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Методические рекомендации к практическим занятиям
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Chapter I. MANAGEMENT IN CONSTRUCTION

1. Construction Management

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. availability	a) требующий напряжения (сил); испытывающий (стойкость)
2. variable	b) полезный, стоящий
3. general contractor	c) наличие, присутствие
4. challenging	d) планирование производства, работ, составление графика
5. scheduling	e) результат, влияние, воздействие
6. construction manager	f) осуществлять надзор, руководить
7. effect	g) изменяющийся фактор (черта, элемент)
8. to take into account	h) проект
9. rewarding	i) руководитель строительных работ
10. to supervise	j) принимать во внимание
11. design	k) генеральный подрядчик

2. Complete the sentences with a proper word/word combination from the box.

general contractor, scheduling, supervise, rewarding, challenging, availability, effect, design

1. The radiation has had a disastrous … on the environment.
2. When he asked them to build him a home, they drew up the … in a week.
3. If you … an activity or a person, you should make sure that the activity is done correctly or that the person is doing a task correctly.
4. It was a … and … experience for him.
5. The … of construction materials should be taken into account.
6. Companies use … to plan human resources and production processes.
7. The customer must conclude a contract with the … .

3. Read the text.

Construction management is both an art and a science, and is something that is usually quite hard to do. It is best done by people with a detailed knowledge of building construction, such as civil engineers or architects. Construction management is hard and **challenging** because one has to look at a broad range of **variables**, and try and guess what **effect** each variable will have on a construction project. But it is also extremely **rewarding** if done right.

A construction manager is someone who plans, coordinates, budgets, and **supervises** construction projects from the early stage to completion. For example, a **construction manager** in the middle of a project will have to **take into account** the following:

– the weather;

– the **availability** of construction workers and necessary materials;
– the availability of key equipment like cranes, bulldozers, etc.;
– changes made to the existing design by architects and clients;
– surprise discoveries of electrical cables below the ground that no one knew about.

The main aspects of construction management are:
– construction **scheduling**;
– quality control;
– contract management.

Construction managers are also called **general contractors** or project managers.

4. Discuss the following questions with the partner. Speak about the job of a construction manager.

1. What is construction management?
2. Is construction management something that is hard to do?
3. Does a construction manager plan, coordinate, and supervise construction projects?
4. What does a construction manager have to take into account?
5. Are construction scheduling and quality control regarded as the main aspects of construction management?
6. Are construction managers also called general contractors or project managers?

2. Construction Scheduling

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. schedule	a) намеченный
2. milestone	b) приостановка, простой рабочего времени
3. intended	c) временная диаграмма, график работ
4. timeline	d) план, график производства, график работ
5. costs	e) вследствие, в результате
6. execution	f) результат, итог
7. due to	g) выполнение (работ)
8. delay	h) затраты, расходы
9. outcome	i) подрядчик
10. contractor	j) веха, этап, важный момент

2. Read the text.

In project management, a **schedule** is a listing of a project's **milestones**, and activities, with **intended** start and finish dates. Construction scheduling is done at two different times. First, it is done after the plans are ready, but before the work

starts at the site, in order to work out a **timeline** and calculate construction **costs** for the project.

Secondly, it is done during the **execution** of the project, when the actual schedule may differ from the planned schedule **due to delays**, weather, or any number of reasons. In this case it can also be called project monitoring.

Construction scheduling should be done by people with an excellent knowledge of building construction. It is usually done on specialized software such as Primavera, or Microsoft Project.

Construction scheduling demands knowledge of what resources are required to produce a given **outcome.**

Often, the time taken to finish a job depends on the resources available to the **contractor.**

3. Discuss the following questions with the partner. Speak about construction scheduling in project management.

1. What is a schedule in project management?
2. Is construction scheduling done after the plans are ready?
3. May the actual schedule differ from the planned schedule? Why?
4. Is excellent knowledge of building construction needed for construction scheduling?
5. What software is used for construction scheduling?
6. Does much depend on the resources available?
7. Do you agree with the statement: *Better schedules deliver better results*?

3. Quality Control in Construction

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. restricted	a) ненадёжный
2. shaft	b) ускоренный способ
3. insecure	c) производство
4. scaffolding	d) ограниченный; узкий
5. shortcut	e) шахта (лифта)
6. supervisor	f) мрамор
7. excavation	g) бригадир, руководитель работ
8. fabrication	h) строительные леса
9. marble	i) экскаваторные работы; земляные работы
10. plumbing	j) опалубка
11. supervision	k) водопроводно-канализационные работы
12. formwork	l) контроль, надзор

2. Complete the sentences with a proper word from the box.

plumbing, formwork, restricted, shaft, scaffolding, shortcut, supervisor, insecure, excavation, quality control

1. … is the procedures and activities that are used to meet requirements for quality.

2. The system of pipes, tanks, and other apparatus required for the water supply, heating, and sanitation in a building is called … .

3. The title of "…" is typically applied to a lower-level managerial role, and they are often responsible for the day-to-day performance of a small group, like a team or a department.

4. Bricklayers and painters stand or sit on … when working at a height.

5. Steel … is stronger, more durable and has longer life than the one made of timber and its reuses are more in number.

6. … is a method of doing something more directly and quickly and often not as thoroughly as by ordinary procedure.

7. A long, narrow, typically vertical passage that accommodates an elevator in a building is called a ... .

8. If scaffolding is ... because it is not fixed properly, it is prohibited to use it.

9. Access is ... to authorized people only.

10. The most hazardous construction operations are … and trenching.

3. Read the text.

Quality control is the most difficult part of construction management. Construction is done in difficult weather, in **restricted** workspaces like **shafts**, and on **insecure** construction **scaffolding** by workers that are tired, hungry, cold or hot. It is easy for them to take **shortcuts** to finish off a job.

A quality control **supervisor** must know how to check quality of lots of completely different kinds of work, from **excavation** in the ground to concrete or steel **fabrication** to finishing materials, like **marble** or paint, to services like electrical and **plumbing**. Quality control demands technical knowledge, and is best done either by engineers, or people who have years of training in construction quality **supervision.**

She or he will have to know the answer to questions such as: what is the correct proportion of water to add to a concrete mix, how to check whether wooden **formwork** is correctly laid, how to ensure that the geometry of the building is not being distorted during construction, and how to provide adequate fire protection to vertical shafts.

4. Decide if the following statements are true or false and correct the false ones.

1. Quality control is not important in construction management.

2. Quality control is a process that helps a company to make sure that it creates quality products.

3. Products and facilities should not be in compliance with established standards.

4. The common way of controlling quality is the inspection of finished products.

5. Quality control in construction is critical to successful completion of the project.

6. Quality control is best done by engineers or people who have necessary

experience in construction supervision.

7. Quality control in construction is periodic inspection of the construction activities and facilities in order to meet the standards.

5. Discuss the following questions with the partner. Speak about the importance of quality control in construction.

1. Is quality control the most difficult part of construction management?
2. Does quality control demand technical knowledge?
3. Who performs quality control?
4. What are the responsibilities of a quality control supervisor?
5. Should a quality control supervisor control lots of things – the correct proportion of water in a concrete mix, correct formwork and safe scaffolding, proper fire protection, etc.?

Chapter II. BUILDING CONSTRUCTION

1. Design and Function

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. design	a) склад
2. load	b) каркас
3. weight	c) водоснабжение
4. warehouse	d) несущая стена
5. residential building	e) вилочный автопогрузчик
6. frame	f) вес
7. load-bearing wall	g) товары
8. partition wall	h) потолок
9. water supply	i) транспортное средство
10. sewage	j) нагрузка
11. ceiling	k) проект / план
12. vehicle	l) жилое здание
13. goods	m) лестница
14. fork-lift truck	n) канализация
15. staircase	o) аварийный выход
16. emergency escape route	p) перегородка

2. Read the text.

Design and form of any structure depends on its use, as each different structure is subject to different **loads** (e. g. the **weight** of books in a library, or the difference in wind loads imposed on low and high-rise buildings). Buildings can be used for residential, storage or business purposes, so a civil engineer will produce plans for houses or apartment blocks, **warehouses** or office buildings, all of which have very different design demands.

Residential buildings are designed with separate rooms for different purposes (such as kitchen, bathroom, etc.). The external walls and the roof form the outer

frame, and the internal space is divided up by **load-bearing** walls, **partition walls** and floors. The building is provided with **water supply**, **sewage** system, heating and air-conditioning systems, lighting and electricity.

Storage buildings, such as warehouses, require high **ceilings** and large open spaces. An important design consideration is access for large **vehicles** to deliver and collect **goods**, and enough free space for **fork-lift trucks** to move.

When planning office structure, allowances need to be made for a large number of people working in a single office. There should be plenty of daylight as well as good ventilation and heating systems. The internal design must enable movement from one part of the building to another, so corridors, hallways, elevators, and **staircases** are obligatory, as are **emergency escape routes** in case of fire.

3. Explain the difference in meanings of the words *in italics*.

1. I think there isn't enough *space* for your books on the shelf. – He's always been curious about the *space* and planets.
2. I admire the hard-wood *floor* in this apartment. – She lives on the 6th *floor*.
3. Nothing *good* can come out of this trip. –Their *goods* are always of excellent quality.
4. The design of these earrings is so unique. – Any residential building requires a complex design.
5. My family has a *load* of money. – Are you sure this structure is able to withstand all the *loads*?

4. Complete the sentences with a word/word combination from the box.

load-bearing, *goods*, *apartment*, *access*, *design*, *residential*, *storage*, *water supply*, *floors*, *loads*, *space*, *obligatory*, *high-rise*, *partition*, *sewage*, *structure*, *roof*

1. … is a plan, scheme, or drawing for the construction of a structure.
2. Modern … buildings are used for business and … purposes. They are subject to significant wind … .
3. Warehouses are large … buildings where … are delivered to and stored.
4. On average, … blocks in our country have 5-12 … .
5. A … is a structure that covers or forms the top of a building.
6. Concrete, blocks or bricks are most often used to construct … walls.
7. A wall separating rooms or dividing internal … is called a … wall.
8. … is the provision of water via a system of pumps and pipes.
9. The function of the … system is to collect, transport, and dispose of water wastes.
10. In any type of … free … to emergency escape routes is … .

5. Discuss the following questions with the partner. Speak about types of buildings.

1. What does a design of a building depend on? Why?
2. What purposes are buildings generally constructed for?
3. What is the characteristic feature of a residential building design?
4. Load-bearing walls are different from partition walls, aren't they?

5. What types of structures are provided with water supply, sewage system, heating and air-conditioning systems?

6. Why do storage buildings require as much internal space as possible?

7. What needs to be taken into account when planning an office building?

8. Why must emergency escape routes be obligatory for any type of structure?

2. Loads

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. substructure	a) фундамент
2. superstructure	b) сила
3. foundation	c) временная (прилагаемая) нагрузка
4. basement	d) основание
5. force	e) временная (подвижная) нагрузка
6. live load	f) постоянная нагрузка
7. dead load	g) надземная часть (сооружения)
8. imposed load	h) землетрясение
9. earthquake	i) подвал

2. Read the text.

A building has two main parts, the **substructure** (the part below ground) and the **superstructure** (the part above ground). The substructure is usually called the **foundation** and may include **basement** walls.

Both the substructure and the superstructure help to support the load of the building. A load is the **force** acting on a building structure, it must be transmitted safely to the ground. **Dead load** of a building is the total weight of all its parts (walls, floors, roofs and finishes). The **live load** is the weight of the furniture, equipment, stored material, and occupants of a building. In some regions, wind load, snow load and **earthquake** shocks of may also be important factors.

Imposed loads depend on the weight of movable objects and on how these are distributed or concentrated (e.g. store goods or snow loads on the roof). Wind loads are affected by wind pressure; live loads are produced by the changing size or position of the load (e.g. traffic moving over a bridge). Full design and structural calculations have to be made if loads exceed certain specified values.

3. Which of the descriptions below explain a) *dead load*, b) *live load* or c) *imposed load*?

1. The load from all movable objects within a structure including loads from furniture, and people.

2. The weight of building materials or other immovable objects in a structure.

3. External loads from snow and wind.

4. A permanent force, acting on a structure including the weight of the structure itself.

5. Externally applied load on a structure or its member produced by the external environment.

6. A constant load in a structure (as a bridge, building, or machine) that is due to the weight of the members.

7. The loads, which are relatively constant over time, including the weight of the structure itself.

4. Discuss the following questions with the partner. Speak about types of loads.

1. Do superstructure and substructure refer to the same part of a structure?
2. What is a load?
3. How live load is different from dead load?
4. Is there a difference between live load and imposed load?
5. Why is it necessary to take all possible loads into account when designing a building?

***5. Try to guess meanings of following combinations with the word load. Use the dictionary in case you need it. Refer each of them to a correspondent column.**

расчетная нагрузка	постоянная нагрузка	временная нагрузка	допустимая нагрузка	предельная нагрузка	разрушающая нагрузка	сжимающая нагрузка

Actual load, allowable load, applied load, assumed load, basic load, bearable load, bending load, changing load, collapse load, column load, combined load, compressive load, concentrated load, continuous load, critical load, crushing load, design load, dead load, (evenly) distributed load, emergency load, failure load, fixed load, full load, limit load, maximum load, peak load, permanent load, permissible load, pressure load, rated load, repeated load, safe load, steady load, superimposed load, test load, ultimate load, wind load.

3. Foundations

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. to support	a) ленточный фундамент
2. to ensure	b) фундамент неглубокого заложения
3. to compact	c) ряд кирпичной кладки
4. strip foundation	d) напряжение
5. trench	e) поддерживать
6. brick course	f) грунт
7. compressive strength	j) фундамент глубокого заложения
8. tension	h) котлован/траншея
9. shear	i) железобетон
10. reinforcing bar	j) сдвиг
11. soil	k) обеспечивать
12. shallow foundation	l) свая
13. deep foundation	m) предварительно напряжённый бетон
14. pile	n) прочность на сжатие
15. reinforced concrete	o) уплотнять
16. pre-tensioned concrete	p) арматурный стержень

2. Read the text.

Foundations are the chief means of **supporting** a building. They carry both the dead and live loads. Foundations spread loads over the ground in such a way as to **ensure** that the building load is supported and the structure itself is stable. The type of foundation and its required **strength** depend on the weight of the building, its structural form and the type of soil.

The most common type of foundation is the **strip foundation**, which is normally constructed for load-bearing walls. A **trench** is excavated to a suitable depth and a concrete base is **compacted** into the bottom and then built up to ground level with **brick courses**, concrete fillings or concrete blocks. Although concrete has a good **compressive strength**, it is weak in **tension** and **shear**. Consequently, **steel reinforcing bars** are often needed.

Foundations may be **shallow** or **deep**. Shallow foundations are usually embedded about a meter into **soil**. A deep foundation is used to transfer a load from a structure through an upper weak layer of soil to a stronger deeper layer of soil. Different types of deep foundations include impact driven **piles**. Historically, piles were wood, later steel, reinforced concrete, and **pre-tensioned concrete**.

3. Complete the sentences with a proper word/word combination from ex. 1.

1. Concrete is able to withstand pushing forces because of its good … … .
2. The weight of the building is transferred to the … through a foundation.
3. In traditional … … steel reinforcement bars are used inside poured concrete.
4. … … are used when soils are sufficiently strong to support the imposed loads.
5. Bricks laid in rows are known as … .
6. … … is one of the types of deep foundation.
7. Foundations are designed to … such structural members as columns and walls.
8. The first step in creating a foundation is making a … .
9. Modern high-rise structures never use wood … .

4. Discuss the following questions with the partner. Speak about foundations.

1. Foundations spread loads over the ground, don’t they?
2. What does the type of foundation depend on?
3. What does a stripe foundation start from?
4. What materials are used to build a foundation up to the ground?
5. Why are steel reinforcing bars often needed when constructing a foundation?
6. How is shallow foundation different from deep foundation?
7. What are modern piled made of?

4. Walls

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. stable structure	a) балка
2. heat loss	b) толстый
3. damp penetration	c) изгиб, потеря устойчивости при продольном изгибе
4. thin	d) простенок
5. thick	e) промежуточный
6. strength	f) проникновение влаги
7. buckling	j) опора
8. factor of safety	h) устойчивая конструкция
9. timber	i) электропроводка
10. masonry	j) прочность
11. mass concrete	k) электрическая розетка
12. built-in	l) брус
13. pier	m) тепловые потери
14. buttress	n) встроенный
15. beam	o) водопровод
16. intermediate	p) тонкий
17. electrical wiring	q) монолитный бетон/ неармированный бетон
18. plumbing	r) коэффициент запаса (прочности)
19. electrical outlet	s) ручная каменная кладка

2. Read the text.

The walls have a key function in conventional building construction, because they transfer all the loads to the ground, resulting in a **stable structure**. They have to provide security (e.g. by restricting the spread of fire), to resist the wind and weather, to restrict **heat loss**, to divide space, to provide acoustic insulation and visual privacy, to prevent **damp penetration**, etc. The stability of a wall is important. Walls are usually **thin** in relation to their overall size, and this presents a problem for structural stability; i.e. they have to be prevented from **buckling.**

Stability of walls partly depends on **strength** of the materials used. The strength of materials must be sufficient to carry the imposed loads with a large **factor of safety**. The materials for wall constructions are **timber**, bricks, blocks and concrete with or without steel reinforcement. Thick **masonry** walls have been used for centuries, and more recently **mass concrete** and brick have been used to form the structure. Nowadays structural steel engineering and reinforced concrete structures also play an enormous role, especially in industrial architecture.

Other elements which increase the stability of a wall are **built-in piers** and **buttresses**. A pier is a column of masonry, thicker than the wall itself, which can also be used to support a concentrated load such as a **beam**. A buttress is built at right angles to the line of the wall; it may be a pier or another wall. The ends of the walls should be securely tied into a buttress, while long walls should have an **intermediate** support.

In addition, the wall may house various types of **electrical wiring** or **plumbing**. **Electrical outlets** are usually mounted in walls.

3. Find one odd ending of the following sentences. In one of the sentences all three endings are correct.

1. The key function of walls is …:
   a) to transfer live and dead loads to the ground;
   b) to provide visual privacy and security;
   c) to increase heat loss.
2. Walls usually ...:
   a) buckle;
   b) ensure the stability of any building;
   c) divide internal space of a building.
3. Stability of walls depends on …:
   a) strength of materials they are made of;
   b) the factor of safety of the imposed loads;
   c) their thickness in relation to their overall size.
4. Most popular materials for wall construction today are …:
   a) mass concrete and concrete blocks;
   b) timber and masonry;
   c) brick and reinforced concrete.
5. Elements that increase the stability of walls are …:
   a) buttresses;
   b) piers and;
   c) beams.
6. Walls may house …:
   a) vents;
   b) electrical wiring and outlets;
   c) plumbing.

4. Discuss the following questions with the partner. Speak about walls.

1. How would you define a wall? What is its key function?
2. What purposes do walls serve?
3. Why is the stability of walls important? What does it depend on?
4. What are most common materials for wall construction?
5. What increases the stability of walls? When is intermediate support needed?

5. Floors

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. fire resistance	a) прогиб
2. load distribution	b) (*зд.*) сооружение, построение
3. a span	c) опалубка
4. load -bearing capacity	d) несущая балка пола, крыши
5. framing	e) пол без промежуточных опор в пролёте
6. a beam	f) пролет
7. a joist	g) бетон заводского изготовления
8. plywood	h) противопожарная безопасность

9. deflection	i) балка
10. shutter	j) распределение нагрузки
11. suspended floor	k) предварительно напряжённый бетон
12. pre-cast concrete	l) несущая способность
13. pre-stressed concrete	m) фанера

2. Rad the text.

The construction of floors and roofs provides support for the walls. Floors are required to provide **fire resistance** and sound insulation. Floors must bear loads and be constructed in such a way as to ensure an even **load distribution**. For this reason, floor **spans** must not be too great, as this could **weaken** the **load-bearing capacity**.

The **framing** of the floor consists of a **beam** that runs down the center of the house, and **joists** that meet on this center beam. Once the floor framing is complete, it is covered with **plywood**. The greater the floor span, the deeper the joists must be in order to prevent **deflection**.

Fir, larch, pine, spruce and imported redwood or whitewood are frequently used for flooring, as is concrete. Different **shuttering** methods and techniques play an important role in the construction of **suspended concrete floors** unless **pre-cast** reinforced concrete or **pre-stressed** concrete are used. The latter provides greater strength and can be used for longer spans.

3. Find one odd element and explain your choice:

1. floor, plywood, wall, roof;
2. fire resistance, sound insulation, load distribution, deflection;
3. beam, joist, concrete, framing;
4. Fir, larch, span, spruce, pine;
5. pre-cast, pre-stressed, pre-tensioned.

4. Discuss the following questions with the partner. Speak about floors.

1. What are the key functions of floors?
2. How can load-bearing capacity of a floor be weakened?
3. Does framing of a floor start with plywood?
4. When is deflection possible? How can it be prevented?
5. What kinds of wood are common for flooring?
6. Is pre-cast reinforced concrete or pre-stressed concrete used for longer spans?

6. Roofs

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. insulation	a) плоская крыша
2. pitched roof	b) стропило
3. flat roof	c) подвеска
4. hip roof	d) наклонная сторона
5. hanger	e) изоляционный материал
6. truss	f) деревянный гонт
7. rafter	g) ферма

8. roof slope	h) двускатная крыша
9. sloping side	i) плёночное кровельное покрытие
10. asphalt shingle	j) четырёхскатная (вальмовая) крыша
11. wood shingle	k) битумная черепица
12. membrane roofing	l) уклон крыши

2. Read the text.

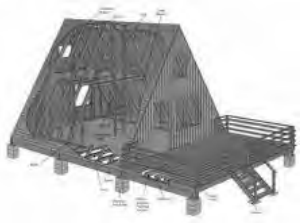
Some of the most primary needs that a structure demands from a roof are protection from the weather, overall design compatibility with the existing structure, and housing of internal elements such as piping, electrical wiring, ventilation, and **insulation**.

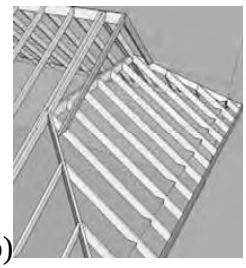
The traditional roof construction is the **pitched roof**. The basic shape of a pitched roof is a triangle. Within this triangle are smaller triangles formed by the **hangers**. The triangle shape is very stable because it cannot be **distorted. Flat roofs** are common (esp. with commercial buildings) and are definitely the simplest to build. **Hip roofs** are a common residential style roof. This type of roof is more difficult to construct because they have a more complicated **truss** and **rafter** structure. It has four **sloping sides** with zero vertical roof lines.

The type of roofing material is determined by roof slope: no **slope** (flat roof), low slope and steep slope. The most common materials include **asphalt shingles**, **wood shingles**, metal, **membrane** roofing material.

***3. Match the pictures with the roof types in the box.**

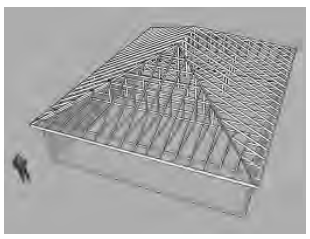
gambrel roof, Dutch hip roof, shed roof, mansard roof, butterfly roof, A-frame roof, folded plate roof, flat roof, hip roof, pitched roof

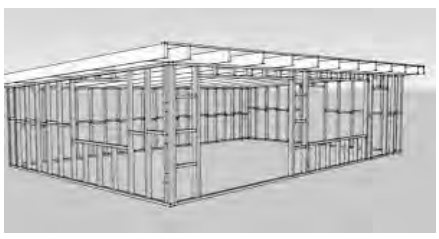
a) 

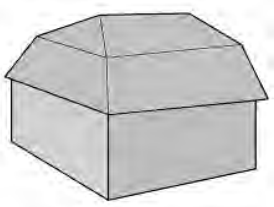
b) 

c) 

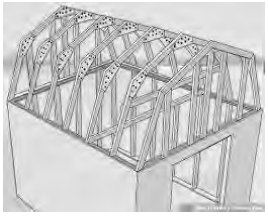
d) 

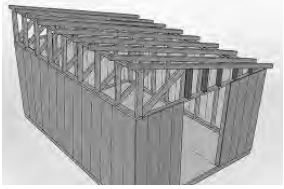
e) 

f) 

g) 

h) 

i) 

j) 

4. Use the pictures above to complete the definitions.

1. The … roof is very popular for churches, cottages, homes, and other structures. The roof acts as both the roof and the walls for a structure.

2. A … roof is basically a flat roof but has more pitch. It is frequently used for additions on homes or other roof styles.

3. The … roof looks like a series of small gable roofs placed side by side.

4. The … roof is most commonly used on barns. When used in residential construction it provides a good amount of space in the attic.

5. The … roof sophisticated design. The style provides plenty of light and ventilation but is not the effective when it comes to water drainage.

6. The … roof is basically a hip roof with a small gable at either end. The gables can be used as ventilation.

5. Discuss the following questions with the partner. Speak about the roofs.

1. What are the main functions of the roof?
2. Pitched roof is the most traditional type of roof, isn't it?
3. What is the simplest type of roof to build? Where is it mostly used?
4. Why are hip roofs difficult to construct?
5. What does the choice of roofing material depend on? What is the most commonly used material in our country?
6. What type of roof would you choose if you built a house for yourself?

7. Construction Elements

1. Remember the names of the following structural elements and complete the definitions below.

beam – балка (перекрытия, пола, крыши);
girder – главная балка;
joist – несущая балка (перекрытия, пола, крыши);
arch – арка;
purlin – обрешетина, прогон;
rafter – стропило;
truss – ферма;
lintel – перемычка (окна, двери);
column – опора, колонна;
slab – плита, панель перекрытия.

1. A … is any one of a set of sloping beams that form the framework of a roof.

2. A … is a structural framework of wood or metal, esp. one arranged in triangles, used to support a roof or bridge.

3. A … is a long thick straight-sided piece of wood, metal, concrete, etc., esp. one used as a horizontal structural member and runs transversely.

4. A … is a horizontal beam that runs over a door or a window.

5. A … is a large beam, esp. one made of steel, used in the construction of bridges and buildings.

6. A … is a beam made of timber, steel, or reinforced concrete, used in the construction of floors, roofs, etc.

7. A … is a horizontal beam that provides intermediate support for the common rafters of a roof construction.

8. A … is a broad flat thick piece of wood, stone, or other material.

9. A … is a vertical curved structure that spans an elevated space and may or may not support the weight above it.

10. A … is a large round support with a capital and a base which is typically made of stone.

2. Read the text.

Beams, **girders**, and **columns** are referred to the building superstructure. They support a building much like bones support the body. They form the skeleton of the superstructure, and bear the weight of the walls and each floor of the building.

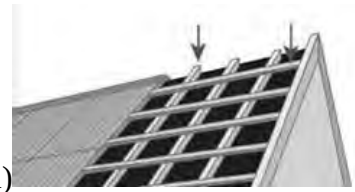
Beams and girders run horizontally. A beam is a horizontal structural element that is capable of **withstanding** load primarily by resisting **bending**. Girders are usually larger than beams and they support smaller beams.

Closely spaced beams are called **joists**, especially in wooden buildings. A joist is one of the horizontal supporting members that run from wall to wall, wall to beam, or beam to beam to support a ceiling, roof, or floor. **Purlins** are small beams that brace **rafters** or girders and help provide the structure to support roofs. Beams above window and door openings are called **lintels**. **Slabs** are beams whose width is greater than their depth.

Columns are heavy vertical supports that carry the load of beams and girders. **Trusses** consist of many wood or steel supports that are connected in triangular patterns. They provide the strength and rigidity to span large distances with relatively small amounts of material. **Arches** are curved supports that usually extend over openings.

3. Name the following structural elements.

a)  b)  c)  d) 

e)  f)  g)  h,i) 

4. Discuss the following questions with the partner. Speak about the functions of different structural elements.

1. What are the main elements of a building superstructure? What are their functions?
2. What distinguishes a beam from a girder?
3. What is a joist? Where is it usually used?
4. What are the basic support elements of a roof?
5. Lintels are used for framing doors and windows, aren't they?
5. What are the main vertical support elements?

8. Prefabricated Construction

1. Match words in Column A with their English equivalents in Column B.

A	B
1. междуэтажное перекрытие, пол	a) prefabrication
2. трата, растрата	b) modular construction
3. сборное строительство, заводское изготовление сборных конструкций	c) to ship
4. изменение (например, проектного задания)	d) frame house
5. каркасный дом	e) support
6. размер, замер	f) floor
7. перевозить	g) alteration
8. использование унифицированных элементов на основе модульной системы	h) waste
9. опора, опорная стойка	i) measurement

2. Complete the sentences with a proper word/word combination from the box.

prefabrication, waste, frame house, support, floor, modular construction, measurement, alteration

1. When we speak about a change in the appearance, character, or structure of something we use the word ... .
2. ... is the practice of manufacturing components of a structure in a factory to enable their quick assembly on the construction site.
3. A thing that bears the weight of something or keeps it upright is called a … .
4. If the structural parts are of wood and are dependent on a wooden frame for support we speak about … .
5. … (sometimes called prefabricated buildings) are made up of components manufactured on assembly lines in factories then assembled on site.
6. … is the size, length, or amount of something, as established by measuring.
7. If we use money (time, resources) carelessly, or to no purpose, we … it.
8. Lower horizontal surface of a building that is laid as part of the permanent construction is called a … .

3. Read the text.

Prefabrication has become an important part of all types of building construction. Prefabricated sections of a building are produced in large quantities in a factory and then **shipped** to various construction sites. This procedure allows work to continue despite poor weather conditions and reduces any **waste** in time and materials at the site. As a result, costs are lowered and construction time decreases.

Many types of building sections can be prefabricated. For example, entire walls may be prefabricated for a wooden **frame house**. Huge wooden arches are prefabricated for use as **supports** in gymnasiums and other buildings. Concrete **beams, floors**, roofs, and wall panels may be precast for many types of structures. Entire buildings may be constructed in a factory and then transported to the desired location.

Prefabricated structures are sometimes made by a process called **modular construction**. Modular construction refers to the use of a standard **measurement** as a basis for all building materials. All building parts are designed so that each dimension equals this measurement or some multiple of it. Such standardization of building parts allows all parts to fit together with few or no **alterations**. Modular parts also used in buildings that are not prefabricated.

4. Discuss the following questions with the partner. Speak about prefabrication as an important part of building construction.

1. Has prefabrication become an important part of all types of building construction?
2. Can many types of building sections be prefabricated?
3. Are concrete beams, floors, roofs, and wall panels precast for many types of structures?
4. Are prefabricated structures sometimes made by a process called modular construction?
5. Does each dimension equal a standard measurement?
6. What does such standardization of building parts allow?

Chapter III. BUILDING MATERIALS

1. Building Materials

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. soil	a) строительный раствор; известковый раствор
2. clay	b) прилипать; сцепляться
3. mortar	c) грунт, земля, почва
4. timber	d) строительный пиломатериал
5. alloy	e) твердеть, набирать прочность (о бетоне)
6. refinement	f) сплав

7. requirement	g) глина
8. available	h) бетонная конструкция
9. aggregate	i) (технические) требования
10. form of ownership	j) очищение, повышение качества
11. precast concrete	k) бетон
12. concrete structures	l) имеющийся в распоряжении
13. to harden	m) сборный железобетон
14. to adhere	n) заполнитель, инертный материал (бетона)
15. concrete	o) форма собственности

2. Complete the sentences with a proper word/word combination from the box.

soil, clay, mortar, timber, available, aggregate, concrete structure, adheres, precast concrete, hardens, concrete

1. Concrete is a very popular material because the aggregate and water are usually … everywhere.
2. A concrete mixture typically includes 60 to 75 percent … (gravel and sand).
3. The Trump International Hotel and Tower building with its 98 stories is the largest … in the world. It is over 1,387 feet (423 meters) high.
4. … is a material used in construction to fill the gaps between the bricks and blocks.
5. Do you know if the newly poured concrete … well to the old concrete?
6. Cement … when it comes into contact with water.
7. Industrialized construction with … … offers many economic advantages and saves money, resources and time.
8. … is a natural building material used for construction since prehistoric times when huge areas were covered with forests.
9. People fired … in extreme temperatures where it hardened into a strong and long-lasting building material.
10. What type of … is good for a foundation for buildings?
11. The ancient Romans were the first to develop … as a building material by mixing lime, water and volcanic ash from Mount Vesuvius.

3. Read the text.

Building material is any material which is used for a construction purpose. **Soils**, building stones, bricks and **clay** products, lime, cement, concrete, **mortar, timber**, metals, **alloys**, etc., are civil engineering materials.

While some of these materials may be directly used without processing, others may need additional **refinemen**t to fit in the exact **requirement.**

Many naturally available materials have been in use for construction purposes since pre-historic times. These materials are **available** abundantly in nature. Wood, cement, **aggregates**, metals, bricks, concrete, clay are the most common type of

building material. The choice of these is based on their cost effectiveness for building projects.

In history, everyday buildings were always made of materials that were readily to hand. In an area where stone was widely available, that became the usual building material; where it was not, brick or timber buildings would be found. The manufacture of building materials is an established industry in many countries. The building materials industry in Belarus is represented by about 1,500 enterprises of different **form of ownership** that specialize in the production of cement and finish materials, **precast concrete** and **concrete structures**, roofing materials, etc.

In building construction, cement is the term which usually refers to a finely powdered, manufactured substance that **hardens** and **adheres** after being mixed with water. Cements are made in a wide variety of compositions for a wide variety of uses.

Aggregate is the collective term for gravel, sand and stone, which amongst other things is used to make concrete.

Concrete is a material consisting of a hard, chemically inert aggregate, that is bonded together by cement and water.

4. Work in pairs. Ask questions and give proper answers.

Example: **Ask your partner, what** the most common types of building materials used in construction are. – What are the most common types of building materials used in construction? – The most common building materials used in construction are … .

Ask your partner,

1. **which** building materials are available abundantly in nature.
2. **what** the choice of building materials is based on.
3. **if** everyday buildings were always made of materials that were readily to hand.
4. **where** stone was the usual building material.
5. **what** building materials the Belarusian enterprises produce.
6. **what** the term *cement* usually refers to in construction.
7. **when** cement hardens.
8. **whether** cement binds sand and gravel together to form concrete.
9. **why** aggregate is a collective term.
10. **what** concrete consists of.

5. Speak about building materials.

2. Properties of Building Materials

1. Match word combinations in Column A, which denote properties of concrete with their English equivalents in Column B.

A	B
1. стойкость против атмосферных воздействий	a) fire resistance
2. морозостойкость	b) chemical resistance
3. химическая стойкость	c) durability

4. гигроскопичность	d) porosity
5. огнестойкость	e) frost resistance
6. пористость	f) weathering resistance
7. объёмная плотность	g) water absorption
8. долговечность, прочность, стойкость	h) bulk density

2. Read the text.

There is a need to know the various properties of building materials in order to ensure their proper application. The important physical properties of building materials are as follows:

Bulk density is the mass per unit volume of a material in its natural state. This is obtained by finding the ratio of the mass of the material to the volume of the material. Most of the technical properties including strength depend on the bulk density of the material.

Chemical resistance is the ability of a material to withstand the action of chemicals like acids, alkalis, salt solutions and gaseous substances.

Fire resistance is the capacity of a material to withstand the action of high temperature without losing strength and changing the original shape of the structure. Wood is highly affected by fire and should be treated so as to resist high temperature and fire.

Frost resistance is the ability of material to resist freezing and thawing. It depends on the density of the material. Generally, dense materials are frost resistant.

Weathering resistance is the capacity of a material to resist alternate wet and dry conditions without getting affected. Weathering causes a change in shape and decrease in mechanical strength.

Porosity of a material is the ratio of volume of pores to the total volume of the material. Denser the material, lesser will be its porosity. Bulk density, water absorption, thermal conductivity, strength, durability, etc., depend on the porosity of the material.

Water absorption is the ability of a material to absorb and retain water. It depends on the porosity of the material, the size and shape of the pores.

Durability is the property of a material to resist the action of atmospheric and other factors continuously. For example, the durability of a building depends on the resistance offered by various materials used to construct it under different conditions.

3. Complete the sentences by selecting the correct ending.

1. Mass per unit volume of a material is termed as …:
   a) unit weight;
   b) specific gravity;
   c) density;
   d) porosity.
2. Hygroscopicity (water absorption) is the property of a material …:
   a) to collect all the impurities in water;
   b) to absorb water vapor from air;

c) to absorb pure air from the atmosphere;
d) to collect the dust from air.

3. Frost resistance is the ability of a material …:
a) to withstand freeze or thaw conditions with minimal effect;
b) to conduct electricity;
c) to absorb energy and plastically deform without fracturing;
d) to withstand the effects of wind, rain, or sun and to retain its integrity;

4. Chemical resistance is the ability of a material …:
a) to do things that need a lot of physical or mental effort;
b) to resist attack by chemicals, environment, and radiation;
c) to withstand great force or pressure;
d) to resist plastic deformation.

5. Fire resistance is defined as …:
a) the quality of being porous, or full of tiny holes;
b) resistance of material to fire for a specified temperature and time;
c) the resistance of a material to localized deformation;
d) the property to resist the action of atmospheric factors.

4. Discuss the following questions with the partner. Speak about the properties of building materials.

1. Is it necessary to know properties of building materials? Why?
2. What is bulk density?
3. How is the ability of a material to withstand the action of chemicals called?
4. What is fire resistance? Should fire-resistant materials be used in construction to prevent fatal fires?
5. Is frost resistance regarded as the ability of material to resist freezing and thawing?
6. How do we call the ability of a material to resist the action of heat, cold, rain and snow without changing its shape and strength?
7. What determines the porosity of a material?
8. What can you say about durability?

3. Cement

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. to quarry	a) печь для обжига
2. raw materials	b) гранула, зерно, песчинка
3. limestone	c) бетонная смесь заводского изготовления
4. kiln	d) соответствовать
5. cement clinker	e) добывать в карьере, каменоломне
6. ready-mix(ed) concrete	f) измельчать, дробить
7. grain	g) клинкер
8. to comply (with)	h) сырьё
9. to grind (ground)	i) известняк

2. Complete definitions using the words from Ex. 1.

1. ... is to reduce (something) to small particles or powder by crushing it.
2. ... is to extract stone or other materials from a place, which is typically a large, deep pit.
3. ... is a dark grey material made by heating ground limestone and clay at a temperature of about 1400 C - 1500 C.
4. ... is a furnace used for processing a substance by burning or drying.
5. … is a hard rock, composed mainly of calcium carbonate or dolomite, used as building material and in the making of cement.
6. ... is a small hard particle of a substance such as salt or sand.
7. ... is to meet specified standards or set of rules.
8. ... or RMC, as it's also known, refers to concrete that is specifically manufactured for customers' construction projects.
9. ... is the basic material from which a product is made.

3. Read the text.

Portland cement is the basic ingredient of concrete. Concrete is formed when Portland cement creates a paste with water that binds with sand and rock to harden.

Bricklayer Joseph Aspdin of Leeds, England first made Portland cement early in the 19th century by burning powdered limestone and clay in his kitchen stove. With this crude method, he laid the foundation for an industry that annually processes mountains of limestone, clay, and other materials into a powder.

Cement plant laboratories check each step in the manufacture of Portland cement by frequent chemical and physical tests. The labs also analyze and test the finished product to ensure that it **complies with** all industry specifications.

The most common way to manufacture Portland cement is through a dry method. The first step is **to quarry** the principal **raw materials**, mainly **limestone**, clay, and other materials. Then the materials are crushed to about 3 inches or smaller.

The crushed rock is combined with other ingredients and ground, mixed, and fed to a cement **kiln**. All the ingredients are heated to about 2,700 degrees Fahrenheit in huge cylindrical steel cement kilns.

As the material moves through the kiln a new substance, called **clinker**, is formed. After the clinker is cooled, cement plants **grind** it and mix it with small amounts of gypsum and limestone. Cement is so fine that 1 pound of cement contains 150 billion **grains**. The cement is now ready to be transported to r**eady-mix concrete** companies to be used in a variety of construction projects.

4. Work in pairs. Ask questions and give proper answers.

Example: Ask your partner, if this text is about cement. – Is this text about cement? – You are right; this text is about cement.

Ask your partner,

1. **if** Portland cement is the basic ingredient of concrete.
2. **whether** Portland cement creates a paste with water that binds with sand and rock.
3. **who** was the first to make Portland cement and **where** and **when** it happened.
4. **how** Joseph first made Portland cement.

5. **how** cement plant laboratories check each step in the manufacture of Portland cement.

6. **what** the most common way to manufacture Portland cement is.

7. **if raw materials** are quarried and then crushed to about 3 inches.

8. **where** crushed rock and other ingredients are fed after being ground and mixed.

9. **what** the temperature in a cement kiln is.

10. **how** the new substance formed in the kiln is called.

11. **if** clinker is ground and mixed with small amounts of gypsum and limestone.

12. **where** cement is transported.

5. Speak about cement as a basic ingredient of concrete.

4. Aggregates

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. constituent	a) крупный заполнитель
2. fine aggregate	b) загрязнение, примесь
3. coarse aggregate	c) составная часть, компонент
4. slab	d) водонепроницаемый
5. disintegration	e) долговечный, прочный (о конструкции, материалах)
6. durable	f) мелкий заполнитель
7. watertight	g) размер, объём
8. impurities	h) отходы
9. pit	i) плита, панель
10. waste materials	j) дробление, измельчение
11. dimension	k) карьер, котлован

2. Match a word in Column A with its synonym in Column B.

A	B
1. constituent	a) permanent
2. slab	b) admixture
3. durable	c) destruction
4. dimension	d) plate
5. disintegration	e) component
6. pit	f) waterproof
7. watertight	g) quarry
8. impurities	h) building
9. construction	i) admixtures
10. waste materials	j) size

3. Read the text.

Aggregates are the major and important **constituent** of concrete. They form 70–80 % of the volume of concrete. Cement is the only factory-made component, whereas aggregates (both coarse and fine) and water are naturally available materials.

Depending on the thickness of the structure to be built, the size of aggregate particles can vary widely. Particles of **fine aggregate** are smaller than 6,4 mm (0,25 in) in size. Fine aggregate is sand, which is usually obtained from rivers or lakes, and is used in relatively thin sections and **slabs**.

Coarse aggregate particles are larger than 6,4 mm (0,25 in). Coarse aggregates are produced by the **disintegration** and crushing of rock and they are used in building dams and other massive structures. In general, the maximum size of coarse aggregate particles should not be larger than one-fifth of the narrowest **dimensions** of the concrete element in which it is used.

Gravel and sand, which are rocks that have been broken into small pieces (either naturally or mechanically by people), have the advantage of being strong, **durable**, and **watertight**. They are used extensively in the manufacture of ready-mixed concrete products, and for general construction purposes.

The aggregates should be absolutely clean, free from organic matter and other **impurities.**

Though aggregates are extracted primarily from quarries and **pits**, greater use is now being made of recycled and **waste materials** in order to help minimize environmental damage.

4. Discuss the following questions with a partner. Speak about aggregate as an important constituent of concrete.

1. What is this text about?
2. What two types of aggregate are discussed in this text?
3. What does the size of particles depend on?
4. What is fine aggregate and how is it obtained?
5. How are coarse aggregates produced?
6. What is the general requirement concerning the maximum size of coarse aggregate particles?
7. Are aggregates strong, durable, and watertight? Is it their advantage?
8. Should aggregate be clean and free from any impurities?
9. Can waste materials be used as aggregates to minimize environmental damage?

5. Concrete

1. Match words in Column A with their Russian equivalents in Column B.

A	B
1. reinforced concrete	a) при растяжении
2. reinforcement bar (rebar)	b) опалубка, опалубочная форма
3. in compression	c) монолитный бетон, уложенный на месте
4. tensile strength	d) чертёж
5. in tension	e) стержень арматуры
6. mould	f) при сжатии
7. formwork	g) железобетон
8. cast-in-situ concrete	h) опалубка; опалубочные конструкции
9. drawing	i) сборный железобетон
10. precast concrete	j) прочность на растяжение

2. Complete the sentences with a proper word/word combination from the box.

compression, reinforced concrete, drawing, cast-in-situ concrete, formwork, reinforcement bar, tensile strength, precast concrete, tension

1. Concrete in which metal bars or wire is embedded to increase its tensile strength is called ... .
2. ... (also known as poured-in-place or cast-in-place concrete) is a concreting technique which is undertaken in the place where something should be, for example, in the concrete component's finished position.
3. The resistance of a material to breaking under tension is known as … .
4. …, also known as reinforcing steel, is a steel bar or mesh of steel wires used in reinforced concrete structures to strengthen and hold the concrete in tension.
5. The method is called ..., and in this method building components are manufactured in a central plant and later brought to the building site for assembly.
6. To be “in ...” means to be under loads tending to reduce size, as opposed to be “in ...” which means to be under loads tending to elongate structural elements.
7. Wood, plastic or steel used as a temporary structure to contain setting concrete are called ... .
8. ... is used to communicate construction specifics to a group of people to explain how to build something.

3. Read the text.

Concrete is an artificial engineering material made from a mixture of Portland cement, water, fine and coarse aggregates, and a small amount of air. It is the most widely used construction material in the world.

When we say concrete, we actually mean **reinforced concrete**. Its full name is reinforced cement concrete, or RCC. RCC is concrete that contains steel bars, called **reinforcement bars,** or **rebars.** This combination works very well, as concrete is very strong in **compression.** Depending on the mixture of materials used, concrete

will support, in compression, 703,070 or more g/sq cm. But the **tensile strength** of concrete is much lower. On the contrary, steel is very strong in **tension**, and by using properly designed steel reinforcement, structural members can be made that are as strong in tension as they are in compression.

To make reinforced concrete, one first makes a **mould,** called **formwork** that will contain the liquid concrete and give it the form we need. Then in compliance with the structural engineer's **drawings** the steel reinforcement bars are placed and tied in place using wire. Once the steel is in place, one can start to prepare the concrete, by mixing cement, sand, gravel in a cement mixer, and pouring in the liquid concrete into the formwork.

Concrete that is cast in place in its mould is called **cast-in-situ concrete**. Cast-in-place concrete is the preferred choice for concrete slabs and foundations, as well as components such as beams, columns, walls, roofs, and so on.

Concrete members that are cast in a concrete factory and then shipped to site are called **precast concrete**.

4. Discuss the following questions with the partner. Speak about concrete.

1. Is concrete an artificial engineering material made from a mixture of Portland cement, water, fine and coarse aggregates?
2. Why do we provide steel in concrete?
3. What does reinforced cement concrete contain?
4. Is concrete very strong in compression?
5. What do you know about tensile strength of concrete?
6. What material is very strong in tension?
7. Are the steel reinforcement bars placed and tied in place in compliance with the structural engineer's drawings?
8. Concrete that is cast in place in its mould is called cast-in-situ concrete, isn't it?
9. How do we call concrete members that are cast in a concrete factory and then shipped to site?

6. Concrete composition

1. Match words in Column A with their English equivalents in Column B.

A	B
1. цементное тесто	a) concrete mix design
2. улавливать, задерживать (воду, воздух)	b) cement paste
3. затвердевать, застывать, схватываться	c) void
4. подбор (проектирование состава бетона)	d) to entrap
5. сохраняющий влагу	e) to set
6. твердеть, набирать прочность (о бетоне)	f) to harden
7. выдерживать (бетон)	g) ratio
8. пустота, пузырек (воздуха)	h) durability
9. разбрызгивать, обрызгивать	i) moisture-retaining
10. соотношение, отношение	j) to cure
11. долговечность, прочность	k) to sprinkle

2. Read the text.

Working out the exact proportions of each ingredient, is a science in itself. It is called **concrete mix design**. A good mix designer will take many factors into account to work out a required mix design. For most construction applications, however, a standard mix is used. In Britain, common examples of standard mixes are M20, M30, M40 concrete, where the number refers to the strength of the concrete in n/mm^2. Therefore, M30 concrete will have a compressive strength of 30 n/mm^2.

The two major components of concrete are a **cement paste** and inert materials. The cement paste consists of Portland cement, water, and some air either in the form of naturally **entrapped** air **voids** or intentionally entrained air bubbles**.** The inert materials are usually composed of fine aggregate and coarse aggregate.

When Portland cement is mixed with water, a cementing medium is formed. In properly mixed concrete, each particle of sand and coarse aggregate is completely surrounded and coated by this paste, and all spaces between the particles are filled with it. As the cement paste **set**s and **harden**s, it binds the aggregates into a solid mass.

Under normal conditions, concrete grows stronger as it grows older. The chemical reactions between cement and water require time. The reactions take place very rapidly at first and then more slowly over a long period of time. In the presence of **moisture**, concrete continues to gain strength for years.

Concrete mixtures are specified in terms of the dry-volume **ratios** of cement, sand, and coarse aggregates. A 1:2:3 mixture consists of one part by volume of cement, two parts of sand, and three parts of coarse aggregate. Depending on the applications, the proportions of the ingredients in the concrete can be altered to change its properties, particularly strength and **durability**. The ratios can vary from 1:2:3 to 1:2:4 and 1:3:5. For high-strength concrete, the water content is kept low. In general, the more water in a concrete mix, the easier it is to work with, but the weaker the hardened concrete becomes.

After surfaces of concrete have hardened sufficiently, they should be **cured** by **sprinkling** with water or by using moisture-retaining materials. The longer concrete is kept moist, the stronger and more durable it will become. In hot weather, it should be kept moist for at least three days.

3. Complete the sentences by selecting the correct ending.

1. Strength of cement concrete depends on …:
   a) quality of water;
   b) quality of aggregate;
   c) quality of cement;
   d) water-cement ratio.
2. Curing of concrete is done by …:
   a) a spraying method;
   b) a bonding method;
   c) covering with moist cloth;
   d) by changing the proportions of ingredients.

3. M30 Grade Designation is given to the concrete …:
   a) with a compressive strength of 30 n/mm^2;
   b) having a very high strength;
   c) with a compressive strength of 40 n/mm^2;
   d) with a standard strength.
4. The more water in a concrete mix, …:
   a) the more impossible it is to work with;
   b) the harder it is to work with;
   c) the easier it is to work with;
   d) the stiffer it is.
5. The longer concrete is kept moist, …:
   a) the older it will become;
   b) the more plastic it will become;
   c) the stronger and more durable it will become;
   d) the weaker it will become.

4. Discuss the following questions with the partner. Speak about concrete mix design.

1. Is it important to take the exact proportions of each ingredient to have a proper concrete mix?
2. Is a standard mix used for most construction applications?
3. What are the two major components of concrete?
4. What do you understand by M30 concrete?
5. What does the cement paste consists of?
6. What are the inert materials usually composed of?
7. What does a 1:2:3 mixture consist of?
8. How is water-cement ratio related to the strength of concrete?
9. Is the water content kept low for high-strength concrete?
10. Should concrete surfaces be cured by sprinkling after they have hardened sufficiently?
11. What is the minimum curing period?

7. Pre-stressed concrete

1. Match word combinations in Column A with their English equivalents in Column B.

A	B
1. сборная конструкция	a) pre-stressed concrete
2. натяжение (арматуры железобетона)	b) load-bearing strength
3. растягивающее напряжение	c) assembly
4. несущая способность	d) tensile stress
5. нерастянутый, не подверженный растяжению	e) tensioning
6. предварительное натяжение (до укладки бетона)	f) anchoring
7. предварительно напряженный бетон	g) hydraulic jacks
8. анкеровка; закрепление (пучков арматуры)	h) pre-tensioning

9. напряжение бетона методом натяжения арматуры на бетон	i) post-tensioning
10. гидравлический домкрат	j) service conditions
11. эксплуатационные условия	k) unstretched

2. Read the text.

Pre-stressed concrete is a technique that greatly increases **load-bearing strength** of concrete. Pre-stressing means the creation of permanent internal forces in a structure or **assembly** to improve its behavior and strength under various **service conditions**. Pre-stressing is commonly accomplished by **tensioning** the steel reinforcement. The basic function of pre-stressing is to greatly reduce the **tensile stresses** in crucial areas of concrete structures.

Pre-tensioning and **post-tensioning** are the two methods used under pre-stressing process.

In the pre-tensioning process, the steel is stretched before the concrete is placed. After the concrete has hardened and developed some strength, the stretching forces are released. The steel shortens somewhat, and because of the bond between the steel and concrete, the compressive stress in the concrete increases. Pre-tensioning is preferred when the structural element is small and easy to transport.

In post-tensioning, the concrete is around, but not in contact with **unstretched** steel. The steel is stretched after the concrete has hardened by **anchoring** one end and using **hydraulic jacks** to pull the other. After stretching, the second end is also anchored, compressing the concrete. Post tensioning is preferred when the structural element is heavy.

3. Discuss the following questions with the partner. Speak about pre-stressed concrete.

1. Does pre-stressing increase load-bearing strength of concrete?
2. Does it improve behavior of concrete under various service conditions?
3. Is pre-stressing done by tensioning the steel reinforcement?
4. Does it reduce the tensile stresses in crucial areas?
5. What are the two methods used under pre-stressing process?
6. When is steel stretched in the pre-tensioning method, before or after concrete is placed?
7. What makes the compressive strength in the concrete increase?
8. When is pre-tensioning preferred?
9. Is steel in contact with concrete in post-tensioning?
10. What piece of equipment is used to stretch steel in this method?
11. When is post-tensioning preferred?
12. Sum up the differences between pre-tensioning and post-tensioning.

GLOSSARY

Aggregate – stone, gravel, or slag used as one of the components of concrete.

Beam – a horizontal structural member that is used to support roof or wall loads.

Bearing wall – a wall that supports vertical loads in addition to its own weight.

Bending – one of three major forces acting on a beam. It is the tendency of a beam to bend or sag between its supports.

Building code – legal requirements designed to protect the public by providing guidelines for structural, electrical, plumbing, and mechanical areas of a structure.

Ceiling joists – the horizontal members of the roof used to resist the outward spread of the rafters and to provide a surface for installing the finished ceiling.

Cement – a powder of alumina, silica, lime, iron oxide, and magnesia pulverized and used as an ingredient in mortar and concrete.

Central heating – a heating system that delivers heat throughout a structure from a single source.

Civil engineer – a licensed professional, who is responsible for the design and supervision of the land drawings such as a topography map, street design and other land-related improvements.

Column – a vertical structural support, usually made of steel.

Compression – a force that crushes or compacts.

Concrete – a building material made from cement, sand, gravel, and water.

Concrete blocks – blocks of concrete that are precast.

Contractor - the manager of a construction project or one specific phase of it.

Course – a continuous row of building material such as shingles, stone, or brick

Crawl space – the area between the floor joists and the ground.

Cure – the process of concrete drying to its maximum design strength, usually taking 28 days.

Dead load – the weight of building materials or other immovable objects in a structure.

Elastic limit – the extent to which a material can be bent and still return to its original shape.

Engineers – licensed professionals who apply mathematical and scientific principles to the design and construction of structures. They include structural, electrical, mechanical and civil engineers

Face brick – brick used on the visible surface to cover other masonry products.

Fireproofing – any material used to cover structural materials to increase their fire rating.

Floor joists – repetitive horizontal structural members of the floor framing system that are used to span between the stem wall or girders to provide support to the subfloor.

Foundation – the system used to support a building’s load consisting of the stem walls, footings, and piers. The term is often used to refer to the footing.

Frame – the structural skeleton of the building.

Live load – the load from all movable objects within a structure including loads from furniture, and people. External loads from snow and wind are also considered live-loaded.

Load-bearing wall – a support wall that holds floor or roof loads in addition to its own weight.

Masonry – the use of brick, stone, or concrete blocks to construct a wall.

Mesh – a metal reinforcing material placed in concrete slabs and masonry walls to help resist cracking.

Monolithic – concrete construction created in one pour.

Mortar – a combination of cement, sand, and water used to bond masonry units together.

Moving loads – loads that are not stationary, such as those produced by automobiles and construction equipment.

Nonbearing wall – a wall that supports no loads other than its own.

Partition – an interior wall.

Post-tensioning – a process of reinforcing concrete slabs that are poured over unstable soil using reinforcement placed in tension.

Precast – a concrete component that has been cast in a location other than where it will be used.

Prefabricated units – buildings or components that are built away from the job site and transported there, ready to be used.

Prestressed concrete – a concrete component placed in compression as it is cast to help resist deflection.

Purlin – a horizontal roof member that is laid perpendicular to rafters to help limit deflection.

Rafter – the inclined structural member of a roof system designed to support roof loads.

Reinforced concrete – concrete that has steel rebar placed in it to resist tension.

Remodel – a construction project that involves moving, adding, or removing structural members.

Retaining load – a wall usually made of masonry that is designed to resist soil loads.

Rough floor – the subfloor, usually plywood that serves as a base for the finished floor.

Simple beam – beam with a uniform load evenly distributed over its entire length and supported at each end.

Slab – a concrete floor system typically poured at ground level.

S**pan** – the horizontal distance between two supporting members.

Storm sewer – a municipal drainage system used to dispose of groundwater, rainwater, surface water or other nonpolluting waste separately from sewage.

Stucco – a type of plaster made from Portland cement, sand, water, and a coloring agent that is applied to exterior walls.

Tensile strength – the resistance of a material or beam to the tendency to stretch.

Truss – a prefabricated or job-built construction member formed of triangular shapes used to support a roof or floor loads over long spans.

Список литературы

1. **Frendo, E.** Vocational English. English for Construction. Level 1 / E. Frendo. – Pearson Education Limited, 2012. – 80 p.

2. **Frendo, E.** Vocational English. English for Construction Level 2 / E. Frendo. – Pearson Education Limited, 2012. – 81 p.

3. **Brieger, N.** Technical English: Vocabulary and Grammar / N. Brieger, A. Pohl. – Summertown Publishing, 2006. – 148 p.

4. **Emmerson, P.** Grammar Builder / P. Emmerson. – Macmillan, 2007. – 272 p.

5. Macmillan English Dictionary for Advanced Learners – A&C Black Publishers Ltd, 2007. – 1748 p.

6. **Гарагуля, С. И.** Английский язык для студентов строительных специальностей / С. И. Гарагуля. – Ростов-на-Дону: Феникс, 2013. – 347 с.

7. Ask about Ireland [Электронный ресурс]. – Режим доступа: http://www.askaboutireland.ie/reading-room/history-heritage/architecture/building-materials. – Дата доступа: 02.09.2019.

8. Understand construction [Электронный ресурс]. – Режим доступа: http://www.understandconstruction.com/construction-management. – Дата доступа: 05.09.2019.

9. Rebar [Электронный ресурс]. – Режим доступа: https://www.designing buildings co.uk›wiki›Rebar. – Дата доступа: 09.09.2019.