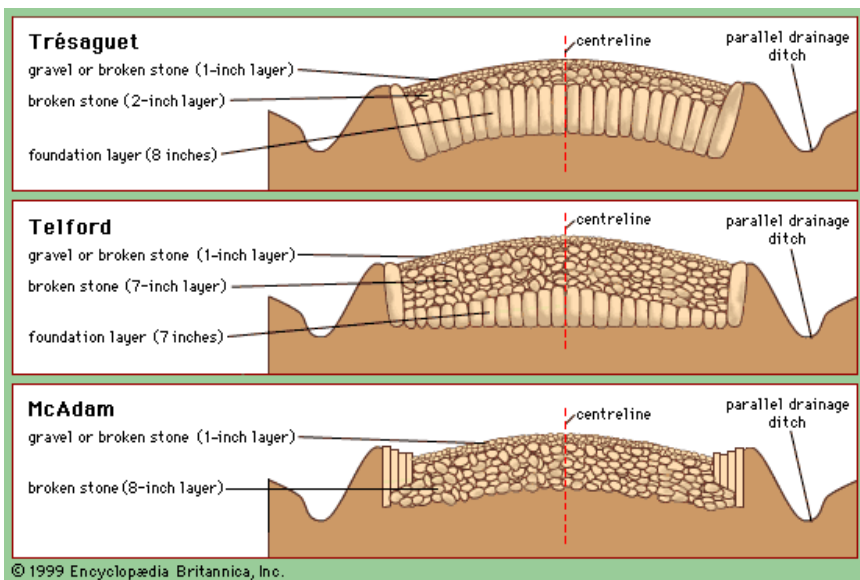
Reading task

4. Read the text carefully and do the tasks that follow.

Gradual technological improvements in the 17th and 18th centuries increased commercial travel, improved vehicles and the breeding of better horses. Rural roads became impassable in wet weather. These factors created an increasing demand for better roads.

Up to this time, roads similar to the Roman roads were built. However, owing to a scarcity of a suitable material and the high cost of labour, the amount of stone material used was progressively reduced and the work was carried out less thoroughly. Research was carried out to find out more rational methods of using stone for pavement construction which would reduce both the amount of labour and the cost. And in the last half of the 18th century the fathers of modern road building and road maintenance appeared in France and Britain.

Tresaguet. In France in 1764, Pierre Tresaguet became an engineer of bridges and roads in Limoges. He developed an entirely new type of relatively light road surface, based on theory that the underlying natural formation should support the load.



His standard cross-section, eighteen feet wide, consisted of an eight-inch-thick course of uniform stones laid edgewise on the natural formation and covered by a two-inch layer of broken stone. The second layer was topped with one-inch layer of smaller broken stone. In order to maintain surface level Tresaguet's pavement was placed in an excavated trench – a technique that made drainage a difficult problem.

McAdam. The greatest advance came from John McAdam, born in 1756 in Scotland. He reached major heights in his road-building career after 1804 when he was appointed general surveyor for Bristol. The roads leading to Bristol were in poor condition. There he showed that traffic could be supported by a relatively thin layer of small, single-sized pieces of broken stone placed and compacted on a well-drained natural formation and covered by an impermeable surface of smaller stones.

McAdam is famous for the surface he developed for roads. This kind of surface, called macadam, is still used today. McAdam also stressed the importance of proper drainage to keep roads on a solid foundation. Drainage was essential to the success of McAdam's method and he required the pavement to be elevated above the surrounding surface. The structural layer of broken stone was eight inches thick and used stone of two or three inches' maximum size laid in layers and compacted by traffic. The top layer was two inches thick, using three-quarter-inch stone to fill surface voids between the large stones. Continuous maintenance was essential.

Russian engineers were the first ones to construct granular surfacing laid on sand base which is now widely used in other countries. The use of a sand base permitted the cost of construction to be reduced and the removal of water from the subgrade to be facilitated. It helped to increase subgrade stability.

Comprehension check

5. Answer the following questions.

1. When did a period of intensive road-building begin in Europe?
2. Why was there a great demand for better roads?
3. What problems did the first engineers try to solve?
4. When did the fathers of modern road building appear?
5. What was the main idea of Tresaguet's method of road pavement construction?

6. What kind of surface did McAdam suggest?
7. What was essential in road pavement construction in McAdam's opinion?
8. What method of road pavement construction was proposed by Russian engineers?

6. Decide whether these statements are true or false. Correct the wrong ones.

1. Rural roads in the 17-th and 18-th centuries were passable in rainy weather.
2. There was enough suitable material to use for pavement construction.
3. Research was carried out to look for more rational methods of using stone for pavement construction.
4. Light road surface laid on natural formation was suggested by Pierre Tresaguet.
5. Tresaguet's pavement was elevated above the surrounding surface.
6. McAdam proposed new kind of surface, called cement, which is still used today.
7. The advantage of McAdam's method was that he placed the pavement in an excavated trench and provided proper drainage.
8. Granular surfacing laid on sand base which is now widely used in other countries was constructed by Russian engineers.

Language focus

7. Find 8 pairs of synonyms.

Advance, alike, allow, amount, change, connect, course, elevate, layer, link, permit, quantity, raise, similar, success, vary.

8. Find 7 pairs of antonyms.

Above, advance, cheap, entirely, expensive, failure, heavy, light, partly, plenty, scarcity, thick, thin, under.

9. State the part of speech of the following words and translate them.

wide – widen – width – widely;
deep – deepen – depth – deeply;
high – heighten – height – highly;
short – shorten – shortly;
long – lengthen – length;
smooth – smoothen – smoothness.

10. Form the nouns from the following verbs using suffixes *-er* /*-or* and translate them into Russian.

Compact, design, excavate, govern, investigate, make, manage, mix, survey, transport, travel, use, vibrate.

11. Give Russian equivalents to the following words.

1) a number of; 2) because of; 3) both ...and; 4) due to; 5) either ...or;
6) however; 7) in order to; 8) owing to; 9) the denser ...the slower;
10) the number

Summarizing

1. Make up a plan of the text.

2. Think and tell about:

- a) Tresaguet's method of road construction;
- b) the greatest advance of McAdam;
- c) the achievement of Russian engineers.

UNIT III. PAVING MATERIALS

Pre-reading tasks

1. Study the vocabulary.

asphalt ['æsfælt] 1) асфальт¹; 2) битум (*AmE*); 3) асфальтобетон²

hot-rolled asphalt асфальтобетон, уложенный в горячем состоянии

recycled asphalt переработанный асфальтобетон³

bitumen ['bitjəmən] битум, асфальт

bituminous [bi'tjuːmɪnəs] битумный

cement [si'ment] цемент

Portland cement портландцемент⁴

concrete ['kɒŋkri:t] бетон

asphaltic concrete асфальтобетон

construction material строительный материал

crack resistance трещиностойкость

cost стоимость

equipment [i'kwɪpm(ə)nt] оборудование

mixing equipment оборудование для перемешивания материалов

spreading equipment оборудование для распределения дорожно-строительной смеси

stone-crushing equipment камнедробильное оборудование

failure разрушение

friction трение

machinery [mæ'ʃiːn(ə)rɪ] машины, машинное оборудование

paving укладка дорожного покрытия

¹ *Асфальт* – греческое название черной горной смолы (битума), которая образуется в каменноугольных породах.

² *Асфальтобетон* – это искусственный безобжиговый строительный материал, изготовленный из смеси битума, крупных и мелких заполнителей (гравия, щебня, песка), минерального порошка и других компонентов. В обиходе асфальтобетонные смеси не совсем корректно именуют асфальтом, т. к. это греческое название черной горной смолы (битума), которая образуется в каменноугольных породах.

³ *Переработанный асфальтобетон* – материал, получаемый путем сортировки и/или дробления с последующим грохочением излишков асфальтобетонной смеси, асфальтобетонного гранулята или асфальтобетонного лома на дробильных установках.

⁴ *Портландцемент* – это самая популярная разновидность цемента, которая используется для изготовления бетона, железобетона, строительных растворов. Представляет собой гидравлическое вяжущее вещество, создаваемое из измельченного клинкера, гипса, специальных добавок (силикатов, алюминатов).

asphalt paving 1) асфальтирование; 2) асфальтобетонное дорожное покрытие

concrete paving 1) укладка бетонного дорожного покрытия; 2) бетонное дорожное покрытие

paving material материал для дорожного покрытия

stiff жесткий

strength прочность

strong прочный

to conduct проводить (тепло, электричество и т. п.)

to crush дробить

to finish (sth) выравнивать (что-л.)

to produce производить

to place укладывать

tough [tʌf] жесткий

tyre ['taɪə] шина, покрышка

Part I

2. Read the proper names.

Battery Park¹ ['bæt(ə)rɪ .pɑ:k]

Belgian ['beldʒ(ə)n]

Champs-Élysées² [ʃɑːz eɪˈliːzeɪ]

Clifford Richardson³ ['klɪfəd 'rɪtʃɑːdsən]

Columbia University⁴ [kəˈlʌmbiə juːnɪˈvɜːsɪti]

Edward de Smedt⁵ [ˈedwəd də 'smed]

England ['ɪŋɡlənd]

Fifth Avenue⁶ ['fɪfθ 'æv(ə)njuː]

¹ *Бэттери-парк* – парк на берегу Нью-Йоркской гавани на южной оконечности Манхэттена.

² *Елисейские поля* – главный бульвар в Париже.

³ *Клиффорд Ричардсон* – американский инженер-химик и эксперт в области асфальтобетона.

⁴ *Колумбийский университет* – частный исследовательский университет в Нью-Йорке, один из известнейших и престижнейших университетов США.

⁵ *Эдуард де Смедт* – американец бельгийского происхождения, изобретатель асфальтобетона.

⁶ *Пятая авеню* – улица в центре Манхэттена в Нью-Йорке; одна из самых известных, уважаемых и дорогих улиц в мире, на которой находится множество модных бутиков и эксклюзивных магазинов, исторических и культурных центров, памятников архитектуры.

Inverness¹ [ˌɪnvəˈnes]
 Joseph Mitchell² [ˈdʒəʊzɪf ˈmɪtʃəl]
 New Jersey³ [ˌnjuː ˈdʒɜːzi]
 New York⁴ [ˌnjuː ˈjɔːk]
 New York City⁵ [ˌnjuː ˈjɔːk ˌsɪti]
 Paris⁶ [ˈpærɪs]
 Scotland [ˈskɒtlənd]
 the United States [ðə ˌjuːˈnaɪtɪd ˌsteɪts]

3. Match the equivalents.

- | | |
|-----------------------|------------------------------------|
| 1) accelerating | a) быть перспективным |
| 2) application | b) волокно |
| 3) availability | c) движение на повороте |
| 4) available | d) доступный |
| 5) behaviour | e) залежь |
| 6) braking | f) заставлять, вынуждать |
| 7) cornering | g) импульс, стимул, толчок |
| 8) deposit | h) мощный |
| 9) draw upon sth | i) наличие |
| 10) fibre | j) поведение |
| 11) force | k) применение |
| 12) impetus | l) смесь |
| 13) mixture | m) стабильный учебник ⁷ |
| 14) offer promise | n) торможение |
| 15) powerful | o) ускорение |
| 16) standard textbook | p) черпать, брать из чего-л. |

¹ *Инвернесс* – портовый город, расположенный на побережье Северного моря на севере Шотландии, административный центр округа Хайленд.

² *Джозеф Митчелл* – шотландский инженер-строитель.

³ *Нью-Джерси* – штат на северо-востоке США.

⁴ *Нью-Йорк* – штат на северо-востоке США, на Атлантическом побережье, у границы с Канадой. В пределах штата находится крупнейший город, финансовый центр страны – Нью-Йорк.

⁵ *Нью-Йорк* – крупнейший город США, расположен на берегу Атлантического океана в юго-восточной части штата Нью-Йорк.

⁶ *Париж* – столица Франции.

⁷ *Стабильный учебник* – учебник, утвержденный в качестве обязательного пособия по какому-л. предмету в определенном учебном заведении и переиздаваемый без серьезных изменений в течение ряда лет.

Reading task

4. Read the text carefully and do the tasks that follow.

Roads at the turn of the 20th century were largely inadequate for the demands about to be placed on them by the automobile and bicycle. As vehicle speeds increased rapidly, the available friction between road and tyre became critical for accelerating, braking and cornering. In addition, numerous pavement failures made it obvious that much stronger and tougher materials were required. The result was an ongoing search for a better pavement. Asphalt and concrete both offered promise. Asphalt is a mixture of bitumen and stone, and concrete is a mixture of cement and stone.

The first road use of asphalt occurred in 1824 when asphalt blocks were placed on the Champs-Élysées in Paris. The first successful concrete pavement was built in Inverness, Scotland, in 1865. Both asphalt and concrete required the availability of powerful stone-crushing, mixing and spreading equipment.

The impetus for the development of modern road asphalt came from the United States which had few deposits of natural bitumen to draw upon and where engineers were therefore forced to study the behaviour of this material.

The first steps came in the 1860s with the work of Belgian immigrant Edward de Smedt at Columbia University in New York. De Smedt conducted his first tests in New Jersey in 1870 and by 1872 was producing the equivalent of modern road asphalt. The first applications were in Battery Park and on Fifth Avenue in New York City in 1872.

In 1887 de Smedt was followed as inspector of asphalts and cements by Clifford Richardson. Richardson basically developed two forms of asphalt: asphaltic concrete, which was strong and stiff and thus provided structural strength; and hot-rolled asphalt, which contained more bitumen and thus produced a far smoother and better surface for the car and bicycle. Richardson published a standard textbook on asphalt paving in 1905, and the practice did not change greatly thereafter. The biggest change was in the machinery available to produce, place and finish the material rather than in the product itself. Toward the end of the century, there were major movements towards the use of recycled asphalt, chemical modifiers for improving bitumen properties and small fibres for improving crack resistance.

The first modern concrete roads were produced by Joseph Mitchell who conducted three successful trials in England and Scotland in 1865–66. Like asphalt technology, concrete road building was largely, developed by the turn of the 20th century and was restricted more by the available machinery than by the material. For the following century the two materials remained in intense competition, both offering a similar product at a similar cost, and there was little evidence that one would far ahead of the other as they continued on their paths of gradual improvement.

Comprehension check

5. Answer the following questions.

1. The world entered the 20th century and roads didn't satisfy the demands of the automobile, did they? Why?
2. What kinds of materials were required for modern roads?
3. Why did the impetus for the development of modern road asphalt come from the United States?
4. What scientist produced the equivalent of modern road asphalt?
5. What kinds of asphalt did Clifford Richardson develop?
6. Who published standard textbook on asphalt paving?
7. Where were the first concrete roads built?
8. Why was concrete road building restricted?
9. Why did asphalt and concrete remain in intense competition for the following century?

6. Match the beginning with the ending.

Asphalt...	...contained more bitumen and produces a far smoother and better surface for the car and bicycle.
Asphaltic concrete...	...is a mixture of bitumen and stone.
Concrete...	...is a mixture of cement and stone.
Hot-rolled asphalt...	...was strong and stiff and provided structural strength.

Language focus

7. Match 8 pair of synonyms.

Rapidly, similar, slowly, the same, to accelerate, to apply, to change, to contain, to involve, to limit, to modify, to occur, to restrict, to speed up, to take place, to use.

8. Fill in the table. Give the Russian equivalents of the words.

Noun	Verb	Adjective	Adverb
<i>addition</i>	add	<i>additional</i>	<i>additionally</i>
		available	
	change		
	complete		
conductivity			
	continue		
	improve		
	mix		
	move		
	pave		
		possible	
	produce		
	require		
		stiff	

Speaking

9. Try to recollect the achievements of the following people whose names were mentioned in the text. Fill in the table.

Inventors	What invented	When invented	Where invented
Edward de Smedt			
Clifford Richardson			
Joseph Mitchell			

Writing practice

10. Write a short paragraph summarizing the text.

Part II

Pre-reading task

1. Read the proper names.

Iraq¹ [ɪˈrɑ:k]

Joseph Aspdin² [ˈdʒəʊzɪf ˈæspɪn]

Lebanon³ [ˈlebənən]

Mesopotamia⁴ [ˌmesəpəˈteɪmɪə]

Sir Walter Raleigh⁵ [ˌsɜːˌwɒltə ˈreɪli]

Syria⁶ [ˈsɪriə]

the Dead Sea⁷ [ðə ˈded ˌsiː]

the Dorset Coast⁸ [ðə ˈdɔːset ˌkəʊst]

the Euphrates River⁹ [[ðə ˌjuːˈfretɪːz ˌrɪvə]

the Gulf of Paria¹⁰ [ðə ˌɡʌlf əv ˈpæriə]

the Isle of Portland¹¹ [ðə aɪl əv ˈpɔːtlənd]

¹ *Ирак* – государство на Ближнем Востоке, в долине рек Тигр и Евфрат.

² *Джозеф Аспдин* – английский каменщик, изобретатель портландцемента.

³ *Ливан* – государство на Ближнем Востоке, расположенное в гористой местности на восточном берегу Средиземного моря. На востоке и севере граничит с Сирией, на юге – с Израилем.

⁴ *Месопотамия, Двуречье* – историко-географический регион на Ближнем Востоке, расположенный в долине двух рек – Тигра и Евфрата.

⁵ *Сэр Уолтер Рэйли* – английский придворный, государственный деятель, поэт и писатель, историк, моряк, солдат и путешественник, фаворит королевы Елизаветы I.

⁶ *Сирия* – государство на Ближнем Востоке, граничащее с Ливаном и Израилем на юго-западе, с Иорданией на юге, с Ираком на востоке и с Турцией на севере. Омывается Средиземным морем на западе.

⁷ *Мертвое море* – бессточный соленый замкнутый водоем на Ближнем Востоке, расположенный между Израилем, Иорданией и Палестинской Автономией.

⁸ *Побережье Дорсета* – графства, расположенного в центре южного побережья Англии.

⁹ *Река Евфрат* – самая крупная река в Западной Азии.

¹⁰ *Залив Пария* – внутреннее море между островом Тринидад и восточным побережьем Венесуэлы.

¹¹ *Остров Портленд* – известняковый остров, расположенный в проливе Ла-Манш.

the River Jordan¹ [ðə ,rɪvə 'dʒɔ:d(ə)n]
Trinidad² [trɪnə'dæd]

Reading task

1. Match the equivalents.

- | | |
|----------------------|------------------------------------|
| 1) aggregate | a) аэродром |
| 2) airfield | b) водонепроницаемый |
| 3) base course | c) гидроизоляция |
| 4) cracking | d) залежь |
| 5) crude method | e) заполнить |
| 6) crude oil | f) крекинг ³ |
| 7) deposit | g) легкие частицы |
| 8) gravity | h) несущий слой дорожного покрытия |
| 9) heavy residue | i) нефтеочистительный завод |
| 10) impurity | j) нефтеперегонка |
| 11) light fractions | k) нефтяная залежь |
| 12) oil distillation | l) нефтяная скважина |
| 13) oil pool | m) приближенный метод |
| 14) oil well | n) почва, грунт |
| 15) refinery | o) примесь |
| 16) soil | p) сырая нефть |
| 17) versatile | q) тяжелый осадок |
| 18) waterproof | r) удельный вес ⁴ |
| 19) waterproofing | s) универсальный |

3. Before reading the text answer the following questions.

- Do you know how asphalt is obtained?
- In your opinion what are the processes used in the refining of asphalt?

¹ Река Иордан – река на Ближнем Востоке. Одна из основных водных артерий региона.

² Тринидад – остров в Карибском море у северо-восточных берегов Южной Америки, является основной частью государства Тринидад и Тобаго.

³ Крекинг – разложение нефтяных продуктов в специальных установках, во время этого процесса происходит расщепление тяжелых малочисленных продуктов (например, мазута) на более ценные продукты (например, бензин).

⁴ Удельный вес – физическая величина, которая определяется как отношение веса вещества (тела) к занимаемому им объему.

Reading task

4. Read the text carefully and do the tasks that follow.

Asphalt – an Ancient Constructional Material

Asphalt, the world's most versatile construction material today, is by no means new. It was used in many ways in ancient Mesopotamia, Syria and Egypt. The asphalt used by the ancients was a native material obtained from many of the oil pools where crude oil rose to the surface and the lighter fractions were evaporated by nature. The remaining heavy residue usually contained various amounts of water, soil and other impurities; but by slow and crude methods of oil distillation, fuel for lamps and bituminous products for mastics, waterproofing and paving were obtained.

The most extensive sources of native asphalt 4,000 to 5,000 years ago were located in Iraq. Several large deposits are known to have existed along the banks of the Euphrates River.

The Egyptians obtained native asphalts for waterproofing and building from the Dead Sea and from a source near the River Jordan in Lebanon.

Asphaltic construction materials are a component of crude oil taken from the hundreds of thousands of oil wells throughout the world today. The amount of asphalt that a crude oil may contain is quite variable, depending upon the gravity of the crude oil. The lower the gravity of the crude oil the higher is the asphalt content.

The crude oil is transported by pipelines, tank cars or barges to the refineries where it is separated into its various components by a continuous-flow refining process.

In the refining of asphalt, two different processes are used: steam and vacuum distillation method and solvent extraction method. Another refining method used to obtain a higher percentage of motor fuel is the "cracking" process, which by intense heat and high pressures brings about a chemical change producing a bituminous type of material not widely used for paving.

The basic principles of soil-asphalt stabilization, as applied to highway and airfield construction, are methods of designing and mixing local soil or aggregate with asphaltic material to form a stable and waterproof base course. Properly constructed soil-asphalt base courses resist deformation through the cementing action of the asphalt which binds the soil

particles together. The thin coating of asphalt around the soil particles also provides a high degree of waterproofing which is further aid to resistance to deformation.

Comprehension check

5. Answer the following questions.

1. How was native asphalt obtained in ancient times?
2. Where were large sources of native asphalt found?
3. What was asphalt used for?
4. What does the amount of asphalt in a crude oil depend on?
5. How is the crude oil transported to the refineries?
6. What processes are used in the refining of asphalt?
7. What is done to form a stable waterproofed base course?

Language focus

6. Build nouns, adjectives, or adverbs from the words below and translate them.

	Noun	Adjective	Adverb
proper	—		
stable			
to coat			—
to continue			
to crack			—
to extract			—
to form			
to refine			
to resist			
to stabilize			
to vary			

7. Find 11 pairs of synonyms.

Aid, amount, apply, bind, connect, contain, course, divide, fraction, get, help, involve, layer, method, obtain, particle, quantity, remain, separate, stay, use, way.

8. Put the correct forms of the words into the sentences.

Nature works its wonders

Sir Walter Raleigh _____ on the island of Trinidad in 1595 and stayed there long enough to obtain a _____ of asphalt. The asphalt he used was a native asphalt _____ from an asphalt lake a short distance from the shore of the Gulf of Paria and was similar to that _____ by the ancients.	to land to supply to take to use
Hundreds of thousands of tons of asphalt have been _____ from the Trinidad lake without any sign of loss. As the material removed, pressure deep in the earth _____ more of the heavy residue to the surface, where nature continues its _____ process.	to remove to force
The natural asphalt _____ from the lake _____ many impurities and foreign matter such as water, fine sand and vegetation. To produce a _____ paving material, these impurities have to be _____; therefore a refining process is necessary.	to refine to remove to contain to suit to remove

9. Translate from Russian into English.

1. Асфальт является природным материалом, получаемым из нефтяных скважин.
2. Сырую нефть транспортируют на нефтеочистительные заводы, где ее разделяют на различные составные элементы.
3. Количество асфальта в сырой нефти зависит от ее плотности.
4. Чем выше плотность сырой нефти, тем выше содержание асфальта.
5. При очистке асфальта используется два метода: метод паровой и вакуумной дистилляции, а также метод экстракции селективным растворителем.
6. Укрепление грунта или заполнителя асфальтом широко используется при строительстве дорог и аэродромов.
7. Тонкое покрытие асфальтом вокруг частиц грунта обеспечивает высокую степень водонепроницаемости основания дорожной одежды.

10. Read the text and choose the right statement.

One of the oldest building materials is finding its way into a lot of new places these days. Concrete, first discovered by the Romans, is now more widely used in construction than all other materials together.

The magic ingredient that makes concrete possible is cement, about which, according to an expert, more has been learnt in the past three decades than in the preceding 2,000 years. Concrete is a synthetic stone which can be formed while soft into practically any shape the builder wants.

Portland cement mixed with water is the paste that binds sand, gravel, clinker¹ into an artificial rock that becomes harder as the years pass. Portland cement does not come from a place of that name; it was called Portland because Joseph Aspdin, the English builder who invented the first dependable, scientifically made cement about 1824, thought it resembled² the rock excavated on the Isle of Portland on the Dorset Coast.

Portland cement is called after the name of...

- 1) the person who invented it;
- 2) the place it had been formed;
- 3) the island where the mineral it is similar to was excavated.

¹ *clinker* шлак. Шлак в металлургии – побочный продукт или отход от производства металла после очистки от остатков ценных компонентов, отправляемый в отвал. В строительстве шлак применяется для изготовления стройматериалов (кирпич, черепица) и в качестве добавки к цементу (существуют цементы, полностью изготавливаемые из шлака).

² *resemble* напоминать

UNIT IV. ROAD

Pre-reading tasks

1. Study the vocabulary.

complex сложный

disintegration нарушение целостности

earthwork ['ɜ:θwɜ:k] земляные работы

gravel ['græv(ə)l] гравий

load нагрузка

dynamic load [daɪ'næmɪk] динамическая нагрузка¹

maintenance ['meɪnt(ə)nəns] обслуживание, содержание

moisture ['mɔɪstʃə] влага, влажность

moisture content ['mɔɪstʃə 'kɒntent] содержание влаги

moisture distribution ['mɔɪstʃə dɪstrɪ'bju:ʃ(ə)n] распределение влаги

operation работа, операция

road-building operations дорожно-строительные работы

site площадка, участок

construction site строительная площадка, стройплощадка

stability устойчивость

structure конструкция, сооружение, строение

engineering structure инженерное сооружение

subgrade ['sʌbgreɪdɪl] подстилающий слой²

subsoil ['sʌbsɔɪl] грунтовое основание дороги; подстилающий грунт³

to cause быть причиной, вызывать

to repair ремонтировать

to service обслуживать

to subject (to) [səb'dʒekt] подвергать (чему-л.)

¹ Динамическая нагрузка – нагрузка, характеризующаяся быстрым изменением во времени ее значения, направления или точки приложения и вызывающая в элементах конструкции значительные силы инерции.

² Подстилающий слой – нижний конструктивный слой дорожной одежды, выполняющий функции передачи нагрузок на земляное полотно, а также функции морозозащитного и дренажного слоя.

³ Подстилающий грунт – естественный грунт с ненарушенной структурой, на котором сооружается земляное полотно. Располагается непосредственно под дорожной конструкцией на толщину активной зоны, в которой практически затухают напряжения и деформации от транспортной нагрузки.

to vary ['veəri] изменять, изменяться

to withstand [wið'stænd] (**withstood**, **withstood** [wið'stud]) выдерживать, противостоять, сопротивляться

to withstand loads выдерживать нагрузки, противостоять нагрузкам, сопротивляться нагрузкам

traffic движение, транспорт

motor traffic автомобильный транспорт

traffic density плотность движения (автомобилей)

2. Read the following international words. Try to guess their meaning.

Aesthetic, climatology, comfort, economic, economy, geology, gravel, hydraulics, hydrology, maximum, mechanization, mechanize, natural factors, physical processes, plan, profile, system, to design, transportation.

3. Match the equivalents.

- | | |
|--|---|
| 1) amenities | a) вводить в эксплуатацию |
| 2) complete mechanization | b) вписывать в ландшафт в плане и профиле |
| 3) engineering solution | c) дробление каменных материалов |
| 4) excessive | d) замерзание |
| 5) fit into the landscape in plan and in profile | e) культурно-рекреационное обустройство территории города |
| 6) freezing | f) ответственный за что-л. |
| 7) gravel quarrying | g) оттаивание |
| 8) in charge of sth | h) первостепенная важность |
| 9) moistening | i) полная механизация |
| 10) passage | j) проезд |
| 11) pavement performance | k) разработка гравийного карьера |
| 12) put into service | l) ремонтная мастерская |
| 13) repair shop | m) техническое решение |
| 14) stone crushing | n) увлажнение |
| 15) thawing | o) чрезмерный |
| 16) utmost importance | p) эксплуатационные качества дорожной одежды |

Reading task

4. Read the text carefully and do the tasks that follow.

Modern highways are complex engineering structures. They are intended for high-speed motor traffic. The road pavement must continuously provide good riding qualities and be capable of withstanding the dynamic loads influenced by passage of vehicles. Pavements and road subgrades are subjected to the influence of many natural factors such as heating by the sun, freezing, thawing, moistening by rain, etc. Complex physical processes develop in the subgrade caused by variations in moisture distribution and an increase in subsoil moisture content. An excessive moisture content quickly causes the subsoil to lose its strength and may lead to disintegration of the road foundation. The many and varied factors of pavement performance have to be taken into account by the designer and constructor who have to provide for the maximum stability of the subgrade and for the maximum strength of the pavement.

Roads are built in the most varied natural conditions – in broad plains and hills, sandy deserts and in mountains. In all these diverse and complex conditions, the highway engineer has to be able to find correct engineering and economic solutions. Because of this, when solving construction problems related to road he has to make use of natural and historical sciences, i. e. geology, climatology, hydraulics, hydrology, etc. He must be able to design highways so as to ensure comfort and safety of transportation.

The road-building operations become complicated because of the extensive length of the construction site – often tens and hundreds of kilometers. The task of the road engineer is to mechanize and technically develop the road-building operations and to provide for the most efficient and complete mechanization of the entire construction process. This is true to such operations as earthworks, sand and gravel quarrying, stone crushing and cement-concrete surfacing.

Finally, when the highway is put into service, its maintenance and the provision for uninterrupted traffic become of the utmost importance of the national economy. The engineer in charge of the highway operation must ensure the maintenance of the road quality under all traffic and weather conditions.

With the growth of traffic density, a demand for greater amenities will come. It will be necessary to provide the national road system with

hotels and restaurants, service stations and repair shops, where drivers and passengers may rest and vehicles be serviced and repaired. Attention should be given to such questions as fitting roads into the landscape in plan and in profile, planting trees, so as to improve their aesthetic value.

Comprehension check

5. Answer the following questions.

1. What is a highway?
2. What are modern highways intended for?
3. What is the main function of the road pavement?
4. What factors are pavements and road subgrades subject to?
5. Why do complex physical processes develop in the subgrade?
6. What can an excessive moisture content lead to?
7. What kinds of sciences must the road engineer know to ensure comfort and safety of transportation?
8. What do you know about the conditions in which road engineers have to build different kinds of roads?
9. In what way it is possible to make road-building operations easier?
10. What conveniences must the national road system be provided with?

Vocabulary practice

6. Choose the right translation of the word.

subsoil a) почва; b) гравий; c) подстилающий слой грунта

to withstand a) различать; b) выдержать; c) обеспечить

distribution a) распределение; b) расширение; c) удаление

content a) ослабление; b) уклон; c) содержание

surfacing a) покрытие; b) замерзание; c) увлажнение

disintegration a) осушение; b) расслоение; c) преодоление

excessive a) чрезмерный; b) полный; c) разнообразный

crush a) поднимать; b) уничтожать; c) дробить

to cause a) определять; b) вызывать; c) требовать

stability a) изменение; b) влияние; c) устойчивость

Language focus

7. Read the following words paying attention to the stress and translate them.

	Noun	Verb
concrete	['kɒŋkri:t]	['kɒŋkri:t]
export	['ekspɔ:t]	[ɪk'spɔ:t]
import	['impɔ:t]	[ɪm'pɔ:t]
increase	['ɪŋkri:s]	[ɪn'kri:s]
subject	['sʌbdʒɪkt]	[səb'dʒekt]
transport	['trænsɔ:t]	[træn'spɔ:t]

8. Complete the table. Try to remember what the following words mean.

Noun	Verb
	construct
	design
distribution	
	heat
	influence
load	
maintenance	
moisture	
passage	
	provide
	solve
	vary

9. Give the initial forms of the words and translate them.

Continuously, excessive, necessity, qualities, safely, sandy, uninterrupted, varied, withstanding.

10. Find 8 pairs of synonyms.

Amenities, change, complete, conveniences, decision, diverse, ensure, guarantee, operation, pay attention (to), solution, take into account, total, various, vary, work.

11. Fill in the correct prepositions.

1) because ...; 2) be capable ...; 3) give attention ...; 4) intend ...;
5) provide ...; 6) subject ...; 7) take ... account

12. Translate the following sentences into English.

1. Современные дороги предназначены для высокоскоростного автомобильного транспорта.
2. Покрытие дороги должно обеспечивать хорошее качество езды и выдерживать динамические нагрузки.
3. Покрытия и дорожные основания подвержены влиянию многих природных факторов, таких, как нагревание солнцем, замерзание, таяние, увлажнение и т. д.
4. Сложные физические процессы, вызванные изменением в распределении влаги, развиваются в грунтовом основании.
5. Чрезмерное содержание влаги в грунтовом основании может привести к его разложению.
6. Проектировщик и строитель должны обеспечивать максимальную устойчивость грунтового основания и максимальную прочность покрытия.
7. Задача инженера-дорожника заключается также в том, чтобы обеспечить механизацию таких процессов, как земляные работы, разработка песчаных и гравийных карьеров, дробление камня и цементно-бетонных покрытий.

Speak on:

- a) the road pavement of modern highways;
- b) the role of a road engineer in the construction of modern highways.

UNIT V. HIGHWAY NETWORK PLANNING

Pre-reading tasks

1. The following unit is devoted to planning, so what do you think?

1. What is the purpose of planning?
2. Is it important to use a plan before doing something?
3. What's the job of highway planners?

2. Study the vocabulary.

adjacent [ə'dʒeɪs(ə)nt] прилегающий, смежный, соседний

aerial photography ['eəriəl fə'tɒɡrəfi] аэрофотосъемка¹

culvert ['kʌlvət] водопропускная труба, кульвэрт², дренажная труба

curve [kɜ:v] изгиб, поворот (дороги и т. п.)

sharpness of curves резкость изгибов, резкость поворотов

drawing чертеж

detailed drawing детальный чертеж

environmental impact statement заключение о воздействии на окружающую среду

excavation 1) выемка грунта, земляные работы, рытье котлована;

2) выемка в грунте, котлован

foundation основание

grade уклон (дороги)

haulage ['hɔ:ldʒ] доставка; транспортировка

lane полоса движения

planner инженер-планировщик

right-of-way полоса отвода³

¹ *Аэрофотосъемка* – технологический процесс аэрофотографической съемки, содержание которого заключается в получении фотографического изображения местности с летательного аппарата.

² *Кульвэрт* представляет собой водопропускную трубу, устраиваемую под дорожными насыпями, плотинами с целью обеспечения дренажа, сохранения их от размывов и одновременного отказа от мостовых конструкций, являющихся более дорогостоящим решением.

³ *Полоса отвода* – земельные участки (независимо от категории земель), которые предназначены для размещения конструктивных элементов автомобильной дороги, дорожных сооружений и на которых располагаются или могут располагаться объекты дорожного сервиса.

shoulder ['ʃəʊldə] обочина
sidewalk ['saɪdwɔ:k] тротуар
slope откос
standard стандарт, норматив, технические требования
steepness ['sti:pnes] крутизна
to draw up (drew up, drawn up) составлять
to fulfill [fʊl'fɪl] выполнять, исполнять, осуществлять
to govern регулировать; определять
to identify [aɪ'dentɪfaɪ] определять
to locate 1) размещать; 2) находиться
traffic движение, транспорт
heavy traffic интенсивное движение (транспорта)

3. Read the following international words. Try to guess their meaning.

Detailed, effect, humus, location, photography, plan, planner, project, public, route, section, standards.

4. Match the English words with their Russian equivalents.

- | | |
|----------------------------|--------------------------------|
| 1) boundary | a) влиять (на) |
| 2) effect (on) | b) воздействие (на) |
| 3) exact | c) граница |
| 4) land use | d) долговременные нужды |
| 5) long-range needs | e) землепользование |
| 6) natural feature | f) общественное слушание |
| 7) public hearing | g) прогнозировать |
| 8) public participation | h) топографическая особенность |
| 9) to affect | i) точный |
| 10) to discover in advance | j) узнать заранее |
| 11) to draw a map | k) участие общественности |
| 12) to predict | l) учет движения (на дороге) |
| 13) traffic count | m) чертить карту |

Reading task

5. Read the text carefully and do the tasks that follow.

In planning a highway network or a route, highway planners must learn:

- where people live;
- where they want to go;
- how they get there;
- where goods are produced;
- what markets the goods are sent to;
- how the goods reach their final users.

Traffic counts tell how many and what kinds of vehicles travel on a road, and when traffic is the heaviest. From these and other facts about the past and present, planners try to predict future growth in population and industry, changes in land use, and how such growth and change will affect highway needs.

Public participation in road planning is essential. In the U.S. highway planners hold public hearings on most major highway projects. These meetings enable citizens to present their views before a project begins.

Before highway construction begins, planners must also prepare an environmental impact statement. The purpose of such a statement is to discover in advance all the possible good and bad effects that a new highway may have on the public and on the environment.

Highway engineers draw up standards for various kinds of roads, highways, and bridges. These standards govern the thickness and kind of foundation and surfacing for different kinds of traffic; the number of lanes needed; the sharpness of curves; and the steepness of hills.

In planning a new road or rebuilding an existing one, maps must be drawn if they are not already available. Aerial photography is widely used today for this work. These maps show the location of other roads, railroads, towns, farms, houses, and other buildings. They also show such natural features as rivers, lakes, forests, hills and the slope of the land. The types of soil may also be identified.

Using these maps, engineers locate new highways and make detailed drawings called plans. The plans show the exact boundaries of the right-of-way. This is land needed for road pavement, shoulders, ditches, and side slopes. The plans also show the exact location, grades, and curves of the pavement, and the location of bridges and culverts.

So highway planners study everything from the long-range needs of a country to a particular section of a single route. This planning determines what the highway needs of the region are and how these needs can best be fulfilled and paid for.

Comprehension check

6. Decide whether these statements are true or false.

1. There is no need for highway planners to know where people live, where they want to go, where goods are produced and sent to.
2. In planning a new highway planners try to predict future growth in population and industry.
3. In the USA before the project begins people meet and discuss their ideas about future highways.
4. Maps showing the location of other roads, towns, houses and other buildings are usually drawn in planning a new road or rebuilding an existing one.
5. There are no special standards for various kinds of roads, highways, and bridges, which govern the thickness, kind of foundation, surfacing, the number of lanes and other peculiarities.
6. A plan is a drawing that shows exact boundaries of the right-of-way and also the exact location, grades, and curves of the pavement, and the location of bridges and culverts.
7. The aim of planning is to find the best way of highway needs fulfillment.

Vocabulary practice

7. Choose the right translation of the word.

- 1) **formation** a) создание; b) земляное полотно; c) учреждение
- 2) **impermeable** a) недоступный; b) непроницаемый; c) устойчивый
- 3) **compact** a) поднимать; b) уменьшать; c) уплотнять
- 4) **slope** a) наклон; b) подъем; c) спуск
- 5) **suitable** a) тщательный; b) внимательный; c) подходящий
- 6) **tough** a) слабый; b) прямой; c) жесткий
- 7) **solid** a) солидный; b) устойчивый; c) твердый
- 8) **crush** a) копать; b) дробить; c) облегчать
- 9) **complete** a) проводить; b) завершать; c) исследовать
- 10) **thoroughly** a) тщательно; b) первоначально; c) успешно

8. Fill in the correct word from the box.

available populations	benefits route	distance traffic	drawings volumes	highways
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1. _____ are designed for the haulage of goods and passengers with a minimum of effort and at low cost.
2. Traffic between two centers is approximately proportional to their _____ and inversely proportional to the _____ between them.
3. Consideration in planning is also given to the effect of new _____ on existing streets, roads, and parking lots.
4. The economic, social, and environmental _____ and costs of the roads are discussed with relevant official and community organizations until an acceptable specific _____ is determined.
5. Computer models are then used to estimate future traffic _____ on each proposed route.
6. Aerial photography is widely used today to draw maps if they are not _____.
7. All construction work is performed in accordance with working _____.

9. Match the terms with their definitions.

bridge shoulder	culvert slope	ditch vehicle	right-of-way
--------------------	------------------	------------------	--------------

1. Any means in or by which someone travels or something is carried.
2. A long, narrow excavation made in the ground by digging, as for draining or irrigating land.
3. A structure that spans and provides a passage over a road, railway, river, or some other obstacle.
4. Ground which has a natural inclination, as the side of the hill.
5. A portion of the right-of-way which is wide for safe emergency stopping and sloped for proper drainage.
6. A drain or channel crossing under a road, sidewalk, etc.
7. The zone which is marked for laying the road, excavating the soil for filling the embankments, for building ancillary structures and for green plantings.

Language focus

10. Arrange the synonyms into 8 pairs.

Accurate, allow, carry out, decide, demands, determine, direct, ditch, exact, fulfill, govern, locate, needs, permit, place, trench.

11. Form nouns from the following verbs and translate them.

Determine, discover, draw, exist, grow, locate, meet, participate, pave, plan, predict, travel.

12. Translate the following sentences into English.

1. Инженеры-дорожники составляют стандарты (нормы) для различных видов дорог, магистралей и мостов.
2. При планировании новой дороги следует чертить карты.
3. Карты показывают местоположение рек, озер, лесов, холмов, других дорог, железных дорог и домов.
4. Используя карты, инженеры выполняют детальные чертежи, называемые планами.
5. При планировании магистралей следует знать, где люди живут и куда они хотят ездить.
6. Участие общества в планировании дорог в США является весьма важным.

Speak on

13. Speak about planning of roads and highways. Use the following expressions as introductions.

It is known that ...

It should be noted that ...

It is essential to note that ...

It is a well-known fact that...

UNIT VI. ORGANIZATION OF SURVEY WORK

Pre-reading tasks

1. Study the vocabulary.

accuracy ['ækjʊərəsi] точность

adopted принятый

available доступный, имеющийся, имеющийся в наличии

data ['deɪtə] (*pl.*) данные, информация, сведения, факты

estimate ['estɪmət] 1) оценка; 2) смета, калькуляция; предварительный подсчет

approximate estimate [ə'prɒksɪmət 'estɪmət] приблизительный расчет

field work полевая съемка, работа в поле (геолога и т. п.)

geological engineer [dʒi:ə'lɒdʒɪk(ə)l] инженер-геолог

gradient ['ɡreɪdɪənt] продольный уклон дороги

investigation [ɪn,vestɪ'geɪʃ(ə)n] исследование, изыскания

geological investigation [dʒi:ə'lɒdʒɪk(ə)l ɪn,vestɪ'geɪʃ(ə)n] геологическое исследование

soil investigation исследование грунта

quarry ['kwɒrɪ] открытая разработка, карьер

survey ['sɜ:veɪ] / **surveying** [sə'veɪnɪŋ] 1) обследование; 2) геологическое изыскание; 3) топографическая съемка

survey work / surveying work изыскательские работы

economic survey экономическое обследование

engineering survey инженерные изыскания

survey operations геодезические работы

survey party изыскательская партия, изыскательский отряд

technical standard нормативный технический документ¹

thoroughness ['θɒrənəs] тщательность

to carry responsibility (for) нести ответственность (за что-л.)

to carry out / to execute ['eksɪkju:t] / **to perform** выполнять, исполнять, осуществлять

¹ Нормативный технический документ – документ, устанавливающий правила, общие принципы или характеристики, касающиеся различных видов деятельности или их результатов.

to check the quality проверять качество
to collect materials собирать материалы
to establish устанавливать, утверждать
to estimate ['estimeɪt] оценивать
to focus attention (on) сосредотачивать внимание (на чем-л.)
to indicate ['ɪndɪkeɪt] указывать, показывать
to lead [li:d] (**led, led**) **to an increase in cost** приводить к увеличению стоимости
to select [sɪ'lekt] выбирать
to utilize ['ju:tɪlaɪz] использовать

2. Read the following international words. Try to guess their meaning.

Cartographical, climatic, climatological, geological, information, inspector, intensity, materials, maximum, minimum, nature, party, period, potential, process, regional situation, relief, season, special, topographical.

3. Read the proper names.

Siberia¹ [saɪ'biəriə]
 the Far East² [ðə 'fa: ɪ:st]

4. Match English and Russian equivalents.

- | | |
|---|--|
| 1) appropriate | a) в соответствии с |
| 2) average monthly intensity of snowfall and rainfall | b) внешний источник |
| 3) carriageway | с) геодезическое бюро |
| 4) considerable | d) глава, начальник |
| 5) designing department | e) достаточный |
| 6) head | f) на основании (чего-л.) |
| 7) in accordance with | g) подходящий |
| 8) intermediary towns and cities | h) приводить достаточные доказательства, основания |

¹ *Сибирь* – азиатская территория России от Урала до Тихого океана.

² *Дальний Восток* – географический, геополитический и историко-культурный регион, включающий Северо-Восточную, Восточную и Юго-Восточную Азию.

9) on the basis (of sth)	i) принимать окончательное решение
10) outside source	j) проезжая часть
11) sufficient	k) проектное бюро
12) surveying department	l) промежуточные населенные пункты
13) time rate	m) с учетом (чего-л.)
14) to encounter difficulties	n) среднемесячная интенсивность осадков
15) to finalize a decision	o) срок
16) to substantiate	p) сталкиваться с трудностями
17) with a view of sth	q) существенный

Reading task

5. Read the text carefully and do the tasks that follow.

Economic and engineering surveys are carried out mainly by special road designing and surveying organizations. The field work is executed by a special survey party that collects the required materials and performs the necessary surveying work. In the process of surveying appropriate data must be obtained for making an approximate estimate of the quantities and cost of the work and also for establishing the required road-building materials both from local and from outside sources, and whether their quantity is sufficient for construction of the road or bridge.

The time rates for carrying out the survey and designing work are established with a view to the type of survey and the nature of the relief of the area, as well as the climatic and other local conditions influencing the efficiency of work of the party. The head of the survey party is in charge of all works and carries full responsibility for the accuracy of the survey field work, and also for the thoroughness and quality of all the data collected.

During surveys special attention should be focused on the study of local natural conditions and in particular on the carrying out of geological and soil investigations.

The survey party usually includes a geological engineer, who is in charge of all operations concerned with geological and soil investigations, and with the location of quarries for road-building materials.

The designing and surveying departments check the quality of the survey party's work with the aid of special inspectors.

The season of the year does not limit the survey operations at present. Surveys are carried out all the year round with the exception of the northern regions of Siberia and the Far East. However, surveying operations in winter encounter considerable difficulties, which lead to an increase in cost.

When studying climatological information, it is necessary to establish the general climatic conditions of the area where the road is to be laid (average monthly temperature over the year, average monthly intensity of snowfall and rainfall for a year). All these items must be substantiated by means of information obtained from local meteorological stations and from highway authorities. These data are utilized in finalizing decisions relating to design.

On the basis of the available cartographical information the location of road is selected. The location of the road is studied on large-scale maps, which are termed topographical maps. Relief and detailed regional situation are indicated on them. The alternative locations of the route are considered, whether to lead the road around or through intermediary towns and cities, to cross large water ways or along a valley, etc.

Simultaneously with map route location the main technical standards for designing the road should be established. The class of the road, the type and width of the carriageway and the overall width, maximum gradient and minimum radius of curves, etc., are included in such technical standards. The class of road and technical standards adopted must be in accordance with the potential development of traffic over a period of not less than 10 years.

Comprehension check

6. Answer the following questions.

1. Is it necessary to carry out survey work of the land before the construction of a road?
2. Who usually performs an examination of the shape, size and position of a piece of land?
3. What data are usually obtained in the process of surveying by a special survey party?
4. What should special attention be focused on during surveys?
5. Does the season of the year limit the survey operations?
6. What does climatological information include?
7. What is usually indicated on topographical maps?
8. What do technical standards comprise?

Vocabulary practice

7. Choose the right translation of the word.

1. **elevate** a) включать; b) смещать; c) поднимать
2. **demand** a) требование; b) бедствие; c) нагрузка;
3. **utilize** a) побуждать; b) нагнетать; c) использовать, применять
4. **route** a) резина; b) трасса, маршрут; c) выступ
5. **maintain** a) сопротивляться; b) усиливать; c) содержать, обслуживать, ремонтировать
6. **urban** a) городской; b) доступный; c) заметный
7. **towards** a) вперед; b) к, по направлению; c) вниз
8. **available** a) соответствующий; b) благоприятный; c) имеющийся в распоряжении
9. **resistance** a) сопротивление; b) прочность; c) мощение
10. **aggregate** a) агрегат; b) заполнитель (бетона); c) множество

8. Match the words with their definitions.

accuracy	climate	condition	curve
data	investigation	survey	

1. A continuous bending line that has no straight parts.
2. The long-term prevalent weather conditions of an area, determined by latitude, position relative to oceans or continents, altitude, etc.
3. A particular state of being or existence; situation with respect to circumstances.
4. A single piece of information; fact.
5. To plot a detailed map of (an area of land) by measuring or calculating distances and height.
6. A careful search or examination in order to discover facts.
7. The degree of agreement between a measured or computed value of a physical quantity and the standard or accepted value for that quantity.

Language focus

9. In the text find synonyms to the following words.

Accept (v), call (v), care (n), fulfill (v), help (v), involve (v), pay attention to (v), point out (v), research (n), use (v).

10. Put the words into the proper column.

Accuracy, appropriate, approximate, available, curve, encounter, exception, focus, include, indicate, intermediary, mainly, relief, responsibility, simultaneously, situate, surveyor, thoroughness.

Verb	Noun	Adjective	Adverb

11. Translate the following groups of words into Russian.

- 1) a number; the number of accidents; a number of advantages; in magazine number one; a motor-car number;
- 2) to take interest; to take into account; it takes me an hour to get to the University; to take part in; to take place;
- 3) to develop road-building industry; to develop the necessary properties; to develop a new type of machinery; the development of the economy; the development of mechanism.

12. Choose the appropriate preposition.

1. Preliminary survey was carried out (*with, by, of*) means (*in, upon, of*) aerial photography.
2. (*On, in, for*) order to protect the surface from heat and cold it was covered with special substance.
3. Both the bridge (*of, to, and*) the tunnel will be finished in time.
4. Owing (*at, to, of*) the new system of regulations the number of accidents went down.
5. The access to the bridge was difficult due (*at, to, of*) the great amount of snow which had fallen during the last week.

6. Because (*for, to, of*) the cracks on the road surface they had to close this section of the road for transport.
7. Good lighting helps cut accidents for both vehicles (*for, and, to*) pedestrians.

Summarizing

13. Write a short summary of the text. You may use the following clichés.

The text deals with...

The author describes (stresses, points out) ...

Special attention is paid to...

The author comes to the conclusion that...

UNIT VII. RIGHT-OF-WAY

Pre-reading tasks

1. Study the vocabulary.

aggregate ['ægrɪɡət] заполнитель¹ (бетона, асфальтобетона)

borrow pit ['bɒrəʊ ,pɪt] кювёт-резерв, боковой резерв²

carriageway ['kærɪdʒweɪ] / **roadway** проезжая часть (дороги)

centre line ось дороги

cutting ['kʌtɪŋ] выемка³

embankment [ɪm'bæŋkm(ə)nt] насыпь

to fill the embankment отсыпать насыпь

green plantings зеленые насаждения

overhaul [ˌəʊvə'hɔ:l] ремонт

quarry ['kwɒrɪ] карьер

roadbed['rəʊdbed] / **formation** / **natural formation** земляное полотно⁴

road zone зона дороги

right-of-way полоса отвода⁵

section 1) сечение; 2) отрезок, участок

cross section поперечный профиль (дороги)

spoil bank кавальёр⁶

¹ *Заполнитель* – рыхлая смесь минеральных зерен природного или искусственного происхождения. В бетоне эти зерна скрепляются вяжущим веществом и образуют прочное камневидное тело. К важнейшим показателям качества современных заполнителей относят зерновой состав, форму и характер поверхности зерен, содержание вредных примесей, плотность, прочность и морозостойкость.

² *Кювет-резерв (боковой резерв)* – неглубокая выработка вдоль дороги, из которой берут грунт для отсыпки насыпи.

³ *Выемка* – земляное сооружение, выполненное путем срезки грунта по заданному профилю. При выемке вся поверхность земляного полотна расположена ниже поверхности земли.

⁴ *Земляное полотно* – основание из грунта для устройства на нем дорожной одежды автомобильных дорог. Оно воспринимает нагрузку от дорожной одежды, автомобилей, равномерно распределяя эту нагрузку на нижележащий естественный грунт.

⁵ *Полоса отвода* – земельные участки (независимо от категории земель), которые предназначены для размещения конструктивных элементов автомобильной дороги, дорожных сооружений и на которых располагаются или могут располагаться объекты дорожного сервиса.

⁶ *Кавальёр* – насыпь, вал правильного профиля вдоль дороги. Служит защитой от сточных вод и заносов.

strip полоса, зона

temporary structures временные сооружения

to allocate ['æləkeɪt] резервировать

to mark отмечать; обозначать

to reinforce [ri:'ɪn'fɔ:s] укреплять, усиливать

to stack складывать в кучу, складывать в штабель

2. Read the following international words. Try to guess their meaning.

Agricultural, agriculture, cement, drainage, excavator, fruit, limit, machinery, machine, material, minimum, motor, office, parallel, route, salt, structure, technical class, transporter, vertical, zone.

3. Match the equivalents.

- | | |
|---------------------------|--------------------------------------|
| 1) ancillary structure | a) автомобиль |
| 2) at right angles to | b) в отдельных случаях |
| 3) in separate cases | c) вертикальная плоскость |
| 4) lateral support | d) вспомогательное сооружение |
| 5) motor vehicle | e) дорожно-строительные машины |
| 6) road machinery | f) окончание |
| 7) snowdrift | g) под прямым углом к |
| 9) termination | h) приспособлять под |
| 8) to render suitable for | i) снежный занос (полотна дороги) |
| 10) vertical plane | j) упор (дорожного покрытия) у краев |

Reading task

4. Read the text carefully and do the tasks that follow.

The zone which is marked for laying the road, excavating the soil for filling the embankments, for building ancillary structures and for green plantings is called the road zone, or right-of-way. The higher the technical class of the road, the wider is the right-of-way for its construction.

Within the limits of inhabited places or agricultural lands used for especially valuable crops, the width of the road zone should be reduced to a minimum, and includes only the width strictly necessary for the road.

In separate cases, for example for building offices, for excavation of quarries for road-building materials, for planting fruit trees as protection against snowdrifts, excavation of borrow pits near the route, certain additional areas may be allocated. However, after the termination of construction works, the land which was appropriated for temporary structures, for the excavation of borrow pits and quarries, has to be leveled, and rendered suitable for further use in agriculture.

The section of a road by a vertical plane at right angles to the road centre line is called a cross-section.

The road surface strip within the limits of which motor vehicles run is called a carriageway or roadway. Usually it is reinforced by means of natural or artificial stone aggregates (concrete) which form the pavements.

The strips of ground adjacent to the carriageway are called the road shoulders. The shoulders render lateral support to the pavement, which is made of solid materials within the limits of the carriageway. Shoulders are used for temporary parking of vehicles, as well as for road machinery during the road overhaul or for stacking road repair materials.

Comprehension check

5. Answer the following questions.

1. What information does this text carry?
2. What is the right-of-way?
3. In what cases is the width of the right-of-way made wider?
4. When is it necessary to reduce the width of the right-of-way to a minimum?
5. What should be done with the land appropriated for temporary structures after the termination of construction works?
6. What is the cross-section of a road?
7. What is a carriageway?
8. What is used to reinforce the carriageway?
9. What are shoulders?
10. What can you say about the function of shoulders?

6. Complete the sentences using the text.

1. Right-of-way is ...
2. Certain additional areas may be allocated in separate cases, for example ...
3. The workers have to render suitable for further use in agriculture the land which ...
4. Motor vehicles run within ...
5. Natural or artificial stone aggregates are used for ...
6. Lateral support to the pavement is provided by ...
7. You can park your vehicle ...

Language focus

7. Arrange the synonyms in pairs.

Allocate, ancillary, auxiliary, defend, finish, in, overhaul, protect, reinforce, repair, reserve, terminate, within, strengthen.

8. Fill in the table. Give the Russian equivalents of the words.

Noun	Verb	Adjective	Adverb
	excavate		—
	level		
	protect		
	reduce		
	separate		
	suit		
	value		
	—	strict	
		wide	

9. Fill in the correct prepositions.

by	in	for	from	of
over	since	to	to	

1. If the car is well maintained it will not need any repair ____ several years.
2. Cement has many advantages ____ traditional materials for it can be easily laid, compacted and shaped.

3. Considerable attention must be given to the reconstruction of roads ____ order ____ make them suitable for high-speed motor traffic.
4. ____ excavators are heavy and slow-moving machines they are carried ____ site ____ site ____ special transporters.
5. Salt spreading on roads reduce the number ____ traffic accidents.

10. Fill in the blanks using the words below and translate the text.

embankment	level	near	quantity
soil	utilization	water	

Roadbed

In order to lay the carriageway at the required 1) _____ above the ground surface a formation, or roadbed, is constructed in the form of embankments or cuttings with side ditches for drainage and diversion of 2) _____. The formation includes also borrow pits – shallow excavations¹ from which the 3) _____ was used for filling the embankments, and spoil banks, which are heaps of excessive soil, parallel to the road, remaining after excavation of cuttings.

If the embankment is low, soil for its construction can be taken from the widen side ditches. When the 4) _____ is high, the soil has to be taken from cuttings adjacent to the road or from shallow excavations made near the road and called borrow pits. When the embankments are high and require a great 5) _____ of soil, the borrow pits are usually excavated away from the embankment. In any case the borrow pits should be excavated as 6) _____ as possible to the road because by reducing the length of haulage of the soil from the borrow pit to the embankment one reduces the cost of the earthworks and improves the 7) _____ of road machinery.

11. Put the words in the right order to make up sentences.

1. A borrow pit, at a reasonable distance, be located, should, to the road construction site.
2. are, given, of the embankment, regular slopes, The sides.

¹ *shallow excavation* неглубокая выработка

3. by using, cheap, local materials, of, road pavements, should be developed, The strength.
4. A roller, an instrument, compaction, for obtaining, in the pavement, is.
5. below the land surface, is said, is situated, the road surface, the road, to be in a cutting, When.

12. Translate from Russian into English.

1. В пределах населенных пунктов и пригородных сельскохозяйственных земель полосу отвода обычно уменьшают до минимума. Она включает в себя только ширину, строго необходимую для дороги.
2. Чем выше категория дороги, тем шире полосы отвода для ее строительства.
3. Кювет-резервы – это неглубокие выемки, из которых грунт используют для того, чтобы отсыпать насыпи.
4. Землю необходимо выровнять после окончания строительных работ и сделать ее пригодной для дальнейшего использования.
5. Обочины используют для временной парковки транспортных средств, для складывания дорожно-строительных материалов и для ремонта машин.

Summarizing

13. Write a short summary of the text. You may use the following clichés.

The text is devoted to ...

... are discussed.

It is spoken in detail ...

Much attention is given to ...

The author comes to the conclusion that ...

UNIT VIII. PAVEMENT

Pre-reading tasks

1. Study the vocabulary.

additive добавка (вводимая в процессе изготовления материала, например, цемента)

base course несущий слой¹

bituminous film битумная пленка

bituminous surfacing with stone каменно-битумное покрытие

concrete slab бетонная плита

crack трещина

cracking растрескивание

durability [dʒɔːrəˈbɪlɪti] долговечность

fine мелкий

flexible гибкий

formation level уровень грунта; нулевая отметка

in situ [ˌɪn ˈsɪˈtjuː] на месте проведения работ

joint шов; стык

transverse joint [trænzˈvɜːs] поперечный шов

longitudinal joint [ˌlɒŋɡɪˈtjuːdɪn(ə)l] продольный шов

light reflectance коэффициент отражения света

mix / mixture [ˈmɪkstʃə] смесь

pavement [ˈpeɪvm(ə)n] дорожное покрытие; дорожная одежда

flexible pavement нежесткая дорожная одежда²

rigid pavement [ˈrɪdʒɪd] жесткая дорожная одежда³

¹ *Несущий слой* покрытия предназначен для восприятия максимальных касательных и растягивающих напряжений, перераспределения и снижения давления от транспортной нагрузки. Его устраивают из прочных и достаточно жестких материалов

² *Нежесткая дорожная одежда* – дорожная одежда, работающая как слоистая система бесконечных в плане размеров со сплошным покрытием на упругом основании. Это дорожные одежды с покрытием из материалов с участием органических вяжущих веществ (асфальтобетонов и т. п.), комплексных органических и гидравлических вяжущих веществ (битумных эмульсий и цемента), а также с покрытием из зернистых материалов (щебня, гравия, шлаков).

³ *Жесткая дорожная одежда* работает как плита конечных размеров на упругом основании при свободном, шарнирном или ином способе соединения плит. Она может быть с цементобетонным покрытием, а также с асфальтобетонным покрытием на основании из цементобетона, расчлененного деформационными швами.

paving machine дорожный укладчик
portland cement concrete бетон на портландцементе
pozzolana [ˌpɒtsəˈlɑːnə] пуццолан¹, вулканический туф
riding characteristics эксплуатационные качества дороги; ходовые качества; ездовые качества
rigid ['rɪdʒɪd] жесткий
road site участок дорожного строительства
service life period срок службы
steel reinforcement [ˈiːnˈfɔːsm(ə)nt] стальная арматура
stiffness жесткость²
flexural stiffness ['flekʃərəl] жесткость на изгиб³
strength [streŋkθ] прочность⁴
tensile strength ['tensail 'streŋkθ] прочность на разрыв; предел прочности на разрыв⁵
subbase / sub-base основание дорожной одежды⁶
subsurface exploration ['slʌbsɜːfɪs] инженерно-геологическое обследование
surface course верхний слой дорожной одежды
surface поверхностный слой

¹ *Пуццолан* – это тип природного или искусственного материала, который в сочетании с известью образует цементоподобный материал, который очень эффективно связывает и отвердевает материалы.

² *Жесткость* – это степень, в которой объект сопротивляется деформации в ответ на приложенное усилие. Дополнительным понятием является гибкость или податливость: чем более гибким является объект, тем менее жестким он является.

³ *Жесткость на изгиб* – это способность материала сопротивляться изгибающим нагрузкам без деформации.

⁴ *Прочность* – способность материалов или конструкций сопротивляться разрушению, а также необратимым изменениям формы под действием внешних нагрузок. Применительно к дорожной одежде и материалам покрытия данный термин можно трактовать как отсутствие силовых трещин, проломов, просадок, приводящих к разрушению дорожной одежды; а также появление деформаций, вызванных погодно-климатическими факторами и транспортной нагрузкой, снижающих скорость и безопасность движения по дороге.

⁵ *Предел прочности на разрыв* – сила, требуемая для растягивания материала бона до значения, при котором он рвется.

⁶ *Основание* – несущая часть дорожной одежды, совместно с покрытием обеспечивающая распределение и передачу нагрузок на грунт земляного полотна. Основание может состоять из двух слоев: верхнего, сооружаемого из более прочных материалов (обычно укрепленных вяжущими), и нижнего, к материалам которого предъявляют менее жесткие требования в отношении прочности.

susceptibility to moisture [səˌseptɪˈbɪlɪti tə ˈmɔɪstʃə] чувствительность к влаге

the highest probable moisture content ['mɔɪstʃə ˈkɒntent] максимально допустимое содержание влаги

to cast (cast, cast) отливать, формовать

to cool охлаждаться, остывать

to enhance [ɪnˈhɑːns] повышать, усиливать, увеличивать

to generate noise ['dʒenəreɪt ˈnɔɪz] производить шум

to glue клеить, склеивать; склеиваться

to maintain workability of the pavement сохранять годность дорожного покрытия

to mix смешивать

to resist противостоять, выдерживать

to resist horizontal forces противостоять горизонтальным усилиям

to roll 1) укатывать (дорогу и т. п.); 2) трамбовать (катком)

to shrink (shrank, shrunk) сжиматься (в размерах)

to solidify [səˈlɪdaɪ] затвердевать, застывать, твердеть

to spray coating напылять покрытие

spray-coating напыление покрытия

to swell (swelled, swollen) расширяться, увеличиваться в размерах

tyre friction трение шин

wearing course ['weərɪŋ ˈkɔːs] слой износа¹

wear-resistant ['weərɪˌzɪstənt] износостойкий

2. Read the following international words. Try to guess their meaning.

Agricultural, agriculture, cement, centimeter, drainage, empirical, excavator, fruit, limit, machinery, machine, material, minimum, motor, office, parallel, route, salt, structure, technical class, term, transporter, vertical, zone.

3. Read the proper name.

McAdam [məkˈædəm]

¹ *Слой износа* – верхний замыкающий слой дорожной одежды, непосредственно воспринимающий воздействие колес транспортных средств и погодноклиматических факторов (подлежит периодическому восстановлению в процессе эксплуатации).

4. Match the equivalents.

- | | |
|-------------------------|--------------------------------------|
| 1) empirical estimate | a) временный |
| 2) fluid | b) горная порода, скальный грунт |
| 3) in size | c) дополнение |
| 4) light traffic | d) жидкий |
| 5) over time | e) защитный слой |
| 6) poor | f) неинтенсивное движение |
| 7) propensity (to) | g) нестандартный |
| 8) protective layer | h) плохой, слабый |
| 9) rock | i) по принципу МакАдама ¹ |
| 10) substandard | j) по размеру |
| 11) supplement | k) расположенный под |
| 12) temporary | l) с течением времени |
| 13) the style of McAdam | m) склонность (к) |
| 14) thoroughly | n) тщательно |
| 15) underlying | o) эмпирическая оценка ² |

Reading task

5. Read the text carefully and do the tasks that follow.

Road traffic is carried by the pavement which in engineering terms is a horizontal structure supported by in situ natural material. In order to design this structure subsurface explorations are conducted. The engineering properties of the local rock and soil such as strength, stiffness, durability, susceptibility to moisture, and propensity to shrink and swell over time are established. These properties are determined either by field tests or by empirical estimates based on the soil type or by laboratory measurements. The material is tested in its weakest expected condition, usually at its highest probable moisture content. Soils unsuitable for the final pavement are identified for removal, the maximum slopes of embankments and cuttings are established, the degree of compaction to be achieved during construction is determined and drainage needs are specified.

¹ Джон МакАдам изобрел дорожное покрытие из зернистых материалов (щебня, гравия, шлаков), также часто называемое «макадам».

² Эмпирическая оценка делается на основе собственного исследования и научных доказательств.

In a typical rural pavement, the base course provides the required supplement to the strength, stiffness and durability of the natural formation. Its thickness ranges from four inches (ten centimeters) for very light traffic and a good natural formation to more than forty inches (100 centimeters) for heavy traffic and a poor natural formation. The subbase is a protective layer and temporary working platform sometimes placed between the base course and the natural formation.

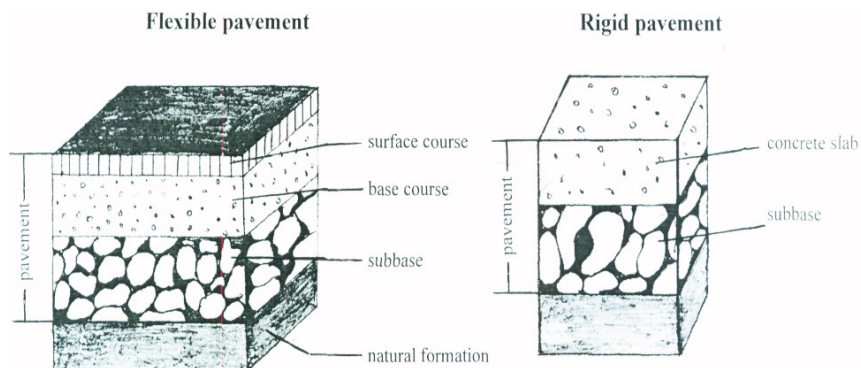
Pavements are called either flexible or rigid, according to their relative flexural stiffness.

Flexible pavements have base courses of broken stone pieces either compacted into place in the style of McAdam or glued together with bitumen to form asphalt. In order to maintain workability, the stones are usually less than 1.5 inches in size and often less than 1 inch. Initially the bitumen must be heated to temperatures of 150–200 °C in order to make it fluid enough to mix with the stone. At the road site a paving machine places the hot mix in layers about twice the thickness of the stone size. The layers are then thoroughly rolled before the mix cools and solidifies.

The surface layer of a flexible pavement protects the underlying base course from traffic and water while also providing tyre friction, generating minimal noise in urban areas, and giving suitable light reflectance for night-time driving. Such surfaces are provided either by a bituminous film coated with stone or by a thin asphalt layer. Bituminous surfacing with stone is relatively cheap, effective and impermeable and lasts for about ten years. Its main disadvantage is its high noise generation. Maintenance usually involves a further spray coating with bitumen. Asphalt surfacing is used with higher traffic volumes or in urban areas. It commonly contains smaller and more wear-resistant stones than the base course and employs relatively more bitumen. Asphalt surfacing is better resist horizontal forces and produces less noise.

Rigid pavements are made of portland cement concrete. The concrete slab ranges in thickness from six to fourteen inches. It is laid by a paving machine, often on a supporting layer that prevents pumping water and natural formation material to the surface through joints and cracks. Concrete shrinks as it hardens, and this shrinkage is resisted by friction from underlying layer, causing cracks to appear in concrete. Cracking is usually controlled by adding steel reinforcement in order to enhance the tensile strength of the pavement and ensure that any cracking is fine and uniformly distributed. Transverse joints are sometimes also used for this

purpose. Longitudinal joints are used when the whole carriageway cannot be cast in one pass of the paving machine.



In places where the local natural material is substandard for use as a base course, it can be “stabilized” with portland cement, pozzolana or bitumen. The strength and stiffness of the mix are increased by the surface reactivity of the additive which also reduces its susceptibility to water. Special machines distribute the stabilizer into the upper eight to twenty inches of soil.

In deciding whether to use a flexible or rigid pavement, engineers take into account service life period, riding characteristics, ease and cost of repair, and the effect of climatic conditions. Often there is little to choose between rigid and flexible pavements.

Comprehension check

6. Answer the following questions.

1. What does this text discuss?
2. What is the pavement?
3. Why is it necessary to conduct subsurface explorations to design the pavement?
4. How are different properties of the local rock and soil determined?
5. What is the function of the base course?
6. Does the thickness of the base course range in a typical rural pavement?
7. Where is the subbase situated?
8. What kinds of pavements are described in the text?
9. What kinds of surfacings of a flexible pavement are used?

10. What are the advantages of bituminous surfacing?
11. Where is asphalt surfacing used?
12. What material is used for rigid pavements?
13. What property does concrete possess when it hardens?
14. What is usually done to control cracking?
15. What is necessary to take into account when making the final choice of pavement structure?

Vocabulary practice

7. Choose the right translation of the word.

1. **to create** a) соединять; b) создавать; c) дополнять
2. **to spray** a) напылять; b) отражать; c) укатывать
3. **to enable** a) требовать; b) давать возможность; c) допускать
4. **embankment** a) насыпь; b) прочность; c) пленка
5. **treatment** a) отражение; b) обработка; c) распределение
6. **durability** a) упругость; b) долговечность; c) гибкость
7. **solidify** a) защищать; b) обеспечивать; c) затвердевать, застывать
8. **additive** a) добавка; b) обочина; c) плотность
9. **stabilize** a) распределять; b) включать; c) укреплять (грунт)
10. **reinforcement** a) наклон; b) арматура; c) износ

8. Fill in the blanks using the words below and translate the sentences.

cracking properties	flexible resistance	gravel rigid	highway site	pavement
------------------------	------------------------	-----------------	-----------------	----------

1. The substance _____ to be determined are of great importance for our research.
2. The _____ has storage for up to 50,000 tonnes of material.
3. The road _____ must be of adequate rigidity, uniformity and resistance to wear.
4. The asphalt concrete surfacing is _____ and should, therefore, be laid over a solid stone base.
5. Broken-stone surfacings have a low _____ to wear under automobile traffic.

6. The pavement is the most expensive part of a _____.
7. The _____ road is the cheapest form of road and the simplest from the construction point of view.
8. Two classifications of pavement have been developed: flexible and _____.
9. Rigid pavement, made of Portland cement concrete, generally has greater strength but is susceptible to _____.

Language focus

9. Put the words into the proper column.

Additive, cast, cause, coating, distribute, durability, flexible, harden, joint, moisten, place, prevent, protective, reflect, reinforcement, relatively, removal, resist, shrink, solidify, stabilizer, suitable, supplement, temporary, thoroughly, typically, workability.

Verb	Noun	Adjective	Adverb

10. Translate the following words paying attention to the prefixes and suffixes.

Disadvantage, disappear, impermeable, inaccurate, invisible, irregular, motionless, unprotected, unsuitable, untested, useless.

11. Form nouns from the following words.

Add, distribute, durable, resist, shrink, stabilize, stiff, supply, susceptible.

12. Find 11 pairs of synonyms.

Carry out, commonly, conduct, connect, contain, defend, enhance, enlarge, ensure, glue, guarantee, harden, identify, involve, protect, range, reinforce, solidify, specify, stabilize, usually, vary.

13. Find 5 pairs of antonyms.

Appear, contract, cool, damage, disappear, enhance, expand, heat, reduce, repair

14. Translate from Russian into English.

1. Дорожная одежда – это горизонтальная конструкция, поддерживаемая естественным материалом.
2. Для того чтобы спроектировать горизонтальную конструкцию, необходимо определить строительные свойства грунта.
3. Такие свойства горной породы и грунта, как прочность, жесткость, долговечность и чувствительность к влаге, определяют различными путями.
4. Дорожная одежда – это многослойная¹ конструкция, состоящая из нескольких слоев: поверхностного слоя, основания дорожной одежды, подстилающего слоя и земляного полотна.
5. Существует два типа дорожной одежды: жесткая и нежесткая дорожная одежда.
6. Выбирая тип покрытия, инженер должен принимать во внимание многие факторы.

Speaking

15. Speak about:

- a) flexible pavement
- b) rigid pavement

¹ многослойная 'multilayer'

UNIT IX. PAVEMENT STRUCTURAL LAYERS

Pre-reading tasks

1. Study the vocabulary.

abrasion истирание

anti-frost heave course морозозащитный слой¹

bearing strength несущая способность²

binder ['baɪndə] вяжущее, вяжущий материал³

drainage course дренарующий слой⁴

multilayer structure многослойная конструкция

pavement base верхний слой основания дорожной одежды⁵

porous ['pɔːrəs] пористый

protective coat защитный слой⁶

roughness ['ɹʌfnəs] шероховатость

sealing coat герметизирующий слой

semi-rigid structure полужесткая конструкция⁷

¹ *Морозозащитный слой* обеспечивает недопущение деформаций покрытия вследствие морозного пучения грунта земляного полотна.

² *Несущая способность* конструкции (или сооружения) – максимальная нагрузка (или комбинация нагрузок), которую конструкция может выдержать без потери своих функциональных свойств.

³ *Вяжущее* – порошкообразный материал, при смешивании с водой и наполнителем образующий пластичную массу, которая впоследствии превращается в искусственный камень.

⁴ *Дренарующий слой* обеспечивает осушение верхнего слоя земляного полотна в период избыточного увлажнения, что способствует повышению прочности и надежности дорожной одежды.

⁵ *Основание* – несущая часть дорожной одежды, совместно с покрытием обеспечивающая распределение и передачу нагрузок на грунт земляного полотна. Основание может состоять из двух слоев: верхнего, сооружаемого из более прочных материалов (обычно укрепленных вяжущими), и нижнего, к материалам которого предъявляют менее жесткие требования в отношении прочности.

⁶ *Защитный слой* – верхний тонкий слой дорожного покрытия (до 3 см), обладающий высокой шероховатостью и водонепроницаемостью. Основное назначение защитного слоя – предохранение материала дорожного покрытия от непосредственного воздействия погодных-климатических факторов и транспортной нагрузки и продление срока его службы.

⁷ *Полужесткие* дорожные покрытия отличаются от нежестких тем, что включают в себя промежуточную жесткую прослойку.

smoothness ['smu:ðnəs] гладкость, ровность
stress напряжение¹
structural layer конструкционный слой
subbase / sub-base подстилающий слой дорожной одежды²
subgrade грунтовое основание дорожной одежды
to attenuate with depth [ə'tenjuet] ослабевать с глубиной
to be saturated by water ['sætʃəreɪtɪd] пропитываться водой
to distribute wheel-loads распределять колесные нагрузки
to induce stresses вызывать напряжения
wear [weə] износ

2. Read the following international words. Try to guess their meaning.

Accumulation, action, adhesion, agent, automobile, coefficient, drainage, drain, guarantee, material, minimum, operation, organic, periodically, region, section, slag, special, structure.

3. Match the English words with their Russian equivalents.

- | | |
|----------------------------------|-----------------------------------|
| 1) all-year-round | a) водонепроницаемый |
| 2) clayey soil | b) глинистый грунт |
| 3) employ | c) зимнее влагонакопление |
| 4) frost resistance | d) илистый грунт |
| 5) impervious to water | e) использовать, применять |
| 6) loamy soil | f) круглогодичный |
| 7) polished surfacing | g) морозостойкость |
| 8) silty soil | h) скользкое покрытие |
| 9) weak bed soil | i) слабый грунт земляного полотна |
| 10) winter moisture accumulation | j) суглинистый грунт |

¹ В механике сплошной среды механическое *напряжение* – это физическая величина, которая выражает внутренние силы, которые соседние частицы в непрерывной среде оказывают друг на друга. Деформация – это мера изменения геометрических размеров среды.

² *Дополнительный слой основания (подстилающий слой)* – нижний конструктивный слой дорожной одежды, выполняющий функции передачи нагрузок на земляное полотно, а также функции морозозащитного и дренирующего слоя

Reading task

4. Read the text carefully and do the tasks that follow.

To ensure all-year-round operation of traffic on a road independent of weather conditions, the carriageway is covered with a pavement which is a rigid or semi-rigid structure laid on the surface of the roadbed and resisting traffic stresses and climatic factors.

The stresses induced in the pavement by motor vehicle wheels attenuate with the depth. This enables the pavement to be designed in the form of a multilayer structure, employing materials whose strengths vary for each layer and are determined in accordance with the magnitude of the acting forces. The pavement consists of following layers.

1. *Surfacing* is the upper, and most rigid, layer of the pavement. It is comparatively thin, but resists well the abrasion and the impacts caused by the wheels, and also the effect of weather conditions. Usually, the surfacing is the most expensive part of the pavement and, therefore, is laid to the minimum admissible thickness. The surfacing provides the required road service qualities (surface smoothness, high coefficient of adhesion). Surfacing usually comprises two coats or courses – the *base course*, on which depend the basic qualities of the surfacing, and the *wearing course*, which is not regarded in *calculations* and which is periodically renewed as it wears out. When the surfacings are made of weak materials, which are subject to appreciable wear, a special wearing course made of strong stone material treated with organic binders is necessary, which may be periodically renewed in the course of road operation.

If the surfacing is not sufficiently impervious to water and may be destroyed during freezing or drying out in hot arid weather conditions, it is covered with a thin protective or sealing coat by surface treatment with a binder and a filling of fine sand. Surface treatment is also used for increasing the roughness of polished surfacings.

2. Below the surfacing base coat is the *pavement base*, a strong bearing layer of stony material or stone with a binder. This layer is designed to distribute the individual wheel-loads over the roadbed or sub-base.

The pavement base is not subject to the direct action of automobile wheels. Therefore, materials of less strength than those used for the surfacing or the wearing course can be employed in its construction.

When the base is protected from the action of surface water – in the case of an impervious surfacing – it may become saturated by water, drawn upwards from the roadbed during winter frost penetration. For this reason, in the northern regions materials used for base construction have to satisfy certain requirements concerning frost resistance.

3. The *sub-base* is a layer of earth or stone materials, resistant to moisture, inserted when necessary between the pavement base and the roadbed to reduce the required thickness of the pavement base. The sub-base is made of gravel, slag, soil treated with binding agents, sand, etc.

On sections where the roadbed comprises silty, loamy and clayey soils, inside which winter moisture accumulation may occur, a sub-base of porous materials is introduced. This consists of a sand or gravel layer which drains away excess water from the upper layers of the roadbed, drains the pavement structure and increases the bearing strength of the roadbed. It is termed a drainage or anti-frost heave course.

If the roadbed is composed of stable, impervious sand, sandy loam or gravel soils, a sub-base is not necessary.

4. The *subgrade* comprises the thoroughly compacted upper layers of the roadbed, upon which are laid the layers of the pavement. The subgrade receives all the distributed pressure of traffic loads and, therefore, is a very important element of the pavement structure. The stability of road pavements can be ensured only on a heterogeneous, well compacted roadbed with adequate drainage. The increase of roadbed soil resistance to external loads, its drainage and the uniformity of water conditions are the best means for ensuring pavement stability and reducing its cost. No increase in the thickness of the pavement base can guarantee the strength of a pavement laid on a weak bed soil.

Comprehension check

5. Answer the following questions.

1. Is the pavement a multilayer structure?
2. What do you know about stresses in each layer?
3. Do the strengths of materials for each layer of the pavement vary?
4. What are the main layers of the pavement?
5. How many courses does the surfacing have? Characterize them.
6. What course of the surfacing is often renewed?

7. When is the surfacing covered by a sealing coat?
8. What is the function of the pavement base?
9. Why is the pavement base of less strength than surfacing?
10. How can the pavement base be saturated by water?
11. What materials are used for the sub-base?
12. Why is the sub-base course termed a drainage or anti-frost heave course?
13. What layer receives all the distributed pressure of traffic loads?
14. Subgrade is the thoroughly compacted upper layer of the roadbed, isn't it?

6. Complete the following sentences.

1. The pavement structural layers are...
2. Surfacing is the most expensive part of the pavement and it is laid to the minimum...
3. Surfacing provides the required road serving qualities such as...
4. The pavement base is designed to distribute...
5. The pavement base can be saturated by water drawn upwards from the roadbed during...
6. The sub-base is made of...
7. The sub-base is termed...
8. The subgrade receives all the distributed pressure of...

Vocabulary practice

7. Fill in the blanks using the words below and translate the sentences.

loads	multilayer	porous	renewed
roadbed	roughness	stresses	

1. The pavement is designed in the form of _____ structure.
2. The _____ induced in the pavement attenuate with the depth.
3. A wearing course is periodically _____ as it wears out.
4. Surface treatment is used for increasing the _____ of polished surfacing.
5. The pavement base is a strong bearing layer of stony materials which distributes the wheel _____ over the sub-base.

6. _____ materials are introduced in the sub-base which drains away excess water.

7. The subgrade comprises the thoroughly compacted upper layers of the _____.

Language focus

8. Find 15 pairs of synonyms.

Agent, call, carefully, cause, comprise, consider, decide, defend, determine, employ, impact, induce, influence, involve, meet the requirements, occur, operation, protect, regard, rigid, satisfy the requirements, section, stretch, substance, take place, term, thoroughly, tough, use, work.

9. Find 6 pairs of antonyms.

Coarse, downwards, external, fine, heterogeneous, homogeneous, increase, internal, reduce, roughness, smoothness, upwards.

10. Form nouns from the following words.

Compact, distribute, drain, penetrate, resist, rough, smooth, stable, treat.

11. Fill in the correct prepositions.

1) to consist ... sth; 2) to subject ... sth; 3) ... accordance ... sth; 4) to treat ... sth; 5) to depend ... sth; 6) ... addition; 7) ... the same time; 8) to be designed ... sth

12. Fill in the blanks with English equivalents.

1. The surfacing provides (*ровность поверхности и высокий коэффициент сцепления*).

2. (*Слой износа*) is not taken into account in calculations.

3. The surfacing which is made of weak materials (*обрабатывается*) with organic (*вяжущими*).

4. To make the surfacing (*водонепроницаемым*) it is covered with a thin (*защитным слоем*).

5. (*Основание дорожной одежды*) is designed (*чтобы распределить нагрузку колес*) over the sub-base.

6. The pavement base (*может быть насыщено*) by water drawn upwards from the roadbed.

7. (*Подстилающий слой устойчив к влаге*), it is designed of (*пористых материалов*).

8. The sub-base is also termed (*дренажный или морозозащитный слой*). It is done from (*гравия, шлака или грунта*) treated with binders.

9. (*Грунтовое основание*) comprises thoroughly compacted upper layers of the roadbed. It receives all (*нагрузки транспорта*) and therefore is considered to be a very important element of pavement structure.

13. Translate from Russian into English.

1. Дорожная одежда является одним из важнейших и дорогостоящих элементов автомобильной дороги. Ее стоимость составляет 50–60 % от общей стоимости дороги.

2. Дорожная одежда – многослойная конструкция, состоящая из нескольких конструктивных слоев, уложенных на тщательно спланированном и уплотненном земляном полотне.

3. Дорожная одежда должна отвечать определенным требованиям. Она должна быть прочной, шероховатой и ровной, обеспечивающей высокий коэффициент сцепления.

4. Слои дорожной одежды проектируются с применением материалов различной прочности в соответствии с величиной действующих напряжений.

5. Местные материалы широко используются, чтобы уменьшить стоимость строительства и сократить срок строительства.

Speaking

14. Comment on the pavement and its structural layers:

- a) the surfacing;
- b) the pavement base;
- c) the sub-base;
- d) the subgrade

Writing

15. Write the summary to the text in English.

UNIT X. ROAD CONSTRUCTION

Pre-reading tasks

1. Study the vocabulary.

adequate требуемый

alignment [ə'laɪnmənt] трасса автомобильной дороги¹

longitudinal alignment продольное выстраивание

vertical alignment вертикальное выравнивание

bearing ratio ['beərɪŋ 'reɪʃəʊ] показатель плотности грунта²

blasting взрывные работы

camber выпуклость поперечного профиля (дороги)

continuous right-of-way непрерывная полоса отвода, сплошная полоса отвода

crash barrier ['kræʃ 'bæriə] ограждение (на мостах и дорогах); барьер на автострате, разделяющий полосы с противоположным направлением движения

digging земляные работы

marking разметка

motorized grader автогрейдер

peg пикет³

retroreflector ['retrəʊfɪˌflektə] световозвращающий отражатель

cat's eye retroreflector уголкового светоотражателя типа «кошачий глаз»⁴

¹ *Трасса дороги* – это ее продольная осевая линия, отвечающая ее проектному положению на местности и определяемая двумя проекциями: горизонтальной (планом) и вертикальной (продольным профилем).

² *Плотность грунта* – физическая величина, характеризующая отношение его массы к занимаемому объемом. Процесс контроля этого показателя важен для обеспечения качества укладки земельного полотна на начальном этапе строительства дорог. Неправильное определение плотности грунта может сказаться на надежности возведенного объекта после его сдачи в эксплуатацию.

³ *Пикет* – забитый в землю колышек, отмечающий точку на местности.

⁴ Чтобы привлечь внимание водителей на аварийных участках дороги, используются точечные световозвращающие элементы «кошачий глаз». Они хорошо выделяют края проезжей части, указывают на приближение к пешеходному переходу, подчеркивают линию разметки и т. д. Точечные световозвращающие элементы монтируются непосредственно к покрытию дороги. «Кошачий глаз» может быть белого, желтого, зеленого и красного цветов.

road sign [saɪn] дорожный указатель; дорожный знак
seal защитное покрытие
settling просадка¹
to blast взрывать; взрываться
to compact уплотнять
to dig (dug, dug) копать
to import [ɪm'pɔ:t] вносить, вводить
to level off выравнивать
to protrude slightly слегка выступать
to spread [spred] (**spread, spread** [spred]) распределять
to stockpile ['stɒkpɑɪl] накапливать, делать запасы
to strip снимать верхний (растительный) слой грунта
vibratory road roller вибрационный дорожный каток

2. Read the following international words. Try to guess their meaning.

Adequate, asphalt concrete, bitumen, control mechanism, fluorescence, geographic, gravel type material, maximum, portland cement, tunnel.

3. Match the equivalents.

- | | |
|---------------------------|--|
| 1) deforestation | a) верхний слой почвы |
| 2) dry density | b) вырубка леса |
| 3) commence | c) до некоторой степени |
| 4) experience heavy loads | d) испытывать сильные нагрузки |
| 5) high-friction surface | e) как только |
| 6) nearby | f) начинать |
| 7) once | g) плотность в сухом состоянии |
| 8) removal | h) поблизости, неподалеку |
| 9) to some extent | i) покрытие с высоким коэффициентом трения |
| 10) topsoil | j) растительность |
| 11) vegetation | k) удаление |

¹ *Просадка* – это деформация дорожной одежды, имеющая вид углубления с плавно очерченными краями, без разрушения материала покрытия.

Reading task

4. Read the text carefully and do the tasks that follow.

Road construction requires the creation of a continuous right-of-way, overcoming geographic obstacles and grades low enough to permit vehicle travel. Removal of earth and rock by digging or blasting, construction of embankments, bridges and tunnels, and removal of vegetation (this may involve deforestation) are often needed. A variety of road building equipment is employed in road building.

Once these activities are completed, construction of the pavement can begin.

Firstly, the longitudinal and vertical alignment of the road is set out by a surveyor. The alignment of the road will be marked with control pegs. The pegs will have level markings as a control mechanism to ensure the road is constructed according to design levels.

Construction of the road commences with the stripping of the topsoil, within the road reserve. The topsoil is usually stockpiled nearby for the construction of embankments along the road. The in-situ ground will be removed, using a heavy motorized grader to a level specified by the civil engineer. This is considered as the roadbed level. It will be compacted using a heavy vibratory road roller. Once the roadbed has been compacted to the required density (as will be specified by the engineer), the pavement layers can now be imported.

The first layer to be imported is the selected subgrade. This is usually a gravel type material. Once placed the material is leveled off by a grader. It will be compacted to a required density, using a road roller.

The next layer to be imported is the sub-base. The subbase material is of a higher quality than the selected sub-grade. It is usually a gravel type material with a high bearing ratio. While the material is worked by a grader, it is mixed with water to aid compaction. Once the subbase layer has been compacted to its required density, the importation of the final layer can commence.

The final layer of a road is the base course consisting of gravel or crushed stone. The base course will be leveled off and compacted. Sometimes (usually for roads that will experience heavy loads) portland cement will be added to it, to ensure adequate strength of this layer. On top of the base course is placed a surface course which typically consists of asphalt

concrete or a seal consisting of a mixture similar sized small stones, bitumen and portland cement. This surface course strengthens the pavement structure by spreading out the vehicle loads applied to the subgrade. It also provides a smooth and high-friction surface for vehicles to drive on.

Two important factors in road construction are ensuring adequate compaction of the pavement layers and ensuring quality control over the use of materials in the pavement layers.

Each layer should be compacted such that the density of the layer is relatively close the maximum dry density of that specific material. For road construction the density required is usually greater than 95 % of the materials maximum dry density. This limits the possibility of the pavement layers from settling and therefore preventing any undulations and holes in the road surface.

Modern roads, and indeed many ancient ones, such as those built by the Romans, have a camber. This is designed to allow water to drain away from the road to its edges. Modern roads that carry motor traffic also employ camber in curves to aid traffic stability by allowing them to ‘bank into’ the bend to some extent.

On the side of the road there may be retroreflectors on pegs, rocks or crash barriers, white toward the direction of the traffic on that side of the road, and red toward the other direction. In the road surface there may be cat’s eye retroreflectors: they protrude slightly, but which can be driven over without damage.

Road signs are often also made retroreflective. For greater visibility of road signs at daytime, sometimes fluorescence is applied to get very bright colors.

Comprehension check

5. Answer the following questions.

1. What does road construction require?
2. Who sets out the longitudinal and vertical alignment of the road?
3. What road building equipment is used during road construction?
4. What is the difference between the materials used in the subgrade and in the subbase?
5. What is the purpose of mixing the materials of the sub-base with water?
6. What does the final layer consist of?

7. Asphalt concrete or a seal is used in a surface course, isn't it?
8. Can you name the important factors in road construction?
9. What does the low density of each layer lead to?
10. What is camber designed for?
11. Are there any special devices on the side of the road? What is their purpose?
12. What is added to road signs to make them brighter at daytime?

6. Decide whether these statements are true or false.

1. Removal of earth and rock by digging or blasting, building embankments, bridges and tunnels are often needed when the road is constructed.
2. The longitudinal and vertical alignment of the road is set out by road planners.
3. The removed topsoil is usually stockpiled nearby for rehabilitation of newly constructed embankments along the road.
4. A heavy motorized grader is used to remove the in-situ ground.
5. The first pavement layer to be imported is the selected sub-base.
6. The sub-based material is usually a gravel type material which is worked by a grader and mixed with water to aid compaction.
7. The base course is the final layer of a road.
8. The density of each layer shouldn't be close the maximum dry density of the specific material to prevent any undulations and holes in the road surface.
9. Modern roads have a camber.
10. Road signs are not retroreflective.

Vocabulary practice

7. Choose the right translation of the word.

1. **оседание** a) overcoming; b) settling; c) alignment
2. **взрывать** a) to blast; b) to penetrate; c) to compact
3. **грунтовое основание** a) subsoil; b) pavement base; c) subgrade
4. **колышек** a) mark; b) peg; c) barrier
5. **плотность** a) density; b) location; c) quality
6. **распространение** a) digging; b) blasting; c) spreading
7. **складировать** a) to keep; b) to remove; c) to stockpile

8. **слой износа** a) surface course; b) wearing course; c) base course
 9. **удаление** a) development; b) removal; c) reduction
 10. **уклон** a) level; b) shoulder; c) grade

8. Match the words with their definitions.

- | | |
|---------------------|--|
| 1) asphalt | a) movements of people and vehicles along roads and streets |
| 2) carriageway | b) a rigid or semi-rigid upper layer of the surface of the road |
| 3) concrete | c) a thoroughly compacted upper layer of the roadbed |
| 4) gravel | d) a self-propelled wheeled machine with a steel blade used to level roads, hills and cuts |
| 5) motorized grader | e) specially prepared way between places for the use of pedestrians, riders, vehicles |
| 6) pave (v) | f) small stones with coarse sand |
| 7) pavement | g) a mixture of cement and stone |
| 8) right-of-way | h) a mixture of bitumen and stone |
| 9) road | i) to put flat stones, bricks, etc. on a path, a road, etc. |
| 10) subbase | j) the land needed for road pavement, shoulders, ditches, side slopes |
| 11) subgrade | k) a layer resistant to moisture, which is made of gravel, slag, soil treated with binders |
| 12) traffic | l) central part of the road used by wheeled traffic |

9. Choose the right verb.

- When constructing a road, builders should _____ (*carry away, exclude, overcome, overtake*) different obstacles.
- Builders sometimes _____ (*add, compact, level, place*) portland cement to the base course to ensure adequate strength of this layer.
- The surface course spreads out the vehicle loads and at the same time _____ (*compacts, cuts, involves, strengthens*) the pavement structure.
- A borrow pit (source for obtaining fill, gravel, and rock) and a water source should be _____ (*divided, indicated, located, used*) near or in reasonable distance to the road construction site.
- Old road surfaces, fences, and buildings may need to be (*allocated, blasted, erased, removed*) before construction can begin.

Language focus

10. Find 9 pairs of synonyms.

Aid, allow, apply, begin, bend (n), choose, commence, determine, employ, help, import, introduce, permit, remove, select, specify, strip, turn (n).

11. Put the words into the proper column.

Continue, continuous, create, creation, creative, import, importation, reflect, removable, removal, remove, select, selection, selective, spread, strength, strengthen, survey, surveyor, variety, various, vary.

Verb	Noun	Adjective

Speak on:

12. Speak about road construction stages, using the following clichés.

First, the author discusses ...

Attention is drawn to the fact that ...

Further it should be noted that ...

A detailed description of... is given.

The author emphasizes the fact that ...

The final part of the article reports on ...

UNIT XI. MAINTENANCE

Pre-reading tasks

1. Study the vocabulary.

bulldozer бульдозер

straight-blade bulldozer бульдозер с прямым отвалом¹

V-shaped bulldozer бульдозер с треугольным отвалом

drain clearing очистка дренажных канав

edge край

footpath пешеходная дорожка

grading профилирование грунта², планировка грунта

grass cutting покос травы

maintenance ['meɪnt(ə)nəns] обслуживание, содержание

emergency maintenance [ɪ'mɜ:dʒ(ə)nsl 'meɪnt(ə)nəns] аварийный ремонт

periodic maintenance периодический ремонт, плановый ремонт

regular maintenance регулярное техническое обслуживание

routine maintenance [ru:'ti:n 'meɪnt(ə)nəns] повседневное техническое обслуживание, текущее техническое обслуживание

seasonal maintenance сезонное обслуживание

major failure серьезное разрушение

pothole ['pɒθəʊl] выбоина, рытвина, колдобина

pothole patching ремонт выбоин, ямочный ремонт

pothole sealing герметизация выбоин

rehabilitation [ˌri:əˌbɪlɪ'teɪʃən] капитальный ремонт

renovation восстановление; реконструкция

repair ремонт

flood repair [flʌd] ремонт после наводнения

¹ *Отвал* – навесное оборудование для бульдозеров, автогрейдеров, погрузчиков, тракторов и автомобилей, используемое для разработки грунтов, снегоуборочных и других работ.

² *Профилирование* представляет собой технологический процесс распределения рыхлого грунта по поверхности (например, земляному полотну). В результате профилирования грунтовой плоскости придается характер ровного горизонтального или наклонного профиля в соответствии с заданными геодезическими отметками. Работы по профилированию грунтовой плоскости (верху земляного полотна) выполняют с помощью грейдера (автогрейдера).

restoration восстановление
resurfacing [ˌriːˈsɜːfɪsɪŋ] замена дорожного покрытия
road sign [saɪn] дорожный знак
snow clearing уборка снега
snow fence снегоудерживающее ограждение; снегозащитное ограждение
snowdrift снежный занос (полотна дороги)
snowplow [ˈsnəʊpləʊ] снегоочиститель
to deteriorate [diˈtiəriəreɪt] ухудшать, ухудшаться, разрушать, разрушаться
overlay [ˌəʊvəˈleɪ] (**overlaid**, **overlaid** [ˌəʊvəˈleɪ]) перекрывать, покрывать
to patch производить ямочный ремонт
to prolong the life of the pavement продлевать срок службы дорожного покрытия
to provide обеспечивать
to restore восстанавливать
to resurface [riːˈsɜːfɪs] заменять дорожное покрытие
to scatter salt разбрасывать соль
to schedule [ˈfedʒuːl, ˈskedʒuːl] составлять график, составлять расписание
to spread [spred] (**spread**, **spread** [spred]) **sand** распределять песок
to treat the surface (with sth) обрабатывать дорожное покрытие чем-л.
to widen расширять
traction сила сцепления (*колеса с дорогой и т. п.*)
traffic facility транспортное сооружение
worn spot разрушенный участок

2. Read the following international words. Try to guess their meaning.

Activities, asphalt, bituminous, bulldozer, characteristics, chemicals, climate, drainage, gravel, intervention, investment, material, public (n), reconstruct, safe, salt, seasonal, section, signal, special, storm, structural defect, structure, type, typically.

3. Match the English words with their Russian equivalents.

- | | |
|------------------------------|-------------------------------|
| 1) at least | a) вмешательство |
| 2) cinder | b) дорожное инвестирование |
| 3) intervention | c) дорожный бюджет |
| 4) major | d) крупный, серьезный |
| 5) minor | e) мелкий, несерьезный |
| 6) prompt | f) мусор |
| 7) rigorous climate | g) накапливать |
| 8) road budget | h) немедленный, быстрый |
| 9) road investment | i) неремонтопригодный |
| 10) slippery | j) по крайней мере |
| 11) storm wind | k) скользкий |
| 12) substantial | l) служить круглый год |
| 13) to pile up | m) суровый климат |
| 14) to serve the year around | n) существенный, значительный |
| 15) trash | o) ураганный ветер |
| 16) unmaintainable | p) шлак |

Reading task

4. Read the text carefully and do the tasks that follow.

The life of a road structure depends on the quality of its maintenance and minor renovation. Maintenance keeps the roadway safe, provides good driving conditions, and prolongs the life of the pavement, thus reducing the road investment. Maintenance consists of activities concerned with the condition of the pavement, shoulders, drainage, traffic facilities, and right-of-way. It includes the prompt sealing of cracks and filling of potholes to prevent water entering through the surface, the removal of trash thrown on the wayside by the traveling public, and the care of pavement markings, signs, and signals. In rigorous winter climates, substantial effort is required to remove snow and ice from the pavement, to scatter salt for snow and ice removal, and to spread sand for better traction.

In many countries an increasing share of road budgets is being allocated to rehabilitation and maintenance of existing roads, rather than new road construction.

Routine maintenance refers to activities such as grading, grass cutting, drain clearing, pothole patching, and shoulder repairs, which are performed at least yearly if not more frequently.

Periodic maintenance activities are typically scheduled over periods of several years and include resurfacing and bridge repairs.

Rehabilitation involves more substantial intervention to strengthen a road, repair structural defects, and restore the road to its initial condition, often after it has deteriorated to an “unmaintainable” standard. Rehabilitation sometimes also includes changes or improvements to previous characteristics, for instance, by widening, making small alignment changes, or providing footpaths.

Other maintenance activities include *seasonal maintenance*, such as snow clearing and flood repairs, *emergency maintenance* to restore roads after major failures, and the *regular maintenance* of road signs.

Repairing damage and resurfacing. Gravel and other similar type roads have to be graded quite often. Surfaces and edges of bituminous materials are repaired by patching with new material where worn spots develop from travel or because of weak spots in the ground underneath. Every ten or fifteen years many roads with bituminous surfaces are resurfaced completely.

Workers repair concrete pavements by digging out broken sections and putting in new concrete. They often repair cracks by filling them with asphalt. Many older concrete pavements must be resurfaced completely.

Deteriorated pavements can be reconstructed in several ways:

- the surface can be treated to improve its characteristics;
- the existing course can be overlaid;
- the damaged layers can be removed and replaced;
- the existing wearing course can be remixed with additional materials.

Clearing ice and snow. Most roads and highways must serve the year around. So they must be kept free from snow and ice in winter. In some places, snow fences are put up. These are thin pickets wired together and placed parallel to the road, on the side from which the storm winds usually blow, and about fifteen to thirty meters from the road. Snowdrifts then do not pile up on the road.

V-shaped or straight-blade bulldozers clear the roads when it snows. In deep drifts, special snowplows are needed.

Often roads and highways that are slippery from ice and snow must have salt, chemicals, sand, or cinder spread on them to keep them passable.

Comprehension check

5. Answer the following questions.

1. What does the life of the road structure depend on?
2. What does maintenance include?
3. It is better to maintain and rehabilitate existing roads than construct new ones, isn't it?
4. What types of maintenance are there?
5. What are the ways of reconstruction of deteriorated pavements?
6. What means of protection from snow do you know?
7. What kinds of machines are used to protect roads from snowdrifts?
8. Do most of roads and highways meet the requirements of modern traffic?

Vocabulary practice

6. Match the words in A with an appropriate ending in B.

A		B
Emergency maintenance		grading, grass cutting, drain clearing, pothole and shoulder repairs which are carried out frequently.
Periodic maintenance		repairing of road signs.
Regular maintenance	involves	restoration of the road to its initial condition and sometimes widening, making small alignment changes or providing footpaths.
Rehabilitation		restoring roads after major failures
Routine maintenance		resurfacing and bridge repairs scheduled over periods of several years.
Seasonal maintenance		snow clearing and flood repairs.

7. Fill in the blanks using the words below and translate the sentences.

bends	clear	conditions
caused	slippery	suit

Driving in bad weather 1) _____ creates extra difficulties. An early indication of likely weather conditions allows motorists to change their driving to 2) _____ those conditions. Statistics also show that such early warnings¹ have saved lives, particularly at dangerous 3) _____. For example, in Finland where most travel is by road, and where one in four accidents are 4) _____ by speeding on icy roads warning of coming snow or ice is essential. This allows road workers to 5) _____ snow and prevent 6) _____ surfaces, thus preventing many accidents.

Language focus

8. Read and translate the following words paying attention to the prefix *re-*.

Reconstruct, remix, remove, replace, restore, resurface.

9. Form nouns from the following verbs and translate them.

Align, attach, care, deteriorate, improve, protect, remove, repair, smooth, strengthen, treat, wire.

10. Find 7 pairs of synonyms.

Adhesion, connect, continue, damage, failure, plan, prolong, scatter, schedule, shoulder, spread, traction, wayside, wire.

11. Find 6 pairs of antonyms.

Above, destroy, deteriorate, failure, final, improve, initial, narrow, rehabilitate, restoration, under, widen.

¹ warnings предупреждения

12. Find in the text the English equivalents. Mind the prepositions.

1) бросать на...; 2) в грунте; 3) выкапывать; 4) из-за; 5) касаться;
6) производить ямочный ремонт новыми материалами; 7) проникать
через...; 8) развиваться из-за/от...; 9) состоять из...; 10) укладывать
бетон

Speaking

13. Speak on:

- a) the significance of maintenance for the life of a road;
- b) the main types of maintenance activities;
- c) ways of repairing damage and resurfacing;
- d) maintenance activities in winter.

UNIT XII. ROAD JUNCTIONS AND INTERSECTIONS

Pre-reading tasks

1. Study the vocabulary.

accident авария, несчастный случай

carrying capacity пропускная способность¹

collision (between) [kə'liʒ(ə)n] столкновение (между)

congestion [kən'dʒestʃ(ə)n] затор (уличного движения); «пробка»

convergence [kən'vɜ:dʒ(ə)ns] слияние (потоков автомобилей)

angle of convergence угол слияния (потоков автомобилей)

control [kən'trəʊl] управление, контроль

directional control [di'rekʃ(ə)n(ə)l kən'trəʊl] управление направлением движения (транспорта)

traffic control управление движением (транспорта)

flyover ['flaɪəʊvə] 1) (*BrE*) путепровод; эстакада; 2) (*AmE*) верхний уровень многоуровневой развязки

intersection 1) пересечение (примыкание) автомобильных дорог²; 2) перекресток (улиц)

island ['aɪlənd] островок безопасности (на пересечении дорог)

junction транспортный узел³

flyover-junction ромбовидное пересечение дорог в разных уровнях

multi-level junction многоуровневая транспортная развязка

road junction транспортная развязка⁴

clover-leaf junction транспортная развязка «клеверный лист»

overpass ['əʊvəpɑ:s] путепровод

pedestrian [pi'destrɪən] пешеход

roundabout ['raʊndəbaʊt] кольцевое пересечение дорог

segregation / separation разделение потоков движения

vertical separation пересечение (дорог) в разных уровнях (посредством путепровода)

¹ Пропускная способность дороги – максимально возможное число автомобилей, которое может проехать на определенном участке дороги за единицу времени.

² Пересечение (примыкание) автомобильных дорог – узел автомобильных дорог в одном уровне.

³ Узел – пересечение автомобильных дорог между собой.

⁴ Транспортная развязка – узел автомобильных дорог в разных уровнях.

signposting ['sainpəʊstɪŋ] система знаков и указателей
subway ['sʌbweɪ] 1) (*BrE*) тоннель; подземный переход; 2) (*AmE*) метро
pedestrian subway пешеходный тоннель
through route ['θru: 'ru:t] сквозной маршрут
to weave [wi:v] (**wove, woven**) перестраиваться в другой ряд движения
traffic ['træfɪk] движение
class of traffic род движения (напр. пригородное, магистральное и т. д.)
cross traffic движение транспорта в пересекающем направлении
local traffic местное транспортное сообщение; местный транспорт
one-way traffic одностороннее движение
opposing traffic встречное движение
peak-hour traffic интенсивность движения в час пик¹
through traffic ['θru: ,træfɪk] транзитное сообщение; магистральное сообщение; транзитный транспорт
two-way traffic двустороннее движение
traffic flow / traffic stream автотранспортный поток; поток движения
traffic lane полоса движения
underpass ['ʌndəpɑ:s] 1) путепровод под дорогой, туннель на пересечении дорог; 2) подземный переход; пешеходный туннель

Part I

2. Read the following international words. Try to guess their meaning.

Civilization, classes, classify, clover, conflict, diameter, factor, function, groups, isolated, percentage, process, route, seriously, system, term, typical.

3. Match the equivalents.

- | | |
|-------------------------|----------------------------------|
| 1) chiefly | a) главным образом |
| 2) complete segregation | b) дорогой |
| 3) converging streams | c) меры безопасности |
| 4) costly | d) новая промышленная территория |
| 5) ill-planned | e) плохо спланированный |
| 6) newly developed area | f) сохранять высокую скорость |

¹ *Час пик* – период максимальной нагрузки.

- | | |
|----------------------------|--------------------------|
| 7) safeguards | g) полное разделение |
| 8) the worst danger spot | h) самый опасный участок |
| 9) to drop speed | i) снижать скорость |
| 10) to maintain high speed | j) сходящиеся потоки |

Reading task

4. Read the text carefully and do the tasks that follow.

A *road junction*, as the term is generally used, is the point at which one road meets another; an *intersection* is the point at which two or more roads cross each other. Both junctions and intersections are, of course, the worst danger spots in a road system.

The problems of reducing danger at these points are those of cost and space. If junctions and intersections are such that all classes of traffic meet each other at the same level, there is a danger of collision, not only between cars of the same class but between those of different classes. Almost complete segregation of different classes can be achieved, and the need for users of the same class to cross traffic streams, the most dangerous process of all, can be avoided.

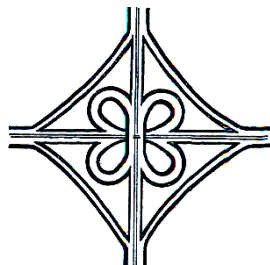
The perfect example of complete segregation of different classes of traffic and of the avoidance of crossing traffic streams is the clover-leaf junction, at which no collision can occur between vehicles if the drivers of those leaving the junction can manage to avoid those already on the road which they are approaching – which is a difficult thing.

All forms of road junction can be classified into groups: multi-level junctions, roundabouts and flyover-junctions.

The clover-leaf junction, the most typical of *multi-level junctions*, has already been mentioned. There is need for multilevel intersections where three conditions are fulfilled:

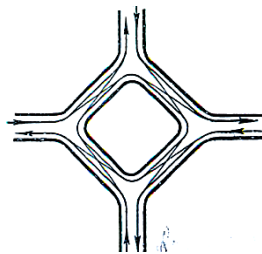
- only a small percentage of the traffic must turn to left or right;
- the major volume of traffic is travelling on a fast through route;

– the volume of traffic would otherwise be sufficient to justify the provision of a roundabout.



Unlike multi-level intersections, *roundabouts* do not enable traffic to cross without dropping speed but pedestrians and cyclists cannot be segregated unless costly over- or underpasses are constructed.

The success of a roundabout depends greatly upon the ease with which vehicles using it can “weave” or pass from one traffic lane to another. The greater the length of the road in which the weaving can be carried out and the smaller the angle of approach of converging streams of traffic, the more easily can weaving be performed. The angle should not be greater than thirty degrees. The greater the diameter of the island, the smaller the angle of convergence.



Flyover-junctions have been developed chiefly at places where there are no pedestrians (and cyclists are few, if any). These “flyovers”, which enable high speeds to be maintained, are extremely expensive, costing about ten times as much as a roundabout, so it is much better to have ten roundabouts at ten dangerous junctions than a single flyover at a single junction.

Comprehension check

5. Answer the following questions.

1. What are the most dangerous spots in a road system?
2. What problems are connected with the problems of reducing danger of these points?
3. How can complete segregation of different classes of traffic be achieved?
4. What types of road junctions do you know?
5. What does the success of a junction depend on?
6. What can you say about the angle of approach of converging streams of traffic?
7. Where have flyover-junctions been developed?

6. Choose the best variant to complete the sentences.

1. There is a danger of collision between vehicles of the same class and those of different classes if...
 - a) *there is no need for drivers to cross traffic streams.*
 - b) *there is a clover-leaf junction.*
 - c) *all classes of traffic meet at the same level at intersections.*

2. Multi-level intersections are adopted when...
 - a) *only a small percentage of traffic travels on a through road.*
 - b) *the traffic must cross the street necessarily dropping speed.*
 - c) *the major volume of traffic is travelling on a fast through route without dropping speed when passing the junctions.*
3. A roundabout is considered successful if...
 - a) *the angle of approach of converging streams of traffic is very large.*
 - b) *the vehicles using it can easily reach different exits as directly as possible passing smoothly from one traffic lane to another at a small angle of convergence.*
 - c) *the road for the vehicles to pass from one traffic lane to another is too short.*
4. Flyover junctions are not very widely used as...
 - a) *they do not enable high speeds to be maintained.*
 - b) *they cost ten times as much as a roundabout and are designed for roads where pedestrians and cyclists are excluded.*
 - c) *they are manageable only on roads which accommodate pedestrians and pedal cyclists.*

Vocabulary practice

7. Choose the right translation of the word in bold.

1. **perfect** example a) совершенный; b) идеальный; c) законченный
2. **to pass** from one lane to another a) передавать; b) проезжать; c) обгонять; двигаться; переходить
3. **to maintain** high speeds a) обслуживать; b) ремонтировать; c) сохранять
4. ten **times as much as** a roundabout a) время, раз; b) сколько; c) так же много, как, столько же, больше
5. to be of great **value** a) математическая величина; b) ценность, значение; c) стоимость

Follow up activity

8. Read the text in 2 minutes and answer the question: *How can the problem of safety be solved?*

Roads appeared in the far-off times and were first in the form of pedestrian tracks. Then, as civilization progressed, they became routes along which horse-drawn traffic and finally vehicles moved.

Roads have always had a dual function: as traffic routes and as a means of approach to dwellings and other buildings. But since the growth of transport these functions have been seriously in conflict with each other. Today this conflict is extremely great and leads to great danger.

Any town so planned that its citizens are killed in great numbers is an ill-planned town. The layout of all newly developed areas must be made dependent on the safety factor. Pedestrians and fast motor traffic will never and can never mix – they must be isolated.

Part II

Pre-reading task

9. Read the following international words. Try to guess their meaning.

Aesthetically, comfort, economic, effective, ideal, occupy, peak hour, result, scheme, special, symbols, tendency, urban.

10. Match the equivalents.

kerb	гушевой транспорт
street widening	подходящей формы
horse-drawn vehicles	боковая улица; переулок
well-lit	ликвидировать, устранять, исключать
at normal speed	бордюр, обочина
side street	хорошо освещенный
suitably-shaped	расширение улицы
eliminate	с нормальной скоростью
objection (to sth)	из-за
due to	возражение (против)

Reading task

11. Read the text carefully and do the tasks that follow.

Traffic Control

(1) It is obvious that in existing urban areas much of the congestion is due to narrow streets and junctions which are incapable of taking peak-hour traffic. The solutions to this problem are costly. They include adequate roundabouts and street widening, and the segregation of traffic by means of flyover roads, underpasses, bridges, and pedestrian subways.

(2) Much of the congestion in urban areas is due to traffic which has no business in the area but is only passing through. There is a tendency for drivers to keep to the well-lit shopping streets. If they can be made to use less important streets and those not occupied by shops, then conditions are improved not only for the through traffic but also for the local traffic.

(3) Signposting is, of course, a directional control and a very effective one. In fact, it is important for all signs and symbols used on the roads to be seen, well in advance, by drivers approaching at normal speed. Directional control cannot increase the capacity of the highway system but it can avoid local congestion.

(4) One-way traffic is a special kind of directional control which is very effective in maintaining the traffic flow in congested areas.

(5) A major cause of congestion in towns is the interruption to the free flow of traffic by cross traffic at junctions. But if the need for traffic streams to cross each other can be avoided then the movement of vehicles will be much easier. This easier movement of traffic can often be achieved by making traffic move in one direction only along certain streets and by prohibiting incoming vehicles from side streets from crossing the main stream. The streets may be either one-way or two-way according to local conditions of traffic or width of carriageway, and traffic at the junctions can be guided by constructing suitably-shaped islands. Besides one-way traffic can also be introduced where the carriageway width is inadequate for two opposing lines of traffic.

(6) The disadvantages of a one-way traffic system are that it increases the distance travelled by some vehicles, that it makes it more difficult for strangers to find their way about. The true aim of a one-way system is to eliminate cross traffic, and under conditions of continuous flow on cross-

ing streets the introduction of a properly designed one-way scheme can double the carrying capacity of the highways.

(7) The two main objections to street intersections are that they are a cause of accidents and that they interrupt the flow of traffic. The best thing to do with intersections is to get rid of them. If that is not possible they may be improved and made safer but they will always remain a source of danger and delay.

(8) Many accidents are caused because traffic streams of different types, or traffic streams travelling in different directions, are using the same carriageway, and these accidents can be avoided either by reservations between traffic lanes, or by vertical separation.

(9) In many cities in America and in Europe segregation of traffic is achieved by means of flyovers or underpasses; at some junctions there are even three different levels. Each has its advantages and disadvantages according to the circumstances. Flyover structures are not always aesthetically pleasing while an underpass may be more expensive to construct. The separation of fast and slow traffic from the heavier and faster traffic is most desirable not only in the interests of freedom of traffic movement, but also of safety. This ideal is not easy to achieve.

(10) Urban traffic control will be of benefit to the general public in the district concerned and will result in greater comfort for road users of all classes, as well as bringing economic advantages to the community as a whole.

Comprehension check

12. Group the following sentences according to the topics:

A. The problems created by motor traffic growth.

B. Ways of solving the traffic congestion problem.

C. Advantages of a one-way traffic scheme.

1. A great intensity of traffic makes it necessary to lower the average speed of vehicles.

2. The problem of avoiding traffic congestion is one of the most important.

3. Under conditions of continuous flow on intersecting streets a properly designed one-way scheme can double the carrying capacity of the highways.

4. The extraordinary growth of motor traffic has created traffic difficulties demanding new designs and planning.

5. Roundabouts, street widening and the segregation of traffic by means of flyover roads, pedestrian subways, underpasses are possible solutions of the congestion problem though they are costly and demand space.
6. A special kind of directional control – one-way traffic – obviates the necessity for traffic streams to cut across each other.
7. Narrow streets and junctions are incapable of taking peak-hour traffic.
8. Directing the traffic stream to less important streets may improve both the through and local traffic.
9. With the carriageway width inadequate for two opposing lines of traffic a one-way scheme is advantageous though it increases the distance travelled by vehicles.

13. Match the sentences with the paragraphs of the text. Put them in order according to the text.

1. The importance of signs in the control of direction choice.
2. The advantage of having one-way streets.
3. Segregation of different types of traffic is an ideal not easy to achieve.
4. The necessity of introducing grade separation.
5. The roads where congestion in town takes place.
6. The danger of having street intersections.
7. Drivers themselves may bring about congestion.
8. The disadvantages of one-way traffic.

Speaking

14. Speak about traffic control using the following clichés:

This text deals with ...

The author pays great attention to the ...

Advantages and disadvantages of the ... are discussed.

UNIT XIII. ROADS: ENVIRONMENTAL ASPECT

Pre-reading tasks

1. Study the vocabulary.

accident авария, случайность, несчастный случай

benefit выгода, польза

bicycle path велодорожка, проложенная отдельно от проезжей части дороги или улицы

car traffic автотранспорт

crossing переход, пересечение

cycle path велосипедная дорожка

cycling езда на велосипеде

cyclist велосипедист

disadvantage [disəd'vɑ:ntɪdʒ] / **drawback** ['drɔ:bæk] недостаток

facilities (pl.) удобства

leisure facilities условия для отдыха

fence ограждение

means (pl. – **means**) средство

measure ['meʒə] мера

to implement measures осуществлять меры

to target measures (at) направлять меры (на)

network сеть

private car личный автомобиль

public transport общественный транспорт

to achieve environmental gains достичь целей в деле защиты окружающей среды

to contribute (to sth) способствовать, содействовать (чему-л.)

to cycle ездить на велосипеде или мотоцикле

to harm the environment наносить вред окружающей среде

to improve physical fitness улучшать физическую форму/физическое здоровье

to reach добираться, достигать

to walk ходить, идти пешком

to widen pavements расширять тротуары

traffic regulation регулирование движения транспорта

traffic safety безопасность движения транспорта

traffic signal светофор

walking ходьба

2. Read the following international words. Try to guess their meaning.

Alternative, conflict, distance, infrastructure, kilometers, positive aspects, risk, services, situation, total.

3. Match the equivalents.

- | | |
|-----------------------------------|----------------------------------|
| 1) air pollutant | a) в настоящее время |
| 2) currently | b) уместный |
| 3) developed | c) неудовлетворительный |
| 4) frequent | d) ощущать улучшение здоровья |
| 5) mode | e) пригородный |
| 6) morbidity | f) развитый |
| 7) principally | g) главным образом |
| 8) relevant | h) режим |
| 9) sub-urban | i) смертность |
| 10) to experience improved health | j) вещество, загрязняющее воздух |
| 11) trends over recent years | k) частый |
| 12) unsatisfactory | l) тенденции последних лет |

4. Read the proper names.

Norway ['nɔ:weɪ]

The Institute of Transport economics [ðə 'ɪnstitju:t 'trænsɒ:t əv i:kə'nɒmiks]

Reading task

5. Read the text carefully and do the tasks that follow.

Walking and Cycling

The ease with which people can get to work, shops and other services is an important part of our daily life. Trends over recent years indicate that people have been making longer and longer journeys, principally by private car, to reach these facilities. There is a conflict between lifestyle built around

more frequent journeys made quickly and conveniently by car and people's desire for less pollution, less noise and less congestion which harm our environment. We can improve matters in two main ways: by locating shops and leisure facilities in town and sub-urban centres; and by enabling journeys to be made by modes other than car such as transport, cycling and walking.

The Institute of Transport economics (Norway) has collected information on walking and cycling in Norway and abroad. The information comprises the extend of walking and cycling, risk and traffic safety for pedestrians and cyclists and the environmental gains that would be achieved if car traffic were replaced by walking and cycling.

In Norway, considerably more than 60 % of trips of two kilometers are made by car. Replacing some of these trips by walking or cycling should therefore be possible. Public transport is only relevant as a means for trips longer than three to five kilometers long.

People living in areas with developed public transport system walk and cycle more than the population in the rest of the country. This indicates that walking and cycling are much a supplement to public transport as an alternative.

Improving the Conditions

People experience improved health as the main benefit of walking. The most positive aspects of cycling are that it is fun and it is convenient. Other benefits of cycling are getting fresh air and that it is simple, inexpensive.

The most important drawbacks of walking and cycling are that it is inconvenient i. e. it takes too long and there is a limit to the distance. Other important disadvantages are that it is impossible to carry large and heavy objects and that the infrastructure is unsatisfactory, i. e. that the network for pedestrian and bicycle paths is insufficiently developed, it is difficult to cross streets, etc.

In order to implement measures to improve the situation for pedestrians and cyclists, it is reasonable to start from the infrastructure. Developing the network of pedestrian and cycle paths, widening pavements, improving opportunities for crossing roads and streets, building subways and crossings for pedestrians and cyclists and providing a smoother road surface are measures requested by many for easier walking and cycling.

Increasing Safety

In total number of accidents may increase if trips are transferred from car to bicycle. In order to achieve the goal of increased walking and cycling and

to ensure that such travel takes place in the safest possible way, safety measures targeted at pedestrians and cyclists need to be implemented.

Traffic regulation measures such as traffic signals and fences also contribute to reducing the number of pedestrian accidents.

A Better Environment and Better Health

Walking and cycling improve physical fitness and reduce morbidity. Pedestrians and cyclists are more exposed to pollution than people in cars. Currently, pedestrians and cyclists contribute to limiting pollution but emissions of air pollutants will be reduced if more people walk and cycle.

Comprehension check

6. Answer the following questions which will help you to make a summary of the text.

- 1 What does this text deal with?
2. Why do scientists think about such means of movement as walking and cycling?
3. What country is spoken about in this text?
4. Are cars widely used for trips of two kilometers in Norway to get to work, shops and other services?
5. What are the main problems created by cars?
6. Is it possible to replace trips for short distances by walking and cycling?
7. What are the main benefits of walking? Cycling?
8. What safety measures can be implemented to improve the situation for pedestrians and cyclists?
9. In what way is walking and cycling connected with the health of people?

Language focus

7. Insert antonyms.

1. Public transport in Hong Kong is **cheap** but in London it is _____.
2. Paris has the Metro railway **below ground** and a large bus system _____.
3. People should _____ and **finish** work at different time to reduce peak hour traffic jams.

4. City administration tries to encourage people to use _____ transport, not **private** cars in the city center.
5. The cost of buying a car can be **increased** while the cost of public transport should be _____.

Vocabulary practice

8. Fill in the missing words from the list.

advantage	atmosphere	average
car	increase	number
per	public transport	reduction
routes	solve	source
study	transportation	

The private 1) _____ has dramatically improved the comfort, speed and individual freedom of movement. The car brought people closer to places of work, 2) _____ and entertainment.

However, the use of private cars can also be a 3) _____ of many most serious problems today. The car is a disadvantage as well as an 4) _____. It pollutes the 5) _____, may be involved in dangerous accidents, and by its great quantity blocks roads. In New York City, 2.5 million cars move in and out of the city each day. The average speed is sometimes 8.1 miles 6) _____ hour. But New Yorkers continue to drive, just as people in London where the 7) _____ speed in certain particularly overcrowded 8) _____ is only 2 miles per hour. Most people believe that the car a necessary part of life in today's world. Car owner usually do not consider other methods of public 9) _____ such as bus, train or bicycle.

The only way to 10) _____ these problems is to reduce the use of private cars. How can we do it? We may 11) _____ the quality and availability of public transport. Cars could not be permitted in certain parts of the city, thus making people walk and use 12) _____. The cost of buying and running a car can be increased with a corresponding 13) _____ in the price of public transport. The reduced 14) _____ of cars on the roads means less pollution.

9. Choose the right variant.

1. The only means of **arrival/access** to the station is through a dark subway.
2. When her car broke down, she had **to catch/to take** a taxi.
3. The two buses collided¹, but luckily none was **injured/wounded**.
4. There are road works in the center streets and long **delays/interval** are expected.
5. Only a mechanic could **realize/understand** the true **amount/extent** of the damage of the car.
6. While turning a corner at high speed my car **hit/crashed** a lamp post.

10. Read the text below and decide which answer (A, B, C or D) best fits each space. (0) is done for you as a model.

On Your Bike!

If you are getting (0) *tired* wasting time looking for parking space, my (1) _____ to you is to consider the bicycle as an alternative. (2) _____ of transport. Cycling is probably the cheapest and healthiest way of getting (3) _____ in our congested city centres. (4) _____ it is convenient and environmentally desirable, it can be an unattractive (5) _____ on a cold wintry morning. It is much easier to (6) _____ onto a nice warm bus or jump into your car, (7) _____ the sight of cyclists as they weave their way in and out of the traffic may fill you with (8) _____ as you sit waiting in yet (9) _____ traffic jam. In spite of the (10) _____ that worsening pollution is getting many people (11) _____, causing more and more health problems, and (12) _____ it is fashionable to express one's (13) _____ of the environmentally safe bicycle, it is hard to (14) _____ the danger cyclists face in sharing the road with cars. (15) _____ cycling is not as risky as it looks at first sight, there are more and more accidents involving cyclists.

- | | | | | |
|----|-----------|--------------|----------|---------------|
| 0. | a) tired | b) irritated | c) fed | d) angry |
| 1. | a) advice | b) warning | c) plan | d) solution |
| 2. | a) method | b) way | c) means | d) instrument |
| 3. | a) on | b) through | c) over | d) about |

¹ *collide* столкнуться

- | | | | |
|--------------------|--------------|-------------|----------------|
| 4. a) Despite | b) In spite | c) Although | d) Even as |
| 5. a) choice | b) advice | c) propose | d) transport |
| 6. a) enter | b) be | c) travel | d) get |
| 7. a) even | b) however | c) though | d) and |
| 8. a) approval | b) envy | c) angry | d) criticism |
| 9. a) other | b) more | c) another | d) longer |
| 10. a) truth | b) reality | c) fact | d) event |
| 11. a) round | b) down | c) over | d) together |
| 12. a) while | b) despite | c) as | d) in spite of |
| 13. a) favour | b) agreement | c) belief | d) approval |
| 14. a) refuse | b) criticize | c) deny | d) think |
| 15. a) Even though | b) However | c) Whereas | d) Although |

Speaking

11. What do you think?

1. What is the traffic situation like in your town? Is there a good public transport system? Is it cheap?
2. Do you have to pay to use the motorways?
3. Do people drive well?
4. Tell each other about a time you were in a traffic jam.

SUPPLEMENTARY READING

ROMAN ROADS

Roman road system, outstanding transportation network of the ancient Mediterranean world, extending from Britain to the Tigris-Euphrates river system and from the Danube River to Spain and northern Africa. In all, the Romans built 50,000 miles (80,000 km) of hard-surfaced highway, primarily for military reasons.

The first of the great Roman roads, the Via Appia (Appian Way), begun by the censor Appius Claudius Caecus in 312 BCE, originally ran southeast from Rome 162 miles (261 km) to Tarentum (now Taranto) and was later extended to the Adriatic coast at Brundisium (now Brindisi). The long branch running through Calabria to the Straits of Messina was known as the Via Popilia. By the beginning of the 2nd century BCE, four other great roads radiated from Rome: the Via Aurelia, extending northwest to Genua (Genoa); the Via Flaminia, running north to the Adriatic, where it joined the Via Aemilia, crossed the Rubicon, and led northwest; the Via Valeria, east across the peninsula by way of Lake Fucinus (Conca del Fucino); and the Via Latina, running southeast and joining the Via Appia near Capua. Their numerous feeder roads extending far into the Roman provinces led to the proverb "All roads lead to Rome."

The Roman roads were notable for their straightness, solid foundations, cambered surfaces facilitating drainage, and use of concrete made from pozzolana (volcanic ash) and lime. Though adapting their technique to materials locally available, the Roman engineers followed basically the same principles in building abroad as they had in Italy. In 145 BCE they began the Via Egnatia, an extension of the Via Appia beyond the Adriatic into Greece and Asia Minor, where it joined the ancient Persian Royal Road.

In northern Africa the Romans followed up their conquest of Carthage by building a road system that spanned the south shore of the Mediterranean. In Gaul they developed a system centred on Lyon, whence main roads extended to the Rhine, Bordeaux, and the English Channel. In Britain the purely strategic roads following the conquest were supplemented by a network radiating from London. In Spain, on the contrary, the topography of the country dictated a system of main roads around the periphery of the peninsula, with secondary roads developed into the central plateaus.

The Roman road system made possible Roman conquest and administration and later provided highways for the great migrations into the empire and a means for the diffusion of Christianity. Despite deterioration from neglect, it continued to serve Europe throughout the Middle Ages, and many fragments of the system survive today.

PAN-AMERICAN HIGHWAY

Pan-American Highway, network of highways connecting North America and South America. Originally conceived in 1923 as a single route, the road grew to include a great number of designated highways in participating countries. The whole system, extending from Alaska and Canada to Chile, Brazil, and the southern tip of Argentina, totals nearly 30,600 km (19,000 miles). The Inter-American Highway, from Nuevo Laredo, Mexico, to Panama City (5,390 km [3,350 miles]), is a part of it.

In 1937 Argentina, Bolivia, Canada, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Peru, and the United States signed the Convention on the Pan-American Highway, whereby they agreed to achieve speedy construction of their respective sections of the highway. The Mexican section, the first Latin American section to be completed, was built and financed entirely by Mexico, while the sections through many of the Central American countries were built with U.S. assistance.

The Pan-American Highway is nearly continuous, with the major exception of the Darién Gap, the overland route that stretches about 100 km (60 miles) between Panama and Colombia. The environmentally sensitive rainforests and marshlands of the Darién Gap are home to a number of Indigenous peoples who have long opposed any plans to continue construction of the highway, and there are concerns about facilitating drug trafficking and illegal immigration should the road be continued. The treacherous, inhospitable terrain is extremely dangerous to travelers, who are also vulnerable to kidnapping or other violence by guerrillas, drug traffickers, and smugglers. Those seeking to travel the length of the Americas on the Pan-American Highway typically bypass the Gap by boat or plane.



GREEN HIGHWAYS: THE PATH TO SUSTAINABLE ROADS IN 2024 (by Jack Shaw)

Electric vehicles (EVs) are an excellent start for making roads more sustainable. What is the next step for the transportation industry? Creating green highways revamps infrastructure and makes it more conducive to EVs. The push for greener roads has led to projects in the U.S. and worldwide. Here's a guide to the present and future of this environmentally conscious concept.

What Technology Powers Green Highways?

Sustainable roads can arrive in various ways. Some rely on technology for daily operations, whereas others are simpler and don't need as much modern tech.

Technology-dependent sustainable highways often include photovoltaic (PV) panels, as these roads integrate solar technology with the ground. Cars drive over highways with electromagnetic coils underneath, connected to the area's electrical grid. The coils provide energy for the cars as they glide across the road, transferring power to receivers in the vehicle's battery.

Constructing green highways also derives from the materials you use. Making the roads more sustainable entails utilizing recycled materials and being smarter about implementation. Resources should be as local as possible and developers should prioritize greener materials like recycled concrete. In this case, having a construction materials lab is important because it tests construction materials, ensuring their strength and positive impact on the environment in road construction.

Transportation officials can improve a highway's longevity by ensuring stormwater and other weather elements don't ruin the road and shorten their life span. They also must be more selective about highway construction and its environmental impact.

Why Are Green Highways Necessary?

Why have industry experts pushed for green highways? The benefits are difficult to ignore. Here are a few reasons more sustainable roads are under construction.

Supporting Electric Vehicles

If EVs are the future of passenger cars, they'll need roads to support their staying power. The automobile market comprises 90 % gas-powered cars, but solar-powered green highways could propel EVs into a

more practical auto option. These roads charge your electric machine as you drive, thus helping you spend less time at a charging station.

Public chargers in the U.S. are level 1, level 2 or direct current (DC) fast charging. You need about four to ten hours to charge with a level 2, meaning an overnight stay could be necessary. Solar-powered roads harness the sun's power and charge your EV while driving. (<https://climatesort.com/green-highways/>)

INTERNATIONAL TRANSPORT CORRIDORS

The geographical position of Belarus predetermined its role as a transit road power: the republic is located at the crossroads of the main transport routes connecting Western European countries with the East, the Black Sea coast regions and the Baltic Sea countries. The territory of Belarus is crossed by two trans-European transport corridors, identified according to the international classification under number II (West – East) and under number IX (North – South).

The highway M-1/E 30 Brest – Minsk – the border of the Russian Federation is a section of the trans-European transport corridor II Berlin – Warsaw – Minsk – Moscow – Nizhny Novgorod, connecting Germany, Poland, Belarus and Russia. This transport corridor is identified by the European Union as the highest priority among the trans-European transport corridors in connection with the importance of trade flows passing through it between East and West. Its length on the territory of the republic is 610 km. The traffic intensity in certain sections of this highway reaches 8,500–10,000 cars per day.

Today, the M-1/E30 highway meets international standards in technical parameters, it uses the most modern technologies and means of organizing traffic. Most of it has the status of a road for cars, which means that the maximum speed is increased to 120 km/h, which allows to increase the throughput of the road and improve the environmental situation.

The highway M-8/E-95 border of the Russian Federation – Vitebsk – Gomel – the border of Ukraine crosses the territory of the republic from north to south, has a length of 456 km and is part of the trans-European transport corridor IX, which connects Finland, Lithuania, Russia, Belarus, Ukraine, Moldova, Romania, Bulgaria and Greece. The branch of this corridor IXB Gomel – Minsk – Vilnius – Klaipeda – Kaliningrad has a length of 468 km across Belarus and provides cargo owners with access from the re-

gions of Eastern Ukraine and Central Russia to the specialized seaports of Klaipeda, Ventspils and Kaliningrad.

It should be noted that there is a network of road service facilities on the sections of trans-European transport corridors passing through the territory of the republic. The state pays special attention to expanding the volume and improving the quality of the services provided, and the priority in this area is the construction of complexes with a full range of services.

The Ministry of Transport and Communications ensures the implementation of the Protocol developed by the Intergovernmental Council of Road Workers on the CIS International Roads, which formulates the basic principles and approaches to the formation and development of the network of international roads of the Commonwealth; measures, aimed at integrating the CIS roads into the European and Asian systems of roads and transport corridors, at creating a modern network of road service facilities and providing services to international road carriers, as well as at organizing interaction between road administrations, were identified.

The Ministry of Transport and Communications is constantly paying the most serious attention to maintaining the most important international highways in good condition and, on the basis of available capabilities, allocates the necessary resources and financial resources to improve the technical equipment and operational status of trans-European corridors. The enterprises of the industry are doing everything possible to ensure that travel on international highways is as safe, fast and more comfortable as possible. The main roads of the republic are the visiting card of the country, the true heritage of the Belarusian people, therefore, the road workers try not only to preserve it, but also to increase it.

Continuous improvement of international transport corridors passing through the territory of the republic, convenience, comfort and safety of movement along them attract transit traffic flows to the country. Every year, more and more carriers choose the roads of the Republic of Belarus. (<https://mintrans.gov.by/en/dorozhnoe-khozyajstvo/mezhdunarodnye-transportnye-koridory>)

GRAMMAR FOCUS

1. State the function of the verb *be* in the following sentences and translate them.

1. The structural layer is eight inches thick.
2. They are building a new ring road round the city.
3. The ring road around the city is to be as long as 150 km.
4. In the Old World all wheels were solid discs. Finally, the wheel was covered with iron and then with rubber.
5. These machines were to make construction quicker and cheaper.
6. The engineer was working at his design for some months.
7. All these materials are to be transported to the site from afar.
8. Granular base was to be compacted by the rollers.

2. State the function of the verb *do* in the following sentences and translate them.

1. We'll do our best to improve the road quality.
2. They didn't know how to give the road a pavement of flat stones, but the Romans did.
3. Motorists don't have to pay a toll to travel on these roads.
4. Did Richardson publish a standard textbook on asphalt paving in 1905?
5. This type of asphalt did play an important part in road construction.
6. Do these methods help you to improve the road pavement?
7. The Egyptians obtained native asphalts from the Dead Sea, didn't they?
8. They began to do their best much earlier than we did.

3. State the function of the verb *have* in the following sentences and translate them.

1. He is a very skilled engineer and we have high opinion of his work.
2. We have to mechanize all building operations to make the road in time.
3. During the construction of the bridge across the river specialists had to solve many technical problems.
4. You will have to take measures to prevent spring waters from penetrating the subgrade.
5. This type of cement has changed the concrete properties.
6. The new ceramic engine has been developed in Japan.

7. They had to stop and rest every quarter of an hour as path was very steep.
8. They will have to consider the conditions of this locality.

4. Remember the function of *it*. Read and translate the following sentences.

1. It is necessary to develop the principles of road design and construction.
2. It is essential that the machinery must be serviced regularly.
3. It is to be noted that the Belarusian enterprises produce modern road-building equipment.
4. It is with the help of our specialists that a lot of roads have been constructed in Asia and Africa.
5. It was May when they received the new equipment.
6. It is said that the experiments are going on successfully.
7. It were Russian engineers who suggested granular surfacing. It was laid on a sand base. In fact, it was the cheapest way of road construction.

5. Define the function of *one (ones)* and translate these sentences.

1. One can say that geographical position of Belarus itself has determined its social and cultural peculiarities for many years.
2. One may work in the laboratory only observing certain rules.
3. One should know how to cross the street.
4. In planning a new road or rebuilding an existing one maps must be drawn.
5. These methods are different from the ones used before.
6. Scientists are developing new processes and improving old ones to produce metals that will meet present day requirements.

6. Pay attention to the words *only, the only, some, the same* and translate the following phrases.

A:

coal is not only a source of heat;
the only example known;
the only means of access to the station;
the only method of solving the problem;
the work was finished only yesterday;

B:

polluted to some extent;
 some local materials;
 some new methods of work;
 the same equipment;
 the same properties; some rules;
 the same traffic intensity

7. Choose the right preposition and translate the sentences.

1. The equipment may be used only (*owing to, in case of, due to*) emergency.
2. They could not get there in time (*in order to, owing to, instead of*) a severe storm.
3. Interest in transport problems has extended far (*among, beyond, between*) the specialists.
4. This bus makes regular trips (*out of, among, between*) the city centre and the suburb.
5. The research centre was situated high in mountains some three kilometers (*below, under, above*) sea-level.
6. All the workers decided to stay and wait for the results (*since, till, as long as*) the end of test.
7. They had to stop and rest every quarter of an hour (*as, because of, but*) the mountain path was very steep.

8. Give the appropriate degrees of comparison of the following adjectives and adverbs.

light		
	less	
		the most difficult
	worse	
		the best
expensive		
	denser	
		the most
	farther (further)	
attractive		

9. Translate the following sentences, paying attention to the suffix *-er*.

1. The denser the ground, the slower is the process of moisture transfer.
2. The higher the average speed of the traffic, the wider will be the traffic lane required.
3. The more experiments scientists make, the greater is their knowledge of the properties of this material.
4. The higher the degree of soil compaction, the slower is the penetration of capillary water.
5. The greater the number of vehicles in the stream, the more severe will be requirements to the road.

10. Translate the following sentences paying attention to the modal verbs.

1. A crane can raise a weight of several tons.
2. Crossing the street cars and trucks should slow down speed.
3. They might use the new equipment for the experiment.
4. The equipment is to be supplied by a Japanese firm.
5. These machines were to make construction quicker and cheaper.
6. During the construction of the bridge across the river specialists have to solve many technical problems.
7. They had to remove a thick layer of sand before they started the construction.
8. You will have to take measures to prevent spring waters from penetrating into the subgrade.
9. A driver must be able to see a pavement ahead in order to stop or turn aside.
10. The drivers are allowed to park their cars in this place.
11. He had to pay a fine for speeding.
12. The properties of this metal will have to be tested with special machines.

11. Choose the correct modal verb.

1. The wheel _____ be changed if you don't want to get into an accident.
a) have to b) should c) can

2. Environmental factors _____ always be considered.
 a) may b) must c) have to
3. The road _____ be reconstructed last year.
 a) have to b) was to c) is to
4. Our car had broken down and we _____ walk to the station.
 a) were to b) must c) had to
5. Somebody _____ to help them.
 a) may b) must c) will have

12. Define the part of speech of the underlined words and translate these sentences.

A:

1. A car causes air pollution.
2. Some mistakes in calculations have been the main cause of failure of the bridge.
3. Both of these failures are almost entirely caused by traffic.
4. The continuous use of highways causes loud traffic noise creating a problem for people who live near highways.
5. These accidents are caused by speeding on icy road.

B:

1. They have read an interesting article on the subject of their investigation.
2. Aluminium loses its strength when it is subjected to a high temperature.
3. The results of their experiments are subjected to criticism.
4. The pavement is subjected to the direct action of traffic loads and of natural factors.

13. Define the part of speech of the underlined words and translate these sentences.

A:

1. Minor roads run parallel to the highways.
2. Transport running on tracks has been widely used in the cities of the 19th century.
3. The escalator runs at full speed when carrying passengers but when empty it runs at half speed.
4. The compressor is designed to run at comparatively low speeds.
5. Great difficulties had to be overcome during the construction of the road. It runs through the taiga, huge marshes and rivers.

B:

1. Motor transport is the most efficient form of transportation over comparatively short distances.
2. In countries with a planned economy all means of transport form a single transportation system.
3. Different kinds of earth and soil are mixed together to form a pavement.

C:

1. Different metals have to be produced in different ways.
2. Cycling is another pleasant way of seeing the British countryside.
3. The roads must be maintained on a proper way.
4. The cleared way was quite wide in the forest to use new machines.

14. Find the verb in the Passive Voice.

- | | | |
|------------------|---------------------|------------------|
| a) will need | b) is needed | c) has needed |
| a) was employed | b) has employed | c) employs |
| a) mixed | b) was mixing | c) will be mixed |
| a) is removing | b) must be removed | c) had removed |
| a) has been used | b) used | c) uses |
| a) leveled | b) is being leveled | c) will level |

15. Translate the following sentences paying attention to the predicates in the Passive Voice with prepositions.

1. This material was much spoken of.
2. The design of the road was much worked at.
3. The engineers' measurements and their calculations can be relied on.
4. The experimental model will be followed by mass production of these mechanisms.
5. The new model of the device will be worked at in the plant laboratory.
6. The construction of the new tunnel was paid great attention to.
7. This document is much spoken about.
8. The specialists were sent for some days ago.
9. Beautiful bridges are looked at with great pleasure.
10. The original design of the bridge was referred to in some journals.

16. Write these sentences in another way.

MODEL: *They built concrete pavement in 1865. – Concrete pavement was built in 1865.*

1. People pay great attention to ecological problem lately.
2. Lorries transport sand to the site.
3. People use this road very often.
4. The workers maintained the road in a proper way.
5. The scientists produced a new substance after many years of hard work.
6. The workers smooth, pave and prepare roads to allow easy travel.
7. People expect considerable noise health effects from road systems.

17. Choose the best variant.

1. This expressway _____ next year.
a) is completed b) was completed
c) will have been completed d) will be completed
2. Local road-building materials _____ be employed to reduce the cost of construction.
a) were b) is
c) must d) able
3. A lot of new roads _____ this year.
a) will build b) have built
c) have been built
4. New roads _____ in our city every year.
a) was built b) have been built
c) has been built d) are built
5. A great number of roads _____ in Belarus since the war.
a) are designed b) has designed
c) has been designed d) designed

18. Use the correct tense-forms of the verbs in brackets.

If tomorrow you 1) _____ (*drive*) down Spencer Road you 2) _____ (*get*) a shock. Suddenly the speed limit changes from 35 to 60. But take it easy! At this point of the road miles 3) _____ (*change*) into kilometres.

Without warning, the city street department recently 4) _____ (*replace*) its road signs to metric units. Officials said that the Federal Highway Administration 5) _____ (*announce*) beforehand that all road signs 6) _____ (*become*) metric within one month. Many drivers 7) _____ (*ask*) about their reaction to it and they 8) _____ (*object*) to it strongly. And they 9) _____ (*support*) by over 170 members of the Congress. The innovation 10) _____ (*discuss*) in the Congress several times before the majority of its members 11) _____ (*agree*) to it. Frankly speaking, when I 12) _____ (*drive*) along Spencer Road last night I 13) _____ (*not / puzzle*) by the change that much.

19. Define the functions of the Participle and translate these sentences.

1. Working in the laboratory he deals with different new materials.
2. The approach roads have been designed to provide free flow for traffic approaching and leaving the bridge.
3. While designing a tunnel there are many factors to be taken into consideration.
4. The bridge was constructed while maintaining traffic on the existing road underneath.
5. Having become popular, suspension bridges were built in different places of Great Britain.
6. Having investigated the static and dynamic behaviour of the system, the scientists approved it.
7. Having been given the site, they examined it thoroughly.
8. Having been built nine centuries ago, the bridge has been reconstructed several times.
9. Being obtained in the laboratory the new substance showed valuable properties.
10. The problem being discussed at the scientific conference is of great importance for industry.
11. The professor told us about the experiments being carried out in the laboratory.
12. When excavating the ground, the workers found some very hard rock thus discovering naturally formed concrete.
13. If protected by a special coating this material becomes waterproof.

20. Point out the sentences with the Participle as an Attribute, an Adverbial modifier, an Absolute Participial Construction.

1. The engine tested showed that it needed no further improvement.
2. While driving a car one should be very attentive.
3. Some new devices having been obtained, the researcher could make more complex experiments.
4. A new electronic instrument will calculate how far a car can drive on the fuel left in the tank.
5. Having been repaired, the engine began operating better.
6. Inspecting the motor, the engineer made some valuable remarks.
7. Having done a number of operations, the machine stopped automatically.
8. The cars at that time were very small, the engine being placed under the seat.

21. Choose the best variant of translation for the underlined Participles.

1. The topsoil is stockpiled for rehabilitation of newly constructed embankment.
a) строящие b) построив c) построенной
2. It will be compacted using heavy vibratory road roller.
a) использующие b) используя c) использовав
3. The in-situ ground will be removed to a level specified by the engineer.
a) определили b) определяя c) определенного
4. The final layer of a road is the base course consisting of gravel or crushed stone.
a) состоявший b) состоящий c) который состоял
5. Having placed a surface course the builders strengthened the pavement structure.
a) разместив b) размещая c) размещенный
6. Being leveled off by a grader a gravel type material will be compacted to required density.
a) выравнивая b) при выравнивании c) будучи выровненным

22. Read and translate the following sentences paying attention to the words with the ending -ed.

1. The machine used showed good results.
2. The methods introduced received general recognition.
3. The equipment tested required some improvement.
4. The substance investigated showed interesting results.
5. The discovery mentioned remained unknown to most scientists for a long time.
6. The methods applied increased the production of motor cars.
7. The properties described required further investigation.
8. The phenomenon discovered attracted the scientists' attention.
9. The results obtained showed that there was a mistake.

23. Choose the right variant of the Participle.

1. (*Building, Having built*) new roads we make our life more comfortable.
2. The road (*being repaired, repairing*) will be much wider.
3. (*Crossing, Having crossed*) the street, cars and trucks should slow down.
4. (*Having built, Having been built*) nine centuries ago, the bridge has been reconstructed several times.
5. (*Being finished, Having finished*) the experiment, he printed the results.
6. (*Broken, Having broken*) by the wind the tree was lying, on the road.
7. Roads (*connecting, having connected*) large, industrial centres are very important.
8. (*Having lived, While living*) in London many years he knew the city well.

24. Choose the right translation of the words given in the brackets.

A: *is performing; performing; performed; is performed*

1. The test (*выполнен*) by a group of students.
2. The group of students (*выполняющая*) the test is in the laboratory.
3. The test (*выполненный*) is very complex.

B: *carrying out; is carrying out; carried out; is carried out*

1. The engineer (*проводит*) the investigation.
2. The investigation (*проводимое*) by the engineer is important.
3. The engineer (*проводящий*) the investigation works is in our laboratory.

C: *are determined; determined; determining; are determining*

1. (*Определяя*) the properties of the soil the scientist made lots of experiments.
2. The properties of the soil (*определены*) accurately enough.
3. When (*были определены*) all the properties of the soil it was recommended for the construction.

25. Define the Absolute Participle Construction in the following sentences and translate them.

1. All the problems having been solved, they stopped the discussion.
2. Maps for building a road are made by planners, a separate plan being drawn for each individual section.
3. The road conditions being unchanged, the automobile can travel at a constant speed.
4. A variety of road building equipment is employed in road building, a bulldozer being the most widely used.
5. The experiment having been finished, they started new investigations.
6. The term *speed* means the rate of motion, the term *velocity* meaning the speed in a definite direction.
7. Cars with internal combustion engines having appeared, the automobile industry began developing rapidly.
8. The population of the city increasing, much attention must be paid to highway construction.

26. Translate the following sentences paying attention to the function of the Gerund.

1. Building a road tunnel through a mountain takes much time.
2. A new system of removing snow and ice from the city streets by using heat has been tested in Moscow.
3. In planning the bridges considerable attention was paid to their appearance
4. We must avoid placing concrete on frozen subgrade.
5. The British and French government signed an agreement to build a tunnel and digging began.
6. Heating may change the properties of the substance.
7. It is not possible to start a construction job without levelling the site.

8. The scientists considered different ways of solving the problem.
9. Cracking is usually controlled by adding steel reinforcement.
10. Good lighting helps cut accidents for both vehicles and pedestrians.

27. Choose the sentences that have the Gerund.

1. Porous asphalt reduces noise by absorbing some of the noise emitted by vehicles.
2. In the late 18th century, European engineers began designing roads that included lighter surfaces.
3. The thin coating of asphalt around the soil particles provides a high degree of waterproofing.
4. An engineer testing the pavement resistance found sufficient drawbacks.
5. When constructing a road, a lot of earthworks should be done.
6. Being provided with batteries an electric car can develop a speed of 50 miles an hour.
7. Several methods of testing soil stability are used.
8. Improving the properties of the material required much time.

28. Define the part of the speech of the underlined words (Participle or Gerund) and translate the sentences.

1. Reconstructing this road will require much time and money.
2. Reconstructing this road they met with many difficulties.
3. Working at a construction site they used different types of machines.
4. Working at a construction site helps to understand all stages of road building.
5. Scientists devote much attention to the problem of changing the climate.
6. Changing the climate, science makes nature serve man.
7. Melting is a physical process. We cleared the road from melting snow. Melting ice, we get water.
8. Speeding causes accidents, so many countries have speed limits.

29. Translate into Russian and define the function of the Infinitive.

1. It is essential to collect and study information about the area where the road is to be laid.
2. To use more glass in a modern motor vehicle means improvement of visibility.

3. The aim of individual road sections is to facilitate safe and efficient movement for different types of users.
4. The chief engineer allowed the new engine to be tested.
5. This method of construction is said to have some advantages.
6. Nothing could make him turn the computer off.
7. Plastics are supposed to be used instead of metals in many cases.
8. The road surface to be repaired was destroyed many years ago by heavy vehicles.
9. Some degree of elevation of the road was made in order to ensure drainage.
10. The authorities wanted speed to be limited within the city centre.
11. This machine enables many operations to be carried out easily.
12. Modern discoveries allow science and engineering to be developed rapidly.
13. The use of this machine permits levelling of the roadbed to speed up.
14. They are likely to be familiar with this phenomenon.
15. This experiment seems to give good results.

30. Read and translate the sentences with the Complex Subject.

1. This bridge is said to have been built two hundred years ago.
2. Rubber is known to have been brought from America.
3. They were reported to have completed the construction of the road last month.
4. Speeding is found to be one of the factors increasing accidents on the road.
5. Proper alignment of the road is supposed to contribute to safe driving.
6. The journey was expected to be brief and pleasant.
7. They seem to be studying the materials to be of great interest.
8. The cooling system proposed by the designers proved to be inefficient.
9. The road to be built in this district is likely to meet all modern requirements.
10. The discovery of a laser is sure to be of great value.
11. This scientist is certain to make a great discovery.

31. Translate into English using the Complex Subject.

1. Известно, что этот тип вяжущего является очень чувствительным¹ к погодным условиям.
2. Говорят, что несколько мостов будет построено по всей длине дороги.
3. Полагают, что стоимость строительства будет уменьшена путем использования местных материалов.
4. Применение этого материала, вероятно, даст лучшие результаты.
5. Улица, оказалась более привлекательной после ремонта.
6. Этот вопрос вряд ли будет рассматриваться на конференции.
7. Дорога, несомненно, будет расширена после реконструкции.
8. Новый метод, кажется, является эффективным.

32. Read and translate the sentences with the Complex Object.

A:

1. We expected the designers to simplify the design of the structure.
2. Nowadays drivers want the road signs to be visible, understandable and uniform.
3. Everybody wanted the construction of the pavement to be completed in time.
4. I know him to have been working at this project for a long time.
5. We supposed them to finished earthworks.

B:

1. These methods enable full investigation of local materials to be carried out.
2. Modern mechanized methods employed for earthworks permit a stable roadbed to be built.
3. This plan enables the reconstruction of be built.
4. This plan enables the reconstruction of both primary and secondary roads to be completed.
5. This width of lanes and shoulders allows the carriageway width to be determined.

¹ чувствительный – sensitive

C:

1. Heat causes most materials extend.
2. The rain made us return home.
3. They could make him change his decision.
4. Air pollution causes scientists find different ways from its harmful effect.
5. This method of construction is said to have some advantages.
6. Nothing could make him turn the computer off.

СОЗДАНИЕ АННОТАЦИИ¹

Аннотация² – это краткое содержание книги, статьи или любого другого текста. В ней в обобщенном виде раскрывается тематика публикации без полного раскрытия ее содержания. Аннотация дает ответ на вопрос, о чем говорится в первичном источнике информации. Она включает в себя:

– *вводную часть* – библиографическое описание, тему (1–2 предложения);

– *основную часть* – перечень затронутых в публикации проблем (3–6 предложений);

– *заключительную часть* – краткую характеристику и оценку, а также кому адресуется данная публикация (1–2 предложения).

1	1
The text (article, story) is entitled "...". As the title implies the text (article, story) describes ... The text (article, story) deals with ... The main idea of the text (article, story) is to show (to prove, to underline, to convince) ...	Текст (статья, рассказ) называется «...». Согласно названию, в тексте (статье, рассказе) описывается... Текст (статья, рассказ) рассматривает ... Основная идея текста (статьи, рассказа) – показать (доказать, подчеркнуть, убедить) ...
2	2
It gives a detailed analysis of... It is stressed that ... It is spoken in detail about... It is reported that ... It is shown that... ... is proposed. ... are examined. ... are discussed.	Он дает подробный анализ ... Подчеркивается... Подробно описывается... Сообщается, что ... Показано, что ... Предлагается... Проверяются/рассматриваются... Обсуждаются...
Much attention is given to...	Много внимания уделено...
3	3
The following conclusions are drawn... The text (article, story) gives valuable information on... The text (article, story) is of great help to ... The text (article, story) is of interest to ...	Делаются следующие выводы ... Текст (статья, рассказ) дает ценную информацию о ... Этот текст (статья, рассказ) окажет большую помощь... Этот текст (статья, рассказ) представляет интерес для...

¹ создание аннотации 'making a summary'

² аннотация 'summary'

РЕФЕРИРОВАНИЕ¹

В отличие от аннотации реферат² не только дает ответ на вопрос, о чем говорится в первичном печатном документе, но и о том, что говорится, т. е. какая основная информация содержится в реферируемом первоисточнике. Реферат дает читателю относительно полное представление о затронутых в первоисточнике вопросах и, таким образом, освобождает пользователя от необходимости полного перевода первоисточника.

Реферат включает в себя:

- *вводную часть* – библиографическое описание, тему;
- *основную часть* – основную идею; изложение содержания первоисточника;
- *заключительную часть* – выводы автора.

Завершить реферат можно кратким комментарием по теме.

Объем реферата зависит от объема первичного печатного документа и может составлять 10–15 % от объема первоисточника.

1 TITLE	1 ЗАГЛАВИЕ
I've read a text (article, story) entitled "...".	Я прочитал(а) текст (статью, рассказа) под названием «...».
I'd like to tell you about a text (article, story) entitled "...".	Я бы хотел(а) рассказать о тексте (статье, рассказе) под названием «...».
SOURCE	ИСТОЧНИК
This is a text (article, story), published in the book (journal, magazine, newspaper) "...".	Этот текст (статья, рассказ) опубликован в книге (научном журнале, журнале, газете) «...».
AUTHOR	АВТОР
The author of this text (article, story) is ..., a famous scientist (writer, journalist).	Автор этого текста (статьи, рассказа) – ..., известный ученый (писатель, журналист).
SUBJECT	ТЕМА
The text (article, story) deals with ...	Текст (статья, рассказ) рассматривает ...
The text (article, story) describes ...	Текст (статья, рассказ) описывает ...
The text (article, story) gives information about ...	Текст (статья, рассказ) дает информацию о ...

¹ *реферирование* 'making an abstract'

² *реферат* 'abstract'

2 IDEA The main idea of the text (article, story) is to show (to prove, to underline, to convince) ... CONTENT The text (article, story) starts with the fact that ... The text (article, story) starts with description (characteristic) of ... Then the author describes ... After that the author touches upon the problem of ... Next the author deals with the fact (problem) ... Besides the author stresses that ...	2 ИДЕЯ Основная идея текста (статьи, рассказа) – показать (доказать, подчеркнуть, убедить) ... СОДЕРЖАНИЕ Текст (статья, рассказ) начинается с факта о ... Текст (статья, рассказ) начинается с описания (характеристики) ... После автор описывает ... Затем автор затрагивает вопрос ... Потом автор рассматривает факт (вопрос) ... Кроме того, автор подчеркивает, что...
3 AUTHOR'S CONCLUSION Finally the author comes to the conclusion that ...	3 ВЫВОДЫ АВТОРА В конце автор приходит к выводу ...
4 YOUR ATTITUDE My attitude to the text (article, story) is simple (complicated, contradictory). I've learnt a lot of interesting (important, new) facts (information, things) from the text (article, story). It makes us think of ... It proves the idea (theory, point of view, opinion) ... On the one hand, I agree that ... On the other hand, I can't agree that ... It can help us in self-education. YOUR ADVICE So in my opinion it is (not) worth reading.	4 ВАШЕ ОТНОШЕНИЕ Мое отношение к тексту (статье, рассказу) однозначно (неоднозначно, противоречиво). Я узнал(а) из текста (статьи, рассказа) много интересных (важных, новых) фактов (информации, вещей). Он заставляет нас задуматься о... Он подтверждает мысль (теорию, точку зрения, мнение) ... С одной стороны, я согласен (согласна), что ... С другой стороны, я не согласен (согласна), что ... Он может помочь в самообразовании. ВАШ СОВЕТ Таким образом, это (не) стоит читать.

СОЗДАНИЕ ПРЕЗЕНТАЦИИ¹

Составление плана презентации

Первый шаг в подготовке любого задания – записать все то, о чем вы хотите сказать, и на основе этого составить план своего выступления, то есть определить, с чего лучше всего начать, а чем – закончить, что обязательно упомянуть, а что можно не затрагивать.

Вот несколько советов:

1. Запишите, что вашей аудитории нужно или интересно будет узнать по теме вашего выступления
2. Может помочь составление списка вопросов, ответы на которые вы намерены дать. Эти ответы и лягут в основу выступления.
3. Располагайте части выступления в таком логическом порядке, который будет понятен аудитории. Ей будет легче следить за вашей мыслью. Не перескакивайте постоянно с одного на другое.
4. Приводите примеры. Они помогут понять вашу точку зрения.

Как начать презентацию?

Безусловно, публичное выступление заставляет нервничать, но если вы хорошо подготовлены, то будете чувствовать себя более уверенно. Для этого, приступая к работе над презентацией и публичным выступлением, следует сразу задать себе следующие вопросы. Прежде всего, это «С кем я собираюсь говорить?» и «Что они уже знают?». Вторых, «Где я выступаю?», «Какие там возможности для этого?». Вам приходится брать в расчет наличие аппаратуры и оборудования, например, экран, если хотите использовать PowerPoint. Третьих, «Какова цель моей презентации?», то есть «Я хочу дать информацию, произвести впечатление, убедить или продать товар?». И последнее – «Сколько времени мне для этого надо?».

Ответы на эти вопросы оказывают огромное влияние на то, что вы включите в свою презентацию и как вы это сделаете. Некоторые для этого сначала записывают свои мысли, а затем пробуют расположить их по смысловым группам, таким образом, создавая основу своей речи. Короткие шпаргалки на небольших карточках, которые удобно держать в руке во время выступления, также помогают чув-

¹ создание презентации ‘making a presentation’

ствовать себя уверенно. Если вы выступаете с электронной презентацией, вы должны подготовить слайды. Для этого надо собрать все изображения, диаграммы и т. п. и расположить их в нужном порядке. Как только вы почувствуете, что все организовано правильно, можно начать готовить начало выступления – вступление.

Даже если аудитория знакома с вами, рекомендуется представиться и назвать свою должность. Затем объяснить, о чем вы планируете говорить и в какой последовательности. Упомяните, какой тип презентации вы будете использовать – например, электронную или в виде постера. Следует уточнить, когда слушатели могут задать интересующие вопросы – во время выступления или в конце. На первом слайде разместите основные пункты плана вашей речи. Также будет нелишним сообщить слушателям о том, что вы предоставите им раздаточный информационный материал; это поможет им слушать вас более внимательно.

USEFUL PHRASES FOR THE INTRODUCTION	ПОЛЕЗНЫЕ ФРАЗЫ ДЛЯ ВВЕДЕНИЯ
Good morning, afternoon, etc.	Доброе утро, день и т. п.
Hello. It's nice to see you (all).	Привет. Приятно (всех) вас видеть.
I'm ... from ... and it's a pleasure to be with you today.	Я ..., и мне приятно сегодня быть с вами.
My name's ... and I'm a ... -year student of ... (name of the department).	Меня зовут ..., и я студент ... курса ... факультета.
I'm ... and I study at the ... course of ... (name of the department).	Я ..., и я учусь на ... курсе ... факультета.
I'd like to explain how ... works.	Я хотел бы объяснить, как работает ...
I'd like to give you some information about ...	Я хотел бы дать информацию о ...
I'm going to talk about/tell about ...	Я собираюсь поговорить/рассказать о ...
The purpose of my talk is ...	Цель моего выступления – ...
First of all, we'll look at ..., and then Finally, ...	Прежде всего, мы рассмотрим ..., затем В конце, ...
If you want to ask me any questions, please interrupt.	Если хотите задать вопрос, не стесняйтесь перебивать.
I'll explain first of all and then you can ask me any questions at the end.	Сначала я все разъясню, а затем в конце вы сможете задать вопросы.
I want to turn now to ...	Я хочу перейти к ...

Как использовать наглядный материал (графики, диаграммы и т. п.)?

USEFUL PHRASES FOR REFERRING TO VISUAL AIDS	ПОЛЕЗНЫЕ ФРАЗЫ ДЛЯ ИСПОЛЬЗОВАНИЯ ДИАГРАММ И ГРАФИКОВ
I'd like to show you a chart/graph which represents ...	Я бы хотел показать вам диаграмму/график, которая отражает ...
This chart/graph represents ...	Эта диаграмма/график отражает ...
If we take a look we can see ...	Если мы взглянем, мы увидим ...
I'd like to draw your attention to ...	Я бы хотел привлечь ваше внимание к ...
Take a look at ...	Взгляните на ...
Let's look now at ...	Давайте посмотрим на ...
As you can see, ...	Как вы видите, ...
You will see ...	Вы увидите ...
You will notice ...	Вы заметите ...
You can see that ...	Вы видите, что ...

Убеждение

Вот несколько советов, чтобы ваша презентация была убедительной:

1. Хорошо подготовьтесь. У вас должны быть все необходимые факты и данные, и они должны быть точными.
2. Дайте достаточно сведений справочного характера, но не перегружайте ими аудиторию.
3. Будьте готовы подкрепить каждое свое заявление доказательствами.
4. Очень полезным будет подготовить для аудитории распечатки с детальной технической или финансовой информацией. Слушатели смогут знакомиться с данными в привычном для себя темпе и обращаться к ним по мере необходимости.
5. Вы должны говорить с энтузиазмом. Улыбайтесь и не забывайте про зрительный контакт со слушателями.
6. Не бойтесь тишины.
7. Не торопитесь! Не спешите и говорите внятно.
8. Будьте готовы к вопросам!

Заключительная часть презентации

В заключении следует:

1. Еще раз напомнить аудитории основные положения вашего выступления.
2. Подвести итоги.
3. Поблагодарить слушателей.
4. Предложить задавать вопросы.

USEFULL PHRASES FOR ENDING YOUR PRESENTATION	ПОЛЕЗНЫЕ ФРАЗЫ ДЛЯ ЗАКЛЮЧЕНИЯ
We've looked at ..., ... and ...	Мы рассмотрели ..., ... и ...
I've discussed ..., ... and ...	Мы обсудили ..., ... и ...
It seems clear that ...	Очевидно, что ...
It's my view that ...	На мой взгляд, ...
Thank you for your attention.	Спасибо за внимание.
I'll be happy to answer any questions you may have.	Я буду счастлив ответить на любые ваши вопросы.

Создание стендовой презентации¹

Стендовая презентация, или стендовый доклад, представляет собой подготовленное устное выступление по выбранной теме со зрительной опорой в виде плаката.

Составив с планом презентации, напишите короткий (!) текст под каждым пунктом плана. По возможности, используйте иллюстрации. Определитесь с компоновкой материала. Распечатайте плакат, прикрепите его на стену. После выступления будьте готовы ответить на вопросы.

Требования к оформлению стенда:

1. Плакат должен быть формата А2 или А1 в горизонтальном или вертикальном расположении. Заглавие, информация об авторе должны располагаться сверху. Буквы заглавия должны быть не менее 2,5 см в высоту. Остальной текст должен легко читаться с расстояния в 1,5 м.

¹ *стендовая презентация* 'poster presentation'

2. Сформулируйте заглавие так, чтобы оно отражало суть вашей презентации.

3. Обязательно давайте пояснение графической информации.

4. Используйте на плакате цифры, буквы, стрелки, чтобы показать нужный порядок следования частей вашей презентации.

5. Нет необходимости заполнять каждый квадратный сантиметр. Оставляя пустое пространство, вы выделяете смысловые блоки.

6. Используйте цвета и графику, чтобы привлечь внимание.

Оценивание презентации

Оценивание презентации представляет собой выставление баллов (минимум 1 балл, максимум 5 баллов) за выполнение требований, предъявляемых к презентации. К таким требованиям относятся:

1. Содержание.

Хорошо ли подготовился оратор?

Разбирается ли он в теме?

2. Организация.

Есть ли введение? Заключение?

Грамотно ли выстроена структура выступления?

3. Голос.

Выступал ли оратор убедительно и с воодушевлением?

Достаточно ли внятно говорил?

Сумел ли заинтересовать?

Произносил или читал свое выступление?

Была ли скорость речи нормальной для слушателей?

4. Манера выступления.

Был ли выступающий «зажат»?

Использовал ли подходящие жесты?

Был ли зрительный контакт с аудиторией?

Вовлекал ли ее в беседу?

5. Наглядные пособия.

Использовались ли наглядные пособия?

Легко ли их было разглядеть?

Помогли ли они?

Полученные баллы затем суммируются и переводятся в отметку.

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Учебное издание

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СТРОИТЕЛЬСТВО АВТОМОБИЛЬНЫХ ДОРОГ

HIGHWAY ENGINEERING

Пособие

для студентов специальности

7-07-0732-03 «Строительство транспортных коммуникаций»
профилизации «Автомобильные дороги»

Редактор *А. С. Козловская*

Компьютерная верстка *А. В. Степанкиной*

Подписано в печать 22.01.2026. Формат 60×84 $\frac{1}{16}$. Бумага офсетная. Ризография.

Усл. печ. л. 7,55. Уч.-изд. л. 4,73. Тираж 200. Заказ 832.

Издатель и полиграфическое исполнение: Белорусский национальный технический университет.

Свидетельство о государственной регистрации издателя, изготовителя, распространителя
печатных изданий № 1/173 от 12.02.2014. Пр. Независимости, 65. 220013, г. Минск.