Министерство науки и высшего образования Российской Федерации

Федеральное государственное бюджетное образовательное учреждение высшего образования Санкт-Петербургский горный университет

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АНГЛИЙСКИЙ ЯЗЫК

ПРОЕКТИРОВАНИЕ, СТРОИТЕЛЬСТВО И РЕКОНСТРУКЦИЯ ЗДАНИЙ И ПОДЗЕМНЫХ СООРУЖЕНИЙ ПРОМЫШЛЕННОГО И ГРАЖДАНСКОГО НАЗНАЧЕНИЯ

ENGLISH

DESIGN, CONSTRUCTION AND RECONSTRUCTION OF BUILDINGS AND UNDERGROUND STRUCTURES FOR INDUSTRIAL AND CIVIL PURPOSES

Методические указания для самостоятельной работы для студентов магистратуры направления 08.04.01

> САНКТ-ПЕТЕРБУРГ 2021

УДК 811.111:69

АНГЛИЙСКИЙ язык. Проектирование, строительство И реконструкция зланий И подземных сооружений промышленного и гражданского назначения. Design, construction and reconstruction of buildings and underground structures for industrial and civil purposes: Методические указания для самостоятельной работы / Санкт-Петербургский Горный Университет. Сост.: *Е.В.Картер*, *В.Н. Ионова*. СПб, 2021. 31 с.

Методические указания ставят своей целью формирование навыков чтения и перевода текстов по специальности, а также извлечения необходимой для речевой практики информации. Тематика текстов, система упражнений и тестовых заданий к ним позволяет научить студентов 1-го курса читать и анализировать прочитанное на иностранном (английском) языке, а также делать устные сообщения и принимать участие в беседе по темам по специальности.

Предназначены для студентов магистратуры направления 08.04.01 «Строительство» и согласованы с программой по иностранному языку для студентов неязыковых вузов.

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Предисловие

Данные методические указания для самостоятельной работы предназначены для студентов 1 курса, обучающихся по направлению подготовки магистратуры 08.04.01 «Строительство».

Изучение предложенного материала направлено на формирование и развитие навыков профессионально-ориентированного чтения и перевода на английском языке.

Методические указания состоят из двух разделов, содержащих разное количество текстов. Предложенные аутентичные тексты содержат информацию по темам, изучаемым в рамках направления подготовки, а также представляющим интерес для студентов профильных направлений. Каждый текст сопровождается заданиями и упражнениями, цель которых – активизация познавательной деятельности учащихся, отработка и закрепление лексического и грамматического материала, формирование активного словарного запаса, развитие навыков аналитического чтения, письма, перевода и поиска информации, контроль понимания и перевода, развитие коммуникативных умений на английском языке, что позволяет мотивировать интерес студентов к будущей специальности.

Unit I. METROS OF THE WORLD

Text 1. NEW YORK CITY METRO

Task 1: Read the text and speak about the New York City Metro.

As is the case with most of the City's grand public works, the story of the subway system is long, colorful and, in retrospect, sometimes quaint. The first attempt at an underground public conveyance came courtesy of inventor and Scientific American editor Alfred Ely Beach, whose Beach Pneumatic Transit Company built a prototype in 1870 that ran on lower Broadway in Manhattan between Murray and Warren Streets.

It wasn't until 1900 that the City began to get serious about the underground, though, opening its first line on October 27, 1904. The subway ran from City Hall to 145th Street in the Bronx and took about 36 minutes to make the trip, which, considering how long that trip takes to-day—about the same amount of time—is remarkable. Expansions to Brooklyn and Queens swiftly followed. Because of both the enormous costs and the level of expertise involved, City Hall contracted several private companies to handle the subway's operations, initially working with the IRT (Interborough Rapid Transit Company), which operated the now-defunct elevated trains in Manhattan, and the BRT (Brooklyn Rapid Transit Corporation) in 1923.

In 1932 the City opened its own subway, the IND (Independent Subway System), along Eighth Avenue in Manhattan, which we now know as the A, C and E lines. The entire system was consolidated in 1940 under the auspices of the New York Transit Authority, which, in turn, was placed under the control of the state-operated MTA (Metropolitan Transit Authority) in 1968. That, by and large, leads us to today.

Task 2: Answer the questions.

1. What was Alfred Ely Beach?

2. When was the first line of the underground opened?

3. How much time did it take to make the trip from City Hall to 145th Street in the Bronx?

4. What expansions swiftly followed to?

5. Why did City Hall contract several private companies to handle the subway's operations?

6. When did the City open its own subway?

Task 3: Fill in the appropriate prepositions.

1. As is the case ____ most ____ the City's grand public works, the story ____ the subway system is long, colorful and, ____ retrospect, sometimes quaint.

2. The prototype ran ____ lower Broadway ____ Manhattan Murray and Warren Streets.

3. The subway ran ____ City Hall ____ 145th Street ____ the Bronx.

4. ____ 1932 the City opened its own subway, the Independent Subway System, ___Eighth Avenue ___ Manhattan.

5. The entire system was consolidated ____1940 ____the auspices the New York Transit Authority.

Text 2. SUBWAY SECRETS

Task: Read the text and fill in the gaps with the following words: used, tunnel, town, time, antique, members, lies, directly.

Any system as extensive and venerable as the New York City subway is bound to have a secret or two lurking within stations and below platforms. Beneath City Hall Park _____ the hidden gem of the IRT past, the City Hall station. Designed in Beaux Arts style with arched ceilings covered in interlocking Guastavino tiles and decorative features like

brass chandeliers, wrought-iron skylights and glass-tile City Hall signs, this station is architecturally unique and ornate. While City Hall station hasn't been ______ since 1945, lucky riders of the 6 train who don't get off at the Brooklyn Bridge stop can get a glimpse of the underground jewel as the train loops back northbound toward the Bronx. The Transit Museum offers official tours for ______ only.

Farther uptown, hidden beneath Track 24 in Grand Central Terminal, is Track 61, which was used in the 1930s when bigwigs looking for a private entrance to the Waldorf-Astoria were in _____. Its most notable passenger, President Franklin Delano Roosevelt, used it to hide his disability from the public. The platform was wide enough to fit FDR's armor-plated Pierce-Arrow limousine, which could be driven _____ from the train to the interior of the Waldorf. The limousine is still housed inside the old train car today. Operation on the track stopped in 1945 when FDR died. Legend has it that Andy Warhol threw an underground party on the platform in 1965.

The three-story dark-red brownstone at 58 Joralemon Street in Brooklyn Heights doesn't house a local family–it's actually home to electrical equipment and serves as a ventilator, releasing exhaust from the

_____ system. This facade also leads to the world's oldest train tunnel, the Atlantic Avenue Tunnel, built in 1844, which at one _____ could be toured by visitors who were comfortable with descending into a manhole in the middle of the Atlantic Avenue/Court Street intersection. Unfortunately for us, the tours ended in 2010.

Text 3. HISTORY AND LEGEND OF THE PARIS UNDERGROUND

Task 1: Read the text and speak about the history of the Paris Underground.

The Paris subway was founded in 1900, coinciding with the Paris Olympics of the same year. The underground was growing at a great pace, reaching its great expansion in 1929, when it expanded to the suburbs. With World War II, much of the network fell into disrepair, and it was very difficult to recover its pace during the post-war period, as the French economy suffered one of the hardest blows and many metro stations were abandoned.

With the economic recovery in the 60's, the metro network grew again and little by little it continued expanding. The last expansion took place in 2013 with the expansion of line 4. The Paris metro is currently the third largest in Europe, after Madrid and London. Due to the changes it has undergone, modifications and expert factors such as wars, which have changed it there are currently 11 abandoned subway stations.

These metro stations have been abandoned, reopened or merged. Some of them were not even used at any time; others were closed and then reopened. They have been the scene of films and television series and in some of them there are stories about ghosts, romances and dramas. Nowadays, some are used to store subway cars, but many can be visited in a touristic way. Two of the 11 ghost stations in Paris did not even open. It is Porte Molitor, also called Murat and Haxo station. The first one, it does not even have access to the street, its construction was abandoned in 1923. The second one was built with the beginning of the Parisian metro, but it was never finished. Nowadays guide tours are organized to visit this station.

With the arrival of the Second World War, as we said at the beginning of the text, many stations were abandoned and never recovered. Among these stations are: Saint-Martin, Arsenal, Champ-de-Mars and Croix-Rouge. The best known and the largest is Saint-Martin, which opened in 1931 and circulated several lines. Its last use took place in 1944, during a brief period of time and since then it has not been used again like subway station. In 2012, it was used as advertising space for the promotion of the film Prometheus.

Other stations have been reopened or merged with others to allow its use. Among them are Cluny, Rennes and Liège. Regarding the merged, we have Victor Hugo and Les Halles, Martin Nadaud, Porte de Versailles and Invalides. All these underground stations are abandoned and reopened or merged and can be visited in as normal metro station. In some of them you can still see old posters or cracks and walls fallen from the Second World War.

Task 2: Answer the questions.

1. When was the Paris subway founded?

2. Why was it very difficult to recover its pace during the post-war period?

3. When did the metro network grow again?

4. How many abandoned subway stations are there?

5. When were many stations abandoned and never recovered?

6. What stations have been reopened or merged with others to allow its use?

Task 3: Mark the sentences as TRUE or FALSE

1. The underground reached its great expansion in 1939.

2. The last expansion took place in 2013.

3. The Paris metro is currently the third largest in Europe, after Madrid and Oslo.

4. Many abandoned subway stations can be visited in a touristic way.

5. The construction of Haxo station was abandoned in 1923.

6. In 2012, it was used as advertising space for the promotion of the film Prometheus.

1 much of the network	A as normal metro station
2. The underground was growing	B fell into disrepair
3 in some of them	C at a great pace
4 can be visited in	D like subway station
5 walls fallen	E there are stories about ghosts, romances and dramas
6 it has not been used again	F from the Second World War

Task 4: Find a phrase match

Text 4. FUTURE PROPOSALS FOR ABANDONED SUBWAY STATIONS

Task: Read the text and translate it in writing.

Having a very old underground, exactly since 1900, many lines have been restructured and modified and some of the original metro stations were abandoned to make place for new ones. But the city of Paris has made a proposal that is incredibly inspiring. Raising the restoration of those old stations to give them a new use, totally different than the one they had when they were built. Some of them would become swimming pools, others in gardens, etc. A magnificent solution that has not left anyone indifferent and has made these places have a second life in this mythical city.

The proposal has been considered by the mayor to see it as a possible future project which is seen as a possibility to recover all the spaces lost by the abandonment of stations. In fact, models of all kinds have been proposed for the rehabilitation of these spaces, from cafeterias and restaurants to cinemas or theatres, through discos and clubs.

Although this proposal is currently paralyzed given that the candidate for mayor of Paris, who proposed, lost the election. It is not ruled out that in the future it will return to resume, thus transforming abandoned metro stations in spaces with magnificent uses.

Text 5. THE LONDON UNDERGROUND

Task 1: Read the text and speak about the London Underground.

The London Underground (also known simply as the Underground, or by its nickname the Tube) is a public rapid transit system serving London region, England and some parts of the adjacent counties of Buckinghamshire, Essex and Hertfordshire in the United Kingdom.

The Underground has its origins in the Metropolitan Railway, the world's first underground passenger railway. Opened in January 1863, it is now part of the Circle, Hammersmith & City and Metropolitan lines; the first line to operate underground electric traction trains, the City & South London Railway in 1890, is now part of the Northern line The network has expanded to 11 lines, and in 2017/18 carried 1.357 billion passengers, making it the world's 12th busiest metro system. The 11 lines collectively handle up to 5 million passengers a day.

The system's first tunnels were built just below the surface, using the cut-and-cover method; later, smaller, roughly circular tunnels—which gave rise to its nickname, the Tube—were dug through at a deeper level. The system has 270 stations and 250 miles (400 km) of track. Despite its name, only 45% of the system is underground in tunnels, with much of the network in the outer environs of London being on the surface. In addition, the Underground does not cover most southern parts of London region, and there are only 29 stations south of the River Thames.

The early tube lines, originally owned by several private companies, were brought together under the "UndergrounD" brand in the early 20th century and eventually merged along with the sub-surface lines and bus services in 1933 to form *London Transport* under the control of the London Passenger Transport Board (LPTB). The current operator, London Underground Limited (LUL), is a wholly owned subsidiary of Transport for London (TfL), the statutory corporation responsible for the transport network in London region. As of 2015, 92% of operational expenditure is covered by passenger fares. The Travelcard ticket was introduced in 1983 and Oyster, a contactless ticketing system, in 2003. Contactless card payments were introduced in 2014, the first public transport system in the world to do so.

The LPTB was a prominent patron of art and design, commissioning many new station buildings, posters and public artworks in a modernist style. The schematic Tube map, designed by Harry Beck in 1931, was voted a national design icon in 2006 and now includes other TfL transport systems such as the Docklands Light Railway, London Overground, Crossrail (which is officially called Elizabeth Line) and Tramlink. Other famous London Underground branding includes the roundel and Johnston typeface, created by Edward Johnston in 1916.

Task 2: Answer the questions.

1. What does the Underground have its origins in?

2. How many lines has the network expanded to?

3. What method was used to build the system's first tunnels?

4. How many stations does the system have?

5. When was the Travelcard ticket introduced?

6. Who designed the schematic Tube map?

7. Who created the famous London Underground branding (the roundel and Johnston typeface)?

1. The London Underground	A commissioning many new station buildings, posters and public artworks in a modernist style.
2. The Underground has its origins in the Metropolitan Railway,	B the first public transport system in the world to do so.
3. The system's first tunnels were built just below the surface,	C is a public rapid transit sys- tem serving London region, England.
4. Contactless card payments were introduced in 2014,	D using the cut-and-cover me- thod.
5. The LPTB was a prominent pa- tron of art and design,	E to 5 million passengers a day.
6. The 11 lines collectively handle up	F the world's first under- ground passenger railway.

Task 3: Match parts of the sentence.

Task 4: Fill in the gaps with the appropriate tense-aspect forms of the verbs.

1. Opened in January 1863, it _____ (*to be*) now part of the Circle, Hammersmith & City and Metropolitan lines.

2. The network _____ (*to expand*) to 11 lines, and in 2017/18 _____(*carry*) 1.357 billion passengers, making it the world's 12th busiest metro system.

3. The Underground _____ (*not, to cover*) most southern parts of London region, and there _____ (*to be*) only 29 stations south of the River Thames.

4. As of 2015, 92% of operational expenditure _____ (*to cover*) by passenger fares.

5. The schematic Tube map, designed by Harry Beck in 1931, (*to vote*) a national design icon in 2006.

6. Other famous London Underground branding _____ (*to in-clude*) the roundel and Johnston typeface.

Unit II. METROS IN RUSSIA

Text 1. MOSCOW METRO

Task 1: Read the text and speak about the first four stages of Moscow Metro construction.

The first line was opened to the public on 15 May 1935 at 07:00 am. It was 11 kilometres long and included 13 stations. The day was celebrated as a technological and ideological victory for socialism (and, by extension, Stalinism). An estimated 285,000 people rode the Metro at its debut, and its design was greeted with pride; street celebrations included parades, plays and concerts. The Bolshoi Theatre presented a choral performance by 2,200 Metro workers; 55,000 colored posters (lauding the Metro as the busiest and fastest in the world) and 25,000 copies of "Songs of the Joyous Metro Conquerors" were distributed. This publicity barrage, produced by the Soviet government, stressed the superiority of the Moscow Metro over all other metros in capitalist societies and the Metro's role as a prototype for the Soviet future. The Moscow Metro averaged 47 km/h and had a top speed of 80 km/h. In comparison, New York City Subway trains averaged a slower 40 km/h and had a top speed of 72 km/h. While the celebration was an expression of popular joy, it was also

an effective propaganda display, legitimizing the Metro and declaring it a success.

The initial line connected Sokolniki to Okhotny Ryad then branching to Park Kultury and Smolenskaya. The latter branch was extended westwards to a new station (Kiyevskaya) in March 1937, the first Metro line crossing the Moskva River over the Smolensky Metro Bridge.

The second stage was completed before the war. In March 1938, the Arbatskaya branch was split and extended to the Kurskaya station (now the dark-blue Arbatsko-Pokrovskaya Line). In September 1938, the Gorkovskaya Line opened between Sokol and Teatralnaya. Here the architecture was based on that of the most popular stations in existence (Krasniye Vorota, Okhotnyi Ryad and Kropotkinskaya); while following the popular art-deco style, it was merged with socialist themes. The first deep-level column station Mayakovskaya was built at the same time.

Building work on the third stage was delayed (but not interrupted) during World War II, and two Metro sections were put into service; Teatralnaya–Avtozavodskaya (three stations, crossing the Moskva River through a deep tunnel) and Kurskaya–Partizanskaya (four stations) were inaugurated in 1943 and 1944 respectively. War motifs replaced socialist visions in the architectural design of these stations. During the Siege of Moscow in the fall and winter of 1941, Metro stations were used as air-raid shelters; the Council of Ministers moved its offices to the Mayakovskaya platforms, where Stalin made public speeches on several occasions. The Chistiye Prudy station was also walled off, and the headquarters of the Air Defence established there.

After the war ended in 1945, construction began on the fourth stage of the Metro, which included the Koltsevaya Line, a deep part of the Arbatsko-Pokrovskaya line from Ploshchad Revolyutsii to Kievskaya and a surface extension to Pervomaiskaya during the early 1950s. The decoration and design characteristic of the Moscow Metro is considered to have reached its zenith in these stations. The Koltsevaya Line was first planned as a line running under the Garden Ring, a wide avenue encircling the borders of Moscow's city centre. The first part of the line – from Park Kultury to Kurskaya (1950) – follows this avenue. Plans were later changed and the northern part of the ring line runs 1–1.5 kilometres outside the Sadovoye Koltso, thus providing service for seven (out of nine)

rail terminals. The next part of the Koltsevaya Line was opened in 1952 (Kurskaya–Belorusskaya), and in 1954 the ring line was completed.

Task 2: Answer the questions.

1. When was the first line opened to the public?

2. How many people rode the Metro at its debut?

3. What did the Bolshoi Theatre present?

4. What branch was extended westwards to Kiyevskaya station?

5. What was the first deep-level column station?

6. What stations were inaugurated in 1943 and 1944?

7. When were Metro stations used as air-raid shelters?

8. When did construction begin on the fourth stage of the Metro?

9. When was the next part of the Koltsevaya Line opened?

10. When was the ring line completed?

Task 3: Mark the sentences as TRUE or FALSE

1. It was 11 kilometres long and included 12 stations.

2. Street celebrations included parades, plays and concerts.

3. 20,000 copies of "Songs of the Joyous Metro Conquerors" were distributed.

4. The Moscow Metro averaged 47 km/h and had a top speed of 80 km/h.

5. The second stage was completed after the war.

6. War motifs replaced socialist visions in the architectural design.

1 4 5 6 4 3 6	
1 the superiority of the Moscow	A an expression of popular
Metro	јоу
2 the Council of Ministers	B over all other metros in
	capitalist societies
3 a technological and ideological	C during the early 1950s
victory	
4 the celebration was	D rail terminals
5 a surface extension to Pervo-	E for socialism
maiskaya	
6 thus providing service for seven	F moved its offices to the
· · · ·	Mayakovskaya platforms

Task 4: Find a phrase match

Text 2. SAINT PETERSBURG METRO

Task: Read the text and translate it in writing.

The Saint Petersburg Metro is a rapid transit system in Saint Petersburg and Leningrad Oblast, Russia. It has been open since 15 November 1955.

Formerly known as the V.I. Lenin Order of Lenin Leningrad Metro, the system exhibits many typical Soviet designs and features exquisite decorations and artwork making it one of the most attractive and elegant metros in the world.

The network consists of 5 lines with a total length of 124 kilometres (77 mi). It has 72 stations including 7 transfer points.

Due to the city's unique geology, the Saint Petersburg Metro is one of the deepest metro systems in the world and the deepest by the average depth of all the stations. The system's deepest station, Admiralteyskaya, is 86 metres (282 ft) below ground. Serving about 2 million passengers daily, it is the 26th busiest metro system in the world.

Text 3. HISTORY OF THE SAINT PETERSBURG METRO

Task 1: Read the text and speak about the history of the Saint Petersburg Metro.

The question of building an underground road in Saint Petersburg arose in 1820. A resident of the city, a self-taught man by the name of Torgovanov, submitted a bold project to Emperor Alexander I - involving the digging of a tunnel from the center of the city to Vasilyevsky Island. The Russian ruler rejected the project and ordered the inventor to sign a pledge "not to engage in hare-brained schemes in the future, but to exercise his efforts in matters appropriate to his estate." Other, more developed projects subsequently emerged, but they, too, received no recognition.

Many arguments were advanced against the construction of an underground road. The "city fathers" stated that the excavation works would "violate the amenities and respectability of the city"; the landlords affirmed that underground traffic would undermine the foundations of the buildings; the merchants feared that "the open excavations would interfere with normal trade"; but the most violent adversaries of the novelty, the clergy, insisted that "the underground passages running near church buildings would detract from their dignity". Thus, all the projects for the construction of an underground passage in Saint Petersburg, and later in Petrograd, remained on paper.

By the end of the 19th century, certain interested parties began discussing the possibility of opening the Russian Empire's first metropolitan railway system. The press of the time praised the initial plans, while engineers privately worried about the serious lack of experience in the sort of projects required to build a metro; at the time, Saint Petersburg did not even have electrified tramways. However, due to the wish of the municipal authorities of the time to take ownership of the metro after its eventual entry into service, none of the aforementioned projects ever came to fruition.

In 1901 the engineer Vladimir Pechkovsky presented his project to build an elevated station in the middle of Nevsky Prospect, opposite the Kazan Cathedral, and to link it, via elevated and underground sections of track (above the Ekaterinsky and Obvodny canals and beneath the Zabalkansky prospect) with the Baltivsky and Varshavsky Rail Terminals. In the same year, Reshevsky, also an engineer, working at the behest of the Emperor's minister for transport, came up with two possible projects, which aimed primarily to unite all of Saint Petersburg's main railway stations with one urban interchange. An interesting development, the work upon which had been carried out for many years by railway engineer P.I. Balinsky (one of the first Russian metro engineers) involved plans to build a dedicated network of six urban lines, two of which would be radial lines with a total length of 172 kilometres. The construction work (including the filling of low-lying areas of the city in order to avoid flooding, construction of 11 major bridges, embankments and viaducts at a height of 5–10 metres, and the actual laying of track etc.) was projected to cost around 190 million rubles. However, in 1903 Emperor Nicholas II rejected the scheme before any work ever started.

Almost all pre-revolutionary designs featured the concept of an elevated metro system, similar to the Paris or Vienna metros, however, as was later discovered through the experience of operating open (groundlevel) metro lines in St. Petersburg, such schemes would likely have resulted in a poor metro service. Unfortunately, at the time, Russian engineers did not have sufficient expertise or technical resources for the construction of deep tunnels through the bedrock located far beneath St Petersburg. In 1918 Moscow became the country's capital after the October Revolution of 1917 and the Russian Civil War (1917–1922) followed; for more than a decade plans to build a metro in St. Petersburg languished.

Task 2: Answer the questions.

1. When did the question of building an underground road in Saint Petersburg arise?

2. Who submitted a bold project to Emperor Alexander I?

3. Did more developed projects receive recognition?

4. What arguments were advanced against the construction of an underground road?

5. Who began discussing the possibility of opening the Russian Empire's first metropolitan railway system?

6. What did the press of the time praise?

7. Why did none of the projects ever come to fruition?

8. Who came up with two possible projects, which aimed primarily to unite all of Saint Petersburg's main railway stations with one urban interchange?

9. What did the construction work include?

10. When did Emperor Nicholas II reject the scheme before any work ever started?

11. What was later discovered through the experience of operating open (ground-level) metro lines in St. Petersburg?

12. When did Moscow become the country's capital?

Task 3: Mark the sentences as TRUE or FALSE

1. The Russian ruler accepted the project.

2. Many arguments were advanced against the construction of an underground road.

3. In 1902 the engineer Vladimir Pechkovsky presented his project to build an elevated station in the middle of Nevsky Prospect.

4. The construction work was projected to cost around 180 million rubles.

5. Almost all pre-revolutionary designs featured the concept of an elevated metro system, similar to the Paris or Vienna metros.

6. At the time, Russian engineers had sufficient expertise and technical resources for the construction of deep tunnels through the bedrock located far beneath St Petersburg.

v v	
1. road	A. assertion
2. reject	B. base
3. argument	C. fade
4. foundation	D. plan
5. praise	E. way
6. languish	F. approve
7. scheme	G. relevant
8. appropriate	H. deny

Task 4: Match the synonyms.

Task 5: Find a phrase match

1 all the projects for the construc-	A experience in the sort of
tion of	projects required to build a metro
2 the digging of a tunnel	B respectability of the city.
3 would likely have resulted in	C an underground passage
	in Saint Petersburg
4 worried about the serious lack	D from the center of the city
of	to Vasilyevsky Island.
5 involved plans	E a poor metro service.
6violate the amenities and	F to build a dedicated net-
	work of six urban lines

Text 4. THE FIRST PHASE CONSTRUCTION OF THE SAINT PETERSBURG METRO

Task: Read the text and fill in the gaps with the following words: engineer, shafts, opening, designed, besieged, metro, construction, lack.

In 1938 the question of building a ______ for St Petersburg (by then renamed to Leningrad), resurfaced at the initiative of Alexei Kosygin, Chairman of the Executive Committee of the Leningrad City Soviets of Working People's Deputies. Ivan Zubkov, an ______ who for his work was later to become a Hero of Socialist Labour was appointed the first director for the metro ______. The initial project was ______ by the Moscow institute 'Metrogiprotrans', but on 21 January 1941 'Construction Directorate $N_{\rm D}$ 5 of the People's Commissariat' was founded

as a body to specifically oversee the design and construction of the Leningrad Metro. By April 1941, 34 _____ for the initial phase of construction had been finished.

During the Second World War construction work was frozen due to severe ______ of funding, manpower and equipment. At this time, many of the metro construction workers were employed in the construction and repair of railheads and other objects vital to the ______ city. Zubkov died in 1944, having never seen the ______ of the metro.

Text 5. THE POST-WAR ERA OF THE SAINT PETERSBURG METRO

Task 1: Read the text and speak about the post-war era of the Saint Petersburg Metro.

In 1946 *Lenmetroproyekt* was created, under the leadership of M.A. Samodurov, to finish the construction of the metro first phase. A new version of the metro project, devised by specialists, identified two new solutions to the problems to be encountered during the metro construction. Firstly, stations were to be built at a level slightly raised above that of normal track so as to prevent drainage directly into them, whilst the average tunnel width was to be reduced from the 6 metres standard of the Moscow Metro to 5.5 metres.

On 3 September 1947 construction began again in the Leningrad subway, and in December 1954, the Council of Ministers of the USSR ordered the establishment of the state transport organization Leningradsky Metropoliten, to be headed by Ivan Novikov. The oroffices ganisation set its in the building up directly above Tekhnologichesky Institut station. On 7 October 1955 the electricity was turned on in the metro, 1 and on 5 November 1955, the act by which the first stage of the metro was put into operation, was signed. Ten years after the end of the war, at the beginning of the post-Stalin Khrushchev Thaw, the city finally got an underground transport network. The subway grand opening was held on 15 November 1955, with the first seven stations (the eighth one, Pushkinskaya opened a few months later) being put into public use. These stations later became part of the Kirovsko-Vyborgskaya Line, connecting the Moscow Rail Terminal in the city centre with the Kirovsky industrial zone in the southwest.

Subsequent development included lines under the Neva River in 1958, and the construction of the Vyborgsky Radius in the mid-1970s to reach the new housing developments in the north. In 1978, the line was extended past the city limits into the Leningrad Oblast. 1,023 governmental awards were made to participants of the construction of the metro first stage.

The first expansion of the metro took place in 1958, when the first line (later to become the Kirovsko-Vyborgskaya Line) was extended beneath the Neva river to the Finlyandsky Rail Terminal. Later this same line was extended when the Vyborgsky radius, constructed in the 1970s, brought the metro to new residential areas constructed in the north-east of the city, and by 1978, those further out, in the nearby Leningrad Oblast. The metro was expanded to the south-west, with the construction of the Kirovsky radius, in 1977. Construction of the second, Moskovsko-Petrogradskaya line began almost immediately after the initial opening of the metro. six later. 1961. Just vears in the section from Tekhnologichesky Institut to Park Pobedy, along Moskovsky Prospect to the southern areas of the city, was opened. In 1963 the line was extended north to the station Petrogradskava station; in the process making Tekhnologichesky Institut the USSR's first cross-platform interchange station. Further extension of the line was undertaken to the south in the early 1970s, and in the 1980s to the north, with the final station Parnas being opened, following numerous delays, in 2006.

The third Nevsko-Vasileostrovskaya Line was first opened in 1967 and eventually linked Vasilievsky Island, the city centre, and the industrial zones on the southeastern bank of the Neva in a series of extensions (1970, 1979, 1981 and 1984). The fourth line, Pravoberezhnaya, was opened in 1985 to serve the new residential districts on the right bank of the Neva before reaching the city centre in 1991 and continuing to the northwest in the late 1990s. It was in this period that the opening of the metro's fifth (Frunzensko-Primorskaya) line was planned, however, it only 2008. with was in the opening of Volkovskava and Zvenigorodskava stations, that this took place. By the time of the USSR's collapse, the Leningrad Metro comprised 54 stations and 94.2 kilometres of track. Up until this period, it was officially known as the 'V.I. Lenin Leningrad Metro of the Order of Lenin'

Task 2: Answer the questions.

1. When was Lenmetroproyekt created?

2. Why were the stations to be built at a level slightly raised above that of normal track?

3. When did the construction begin again in the Leningrad subway?

4. When was the electricity turned on in the metro?

5. How many stations were put into public use on 15 November 1955?

6. When was the line extended past the city limits into the Leningrad Oblast?

7. How many governmental awards were made to participants of the construction of the metro first stage?

8. When did the first expansion of the metro take place?

9. When was the metro expanded to the south-west?

10. When was the third Nevsko-Vasileostrovskaya Line first opened?

11. How many stations did the Leningrad Metro comprise by the time of the USSR's collapse?

Task 3: Fill in the appropriate prepositions.

1. A new version ____ the metro project, devised ____ specialists, identified two new solutions ____ the problems to be encountered ____ the metro construction.

2. The organisation set _____ its offices _____ the building directly Tekhnologichesky Institut station.

3. Ten years _____ the end _____ the war, _____ the beginning _____ the post-Stalin Khrushchev Thaw, the city finally got an underground transport network.

4. These stations later became part _____ the Kirovsko-Vyborgskaya Line, connecting the Moscow Rail Terminal _____ the city centre _____ the Kirovsky industrial zone _____ the southwest.

5. Subsequent development included lines _____ the Neva River _____ 1958, and the construction _____ the Vyborgsky Radius _____ the mid-1970s to reach the new housing developments _____ the north.

6. Later this same line was extended when the Vyborgsky radius, constructed _____ the 1970s, brought the metro _____ new residential areas

constructed _____ the north-east _____ the city, and _____ 1978, those further _____, ____ the nearby Leningrad Oblast.

7. Just six years later, ____ 1961, the section ____Tekhnologichesky Institut ___ Park Pobedy, ____ Moskovsky Prospect ___ the southern areas ___ the city, was opened.

8. The fourth line, Pravoberezhnaya, was opened ____ 1985 to serve the new residential districts ____ the right bank ____ the Neva ____ reaching the city centre ____ 1991 and continuing to the northwest ____ the late 1990s.

Text 6. THE POST-SOVIET PERIOD OF THE SAINT PETERSBURG METRO

Task: Read the text and fill in the gaps with the following words: six, tunnel, completed, cut off, stations, case, set, individual, beginning, cavity, sufficient, attempts, massively.

At the _____ of 1992 construction work was being carried out at 14 stations, or objects relating to them. These were stations of the radius Primorsky (Admiralteyskaya, Sportivnaya, Chkalovskaya, Krestovsky Ostrov, Staraya Derevnya, and Komendantsky Prospekt), two stations on the (Spasskaya and fourth line transfer tunnels to Sadovaya station), Parnas and the 'Vyborg' depot on line 2, and five of the Frunzensky radius (Zvenigorodskaya, Obvodny Kanal. Volkovskava, Bukharestskava, and Mezhdunarodnava). Thus, it was believed, considering the average time of construction of a metro station in Saint Petersburg being equal to 5.6 years, that, with funding, all the works mentioned above would be completed by no later than 1997; a record in the history of the construction of the St. Petersburg metro. This however, was not achieved, and the plans were only _____ in late 2012.

In 1994 it was planned, over 10 years, to ______ extend the metro and almost "double" its size, building three new lines and 61 new stations. However, in reality, over this period until 2004, just 6 stations were opened. At this point the metro considered funding construction through a system of ______ stage and station sponsorship. Saint Petersburg's unforgiving geology has frequently hampered _____ by Metro builders. The most notable ______ took place on the Kirovsko-Vyborgskaya Line. While constructing the line in the 1970s, the tunnelers entered an underground ______ of the Neva River. They managed to complete the tunnel, but in 1995 the _____ had to be closed and a section of it between Lesnaya and Ploschad Muzhestva flooded. For more than nine years, the northern segment of the line was physically _____ from the rest of the system. A new _____ of tunnels was built and in June 2004 normal service was restored.

Text 7. STATIONS

Task 1: Read the text and speak about the stations of the Saint Petersburg Metro.

Some of the features of the Saint Petersburg metro make it stand out amongst others, even those in the former USSR. It is customary to have stations in the centre of a city built very deep, not only to minimise disruption, but also, because of the cold war threat, they were built to double as bomb shelters, and many old stations do feature provisions such as blast doors and air filters. In most cities, the lines become shallow or even begin to run above ground as they reach the city's outer residential districts. However, this is not the case in Saint Petersburg. The difficult geology means that all but 9 stations are at a deep level. The design and architecture went through numerous phases. The original stations were predominantly of the pylon type, of which there are 15 stations. Also popular was the column layout, and there are 16 such stations in the system.

The first stage is exquisitely decorated in the Stalinist architecture style, but from 1958, Nikita Khrushchev's struggle with decorative extras restricted the vivid decorations to simple aesthetic themes. During this time a new design called "horizontal lift" became widespread, and 10 stations were built with this layout. The horizontal lift design is a variation of a station with platform screen doors, and has not been found elsewhere outside Saint Petersburg. However, because the design became unpopular with passengers, and for technical reasons, no stations featuring this design were built between 1972 and 2018. From the mid-1970s, a new open "single-vault" design was developed by local engineers and became very popular, not only in Saint Petersburg, but some other cities as well. Known technically as *Leningradky Odnosvod*, it remains the most popular of all and there are 16 such stations in the city.

The remaining stations are located virtually on the edge of the city, and one, Devyatkino, is territorially in Leningrad Oblast, far away from the harsh underground geology that forms the Neva delta. The six shallow column stations are located in the southern and northwestern sections of the city, and the first three are found on the Kirovsko-Vyborgskaya line. The first one, Avtovo, is considered to be one of the most beautiful stations in the world and was opened as part of the first stage in 1955, while the other two were built in the late 1970s as typical Moscow-style pillar trispan stations. There are two shallow-column stations the Nevsko-Vasileostrovskaya on line: Novokrestovskaya and Begovaya. Both of these stations, which use a modified version of the horizontal lift design, were opened in May 2018 as part of the line's extension to the northwestern section of the city. A sixth shallow-column station, Dunayskaya, opened in October 2019 as part of the Frunzensko-Primorskava line's southern extension. In addition, there are four termini stations that are on the surface and are located near the lines' connection with the train depots. The city's northern climate means that even here all of the station space is inside an enclosed structure

Task 2: Answer the questions.

1. Why is it customary to have stations in the centre of a city built very deep?

2. What architecture style is the first stage exquisitely decorated in?

3. Whose struggle with decorative extras restricted the vivid decorations to simple aesthetic themes?

4. What is the horizontal lift design?

5. Why were no stations featuring this design built between 1972 and 2018?

6. When was a new open "single-vault" design developed by local engineers?

7. Where are the remaining stations virtually located?

8. Where are the six shallow column stations located?

9. When was Avtovo opened?

10. What does the city's northern climate mean?

Task 3: Mark the sentences as TRUE or FALSE

1. In a few cities, the lines become shallow or even begin to run above ground as they reach the city's outer residential districts.

2. The difficult geology means that all but 8 stations are at a deep level.

3. The original stations were predominantly of the pylon type, of which there are 15 stations.

4. The horizontal lift design has not been found elsewhere outside Saint Petersburg.

5. *Leningradky Odnosvod* remains the most popular of all, and there are 15 such stations in the city.

6. Devyatkino is territorially in Saint Petersburg.

7. Avtovo is considered to be one of the most beautiful stations in the world.

8. Novokrestovskaya and Begovaya use a modified version of the horizontal lift design.

1. deep	A. period
2. shallow	B. usual
3. phase	C. empty
4. original	D. bright
5. predominant	E. alter
6. vivid	F. bottomless
7. modify	G. prevalent
8. typical	H. initial

Task 4: Match the synonyms.

Task 5: Choose one of the stations in the Saint Petersburg Metro and discuss it with your partner in detail.

Text 8. HISTORY OF THE KAZAN METRO

Task 1: Read the text and speak about the history of the Kazan Metro.

Kazan is a historic and cultural centre on the middle Volga. The first plans to have a rapid-transit system were proposed back in the days of the Russian Empire, but after the October Revolution and the Russian Civil War little was left for the design. Nevertheless, in the 1930s, Kazan, being the capital of the Tatar ASSR—one of the most visible autonomous republics and rapidly growing as an industrial centre—prompted some to propose a rapid transit system for the future, particularly after the successful construction of Moscow Metro in 1935.

However, World War II ended such attempts, and in the post-war USSR only the largest capitals of Union republics could afford a Metro system. Nevertheless, in 1979 the Kazan city's population passed the one million mark: a Soviet requirement for a Metro to be allowed. 1983 was the year when the Supreme Soviet of the Tatar ASSR authorised planning a metro system. The original design was to prove the final, as the City of Kazan effectively followed a typical Soviet model with a historical centre on the inflow of the Kazanka River into the Volga, and the various industrial and "bedroom" districts (housing complexes) on the edges. The first line would follow a north-south axis beginning in the Transit Railway Station in the north. passing through the postwar Stalinist buildings and then down south of the Kazanka, next to the Kazan Kremlin and through the historical centre to the microdistrict of Gorki

The first geological survey began in 1984, and by 1989 the construction of the first stage was drawn up and submitted for final authorisation to begin construction. It was not to be. In 1991, the Soviet Union broke up and the economic, as well as political turmoil that rocked Tatarstan and Russia, caused the Kazan Metro project to be axed.

Luckily for Kazan, throughout the 1990s, the status of it being the most visible autonomous capital reinforced its position; enough for the Federal government to issue a review of the project in 1995 and authorising the construction. The most prominent deadline was the city's millennium anniversary in 2005. After securing financing and training, the first stone was laid on August 27, 1997.

The first stage of six stations features deep-level tunnels all built by tunnel boring machines, and the stations are either sub-surface or elevated. Little of the original Soviet station plans remain in the architecture of the stations, with the emphasis being on traditional Tatar and Islamic motifs as part of modern high-tech designs. The first shield arrived in Kazan at the end of 1999 and was launched in May 2000. Initially, the pace was slow and the financial problems were about to prevent the construction to be completed on time. In a desperate attempt, in late 2003 the Russian Ministry of Transport ordered metro brigades from Samara and Moscow to assist and the first stage was made one station shorter, leaving the difficult path under the Kazanka River to open at a later time. Another contribution was made by the Almaty Metro construction brigade from Kazakhstan. Thus, by the late 2004, a total of eight tunnel boring mechanisms were in operation. Overall, a total of thirteen individual tunnels had to be bored.

Despite a rocky start, Kazan Metro was opened on August 27, 2005, by the President of Russia Vladimir Putin, the President of Tatarstan Mintimer Shaymiyev, and the President of Kazakhstan Nursultan Nazarbayev, as well as the mayor of Kazan and the heads of all existing Russian Metros.

The extension to Prospekt Pobedy opened on December 29, 2008, as the first extension south of Gorki station in the second stage. In 2010 the Metro extended across the Kazanka River, with the opening of the Kozya Sloboda station. The Kazan metro opened a three-station northern extension on May 9, 2013.

Task 2: Answer the questions.

1. Where is Kazan situated?

2. When did Kazan prompt some to propose a rapid transit system for the future?

3. What ended such attempts?

4. When did the Kazan city's population pass the one million mark?

5. When did the Supreme Soviet of the Tatar ASSR authorize planning a metro system?

6. When did the first geological survey begin?

7. What caused the Kazan Metro project to be axed?

8. What was the most prominent deadline?

9. What does the first stage of six stations feature?

10. When did the first shield arrive in Kazan?

11. How many tunnel boring mechanisms were in operation by the late 2004?

12. When was Kazan Metro opened?

Task 3: Fill in the appropriate prepositions.

1. The first plans to have a rapid-transit system were proposed back _____ the days of the Russian Empire, but _____ the October Revolution and the Russian Civil War little was left _____ the design.

2. The original design was to prove the final, as the City ____ Kazan effectively followed a typical Soviet model ____ a historical centre the inflow the Kazanka River the Volga.

3. The first line would follow a north-south axis beginning ______ the Transit Railway Station _____ the north, passing _____ the postwar Stalinist buildings and then _____ south ____ the Kazanka, _____ to the Kazan Kremlin and ____ the historical centre ____ the microdistrict _____ Gorki.

4. ____ 1989 the construction ____ the first stage was drawn ____ and submitted ____ final authorisation to begin construction.

5. _____ securing financing and training, the first stone was laid _____ August 27, 1997.

6. Little _____ the original Soviet station plans remain _____ the architecture _____ the stations, _____ the emphasis being _____ traditional Tatar and Islamic motifs as part _____ modern high-tech designs.

7. _____a desperate attempt, _____ late 2003 the Russian Ministry _____Transport ordered metro brigades _____ Samara and Moscow to assist and the first stage was made one station shorter, leaving the difficult path the Kazanka River to open a later time.

8. ____ 2010 the Metro extended ____ the Kazanka River, ____ the opening ____ the Kozya Sloboda station.

Task 4: Find a phrase match

1 one of the most visible auto-	A "bedroom" districts (hous-
nomous republics and	ing complexes) on the edges.
2 in the post-war USSR only	B to be completed on time.
3 the various industrial and	C from Kazakhstan.
4 the status of it	D rapidly growing as an in-
	dustrial centre
5 about to prevent the construc-	E the largest capitals of Un-
tion	ion republics
6 made by the Almaty Metro con-	F being the most visible au-
struction brigade from Kazakhstan	tonomous capital

Text 9. SERVICE

Task: Read the text and fill in the gaps with the following words:

modern, metro, cameras, length, cooperation, intervals, announcements, pillar-spans, exists, public, students, operated, features, architectural, automated, single-line, sent, driver.

At present, the Kazan Metro is a _____ system that stretches nearly sixteen kilometres and has eleven stations. The newest of the Russian systems, it is also the most _____. Smart-card ticketing and semi-automated train drive are _____ that at the time were just being introduced in selected Moscow stations. The system is _____ by the municipality company *MetroElektroTrans*.

Like all Metros in Russia and the former USSR, each station has its own _____ theme. At present two stations are single-vault, and two are _____. In addition, one station _____ on a combined glazed flyover. The metro runs from 6:00 to 23:00. The metro also sells smart-tokens valid for one day and smart cards (passes) which are valid for several trips or a specified ______ of time. There are discounted fares for pensioners, _____, and children. Security is a major issue in the Kazan Metro. Like all modern systems, it is outfitted with CCTV _____. Each station has its own police group for ______ order. Professional photography is prohibited. All information and ______ are given in three languages ______ Russian, Tatar, and English.

Only the 81-553.3/554.3 «Kazan» model was maintained in Kazan ______ since 2005. Trains were produced by Saint Petersburgbased *Vagonmash* factory in _____ with Škoda Dopravní Technika of Plzeň, Czech Republic in 2005. These are the most modern models currently in service in Russia and the former Soviet Union and they are fully _____. As a result, they do not require an engineer or a _____ on board, just a supervisor. A total of 16 cars (4 trains) are currently in operation with a capacity of ~250 people each.

In 2011 new 3-car 81-740/741 «Rusich» trains were bought for opening of new *Kozia sloboda* station. A total of 27 cars (9 trains) are currently in operation with a capacity of \sim 350 people each. 12 trains (1 train is reserved) provide 5-minute _____ on the line in rush hours. In 2019 a contract was signed by delivering one train of type 81-

765/766/767. The train was built by April 2020 and was _____ to Kazan by May 2020.

Text 10. YEKATERINBURG METRO

Task 1: Read the text and speak about the Yekaterinburg Metro.

Yekaterinburg, formerly called Sverdlovsk, was always known as the informal capital of the Urals, a natural divide between Europe and Asia, between European Russia and Siberia. The city grew very rapidly because it was an important industrial centre and a transport hub. Plans for a rapid-transit system began in the late 1970s, and in 1980 construction began.

The city's uneven landscape, as well as its layout with a very dense city centre, prompted to combine deep and shallow stations. On 26 April 1991, the sixth Metro of Russia and the thirteenth and last Metro of the Soviet Union, which ceased to exist only a few months later, was finally opened to the public. The economic crisis of the early 1990s rocked the Metro very hard and the first stage comprised only three stations. However, then-president Boris Yeltsin diverted state funds to complete its construction and by 1995 the Metro was doubled in length. Since then, only two extensions have been built.

The Metro is a typical Soviet design, which when completed will form a triangle from three lines intersecting in the city centre. The eight stations comprise 12.7 kilometres of length and are split between deep and shallow. Of the latter, four are pillar-trispans and one is a single vault (built to Kharkov technology). The deep-level stations include one pylon, one column and two Leningrad-technology single vaults, although one was built to a design making it appear as a single deck. Like all ex-Soviet Metros, the stations are elaborately decorated, although economic hardships prevented the full original designs from being implemented.

The Metro is served by one depot, Kalinovskoye, and 62 cars are assigned to it.

Ridership has improved in recent years. In 2011, the average daily ridership on the Metro was 105,000. By 2012, the average daily ridership had increased to 130,000. This corresponds to an annual ridership in 2012 of approximately 47.45 million people.

The construction of the Bazhovskaya station which should be between the "Geologicheskaya" and "Chkalovskaya" has been postponed indefinitely.

The first section of the second line with length of 4.5 km should have four stations: "Metallurgicheskaya", "Tatishchyevskaya", "Ploshchad Kommunarov" and "Ploshchad 1905 Goda". Station "Tatishchyevskaya" and "Ploshchad Kommunarov" will be near Central Stadium, which hosted the FIFA World Cup 2018 matches. The opening was originally planned for 2018. However, only pre-development was finished in 2013 and the design competition had not been declared, the construction was delayed, and the 2018 opening was not feasible.

Task 2: Answer the questions.

1. What was Yekaterinburg, formerly called Sverdlovsk, always known as?

2. What prompted to combine deep and shallow stations?

3. When was the sixth Metro of Russia and the thirteenth and last Metro of the Soviet Union, which ceased to exist only a few months later, finally opened to the public?

4. How many extensions have been built since 1995?

5. How many kilometres do the eight stations comprise?

6. What do the deep-level stations include?

7. How many cars are assigned to the Metro?

8. What was the average daily ridership on the Metro in 2011?

9. When was the pre-development finished?

Task 3: Fill in the appropriate prepositions.

1. Plans _____ a rapid-transit system began _____ the late 1970s, and 1980 construction began.

2. ____ 1995 the Metro was doubled ____ length.

3. Ridership has improved <u>recent years</u>.

4. This corresponds _____ an annual ridership _____ 2012 ____ approximately 47.45 million people.

5. The first section _____ the second line _____ length _____ 4.5 km should have four stations: "Metallurgicheskaya", "Tatishchyevskaya", "Ploshchad Kommunarov" and "Ploshchad 1905 Goda".

Task 4: Fill in the gaps with the appropriate tense-aspect forms of the verbs.

1. The city _____ (*to grow*) very rapidly because it _____ (*to be*) an important industrial centre and a transport hub.

2. The economic crisis of the early 1990s _____ (*to rock*) the Metro very hard and the first stage _____ (*to comprise*) only three stations.

3. The Metro _____ (*to be*) a typical Soviet design, which when completed will _____ (*to form*) a triangle from three lines intersecting in the city centre.

4. Like all ex-Soviet Metros, the stations elaborately _____ (*to decorate*), although economic hardships _____ (*to prevent*) the full original designs from being implemented.

5. By 2012, the average daily ridership _____ (to increase) to 130,000.

6. The construction of the Bazhovskaya station which should

(*to be*) between the "Geologicheskaya" and "Chkalovskaya" ______(*to postpone*) indefinitely.

7. Station "Tatishchyevskaya" and "Ploshchad Kommunarov"

(to be) near Central Stadium, which _____ (to host) the FIFA World Cup 2018 matches.

8. The opening originally (to plan) for 2018.

9. The design competition _____ (*not, to declare*), the construction _____ (*to delay*), and the 2018 opening (*not, to be*) feasible.

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АНГЛИЙСКИЙ ЯЗЫК

ПРОЕКТИРОВАНИЕ, СТРОИТЕЛЬСТВО И РЕКОНСТРУКЦИЯ ЗДАНИЙ И ПОДЗЕМНЫХ СООРУЖЕНИЙ ПРОМЫШЛЕННОГО И ГРАЖДАНСКОГО НАЗНАЧЕНИЯ

ENGLISH

DESIGN, CONSTRUCTION AND RECONSTRUCTION OF BUILDINGS AND UNDERGROUND STRUCTURES FOR INDUSTRIAL AND CIVIL PURPOSES

Методические указания для самостоятельной работы для студентов магистратуры направления 08.04.01

Сост.: Е.В.Картер, В.Н. Ионова

Печатается с оригинал-макета, подготовленного кафедрой иностранных языков

Ответственный за выпуск Е.В.Картер

Лицензия ИД № 06517 от 09.01.2002

Подписано к печати 02.03.2021. Формат 60×84/16. Усл. печ. л. 1,9. Усл.кр.-отт. 1,9. Уч.-изд.л. 1,8. Тираж 75 экз. Заказ 147.

Санкт-Петербургский горный университет РИЦ Санкт-Петербургского горного университета Адрес университета и РИЦ: 199106 Санкт-Петербург, 21-я линия, 2