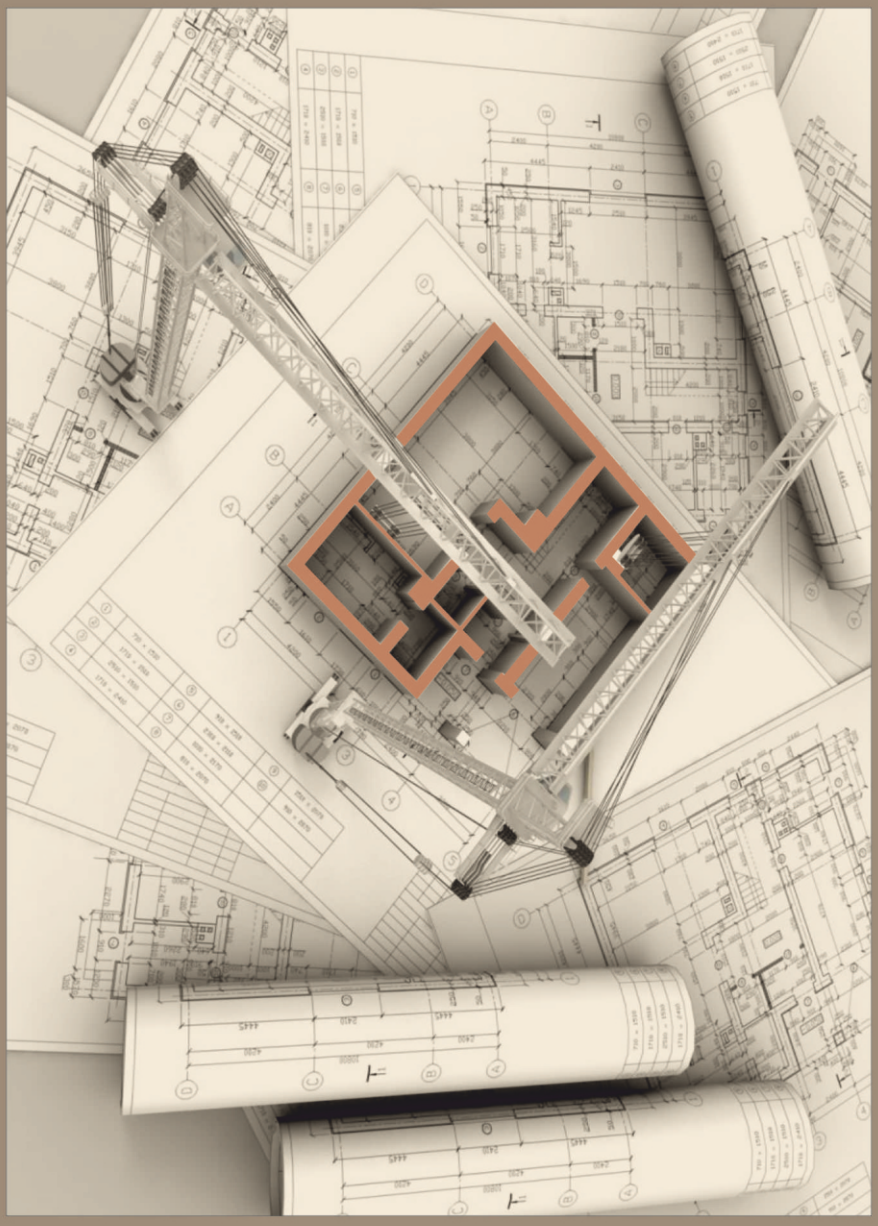
E.N. Konovalova
F.M. Marsheva
F.D. Mubarakshina



PROFESSIONAL ENGLISH IN USE:
ARCHITECTURE
Part 2

Министерство образования и науки Российской Федерации
Казанский государственный архитектурно-строительный университет

Е.Н. Коновалова
Ф.М. Маршева
Ф.Д. Мубаракшина

PROFESSIONAL ENGLISH IN USE: ARCHITECTURE

Part 2

Учебное пособие для студентов архитектурно-строительных вузов

Казань
2015

УДК 802.0:72
ББК81.2Англ:85.11
К64

Коновалова Е.Н., Маршева Ф.М., Мубаракшина Ф.Д.

К64 Professional English in use: architecture. Part 2: Учебное пособие / Е.Н. Коновалова, Ф.М. Маршева, Ф.Д. Мубаракшина. – Казань: Изд-во Казанск. гос. архитект.-строит. ун-та, 2015. – 148 с.

ISBN 978-5-7829-0509-5

Печатается по решению Редакционно-издательского совета Казанского государственного архитектурно-строительного университета

Учебное пособие предназначено для студентов архитектурно-строительных вузов, изучающих английский язык. Пособие составлено в соответствии с программой курса «Иностранный язык», основная его цель – освоение студентами терминологии, связанной с теорией и историей архитектуры, а также формирование у них умения использовать языковой материал в профессиональном общении со специалистами.

Ил. 25; библиогр. 14 наимен.

Рецензенты:
Кандидат филологических наук, заведующая кафедрой иностранных языков КГАСУ
М.К. Гулканян
Кандидат архитектуры, профессор кафедры архитектурного проектирования КГАСУ
И.Н. Агишева
Кандидат филологических наук, доцент кафедры теории и практики перевода Института международных отношений, истории и востоковедения КФУ
И.И. Кузнецова

УДК 802.0:72
ББК81.2Англ:85.11

ISBN 978-5-7829-0509-5

INTRODUCTION

ВВЕДЕНИЕ

Настоящее учебное пособие представляет собой вторую часть серии «Professional English in Use: Architecture», оно предназначено авторами для студентов младших курсов архитектурных, инженерно-архитектурных и дизайнерских специальностей.

Учебное пособие составлено в соответствии с требованиями к дисциплине «Иностранный язык», относящейся к дисциплинам гуманитарного, социального и экономического цикла образовательных программ по ФГОС-3, и предполагает совершенствование навыков в английском языке студентов, опирающихся на знания, полученные ими в результате изучения «Professional English in Use: Architecture. Part 1». Предлагаемое учебное пособие посвящено изучению вопросов архитектурного проектирования в целом, а также исследованию его составных элементов. Основное внимание в пособии уделено собственно архитектурному проектированию, дизайнерской работе, процессу проектирования зданий, а также работе на строительной площадке. Большая часть пособия отведена освоению профессиональной терминологии.

Главными целями настоящего учебного пособия являются формирование коммуникативных компетенций студентов, направленных на освоение общения на английском языке по архитектурной тематике, обучение чтению оригинальной литературы по специальности, а также подготовка к реферированию и аннотированию текстов на профессиональные архитектурные темы.

Авторы в своем пособии постарались решить следующие задачи: продолжить обучение студентов практическому владению английским языком по архитектурной тематике; развить у студентов умение работать с информацией на английском языке на профессиональные темы; развить у учащихся навыки публичной речи перед аудиторией в рамках специальности; способствовать освоению студентами английской терминологии по теории и практике архитектурного проектирования и ознакомить их с особенностями проектно-строительного дела и материаловедения.

- **Структура учебного пособия** включает в себя пять уроков-тем (Units), которые раскрывают следующие стороны проектной деятельности:

1 – Архитектура как профессия.

2 – Классификация зданий и сооружений.

3 – Проектирование зданий и сооружений.

4 – Строительные материалы.

5 – Строительство зданий.

Каждый Unit состоит из следующих разделов, которые соответствуют основным видам речевой деятельности:

- грамматический практикум – «Grammar review» с комплексом упражнений;
- чтение на английском языке – «Reading»;
- реферирование текста – «Rendering»;
- разговорный практикум – «Speaking»;
- переводческий практикум – «Translating»;

Грамматический практикум («Grammar Review») состоит из пояснительных таблиц с упражнениями и включает в себя следующие грамматические темы:

1. Времена группы *Perfect Active* и *Passive*.
2. Составные предлоги и составные союзы.
3. Неопределенные местоимения.
4. Причастия.
5. Предлоги места и времени.

- **Чтение** («Reading») представлено двумя базовыми текстами А и В для развития умений чтения. Кроме того, в каждом уроке есть тексты, описывающие разные стороны проектной деятельности, а также рубрика «Facts in Brief», которая знакомит студентов с кратко изложенными интересными фактами в области архитектуры.

- **Реферирование** «Rendering» представлено текстом С и направлено на обучение студентов умению выделять основное смысловое содержание в тексте при соблюдении временных рамок и грамматики.

- **Разговорный практикум** («Speaking») – это упражнения на развитие умений подготовленного монологического высказывания и упражнения по диалогической речи; задания, формирующие умения выражать свое мнение, одобрение или неодобрение чужих высказываний; упражнения на ведение дискуссий с партнерами и презентации.

- **Переводческий практикум** («Translating») включает в себя тексты на английском и русском языках, предназначенные для перевода.

В конце пособия размещены приложения Appendix «А» и Appendix «В». В приложении Appendix «А» представлены тексты, содержащие дополнительную информацию по основным урокам-темам, предназначенные для переводов и для использования в подготовке сообщений, презентаций (стр. 103-134). В приложение Appendix «В» включены контрольные задания по английскому языку, сформированные на профессиональной терминологии. Контрольные задания составлены последовательно в соответствии с логикой изложения материала в уроках-темах (стр. 135-146).

В заключение, авторы выражают благодарность рецензентам и надеются, что разработанное ими учебное пособие окажется полезным для студентов архитектурного направления в освоении **профессионального английского языка** в области архитектурного проектирования, строительства и материаловедения.

UNIT 1

ARCHITECTURE AS A PROFESSION

1.1. GRAMMAR REVIEW

- **Времена группы Perfect Active и Perfect Passive**

Tense	**Perfect Active:** **to have + Participle II**	**Perfect Passive:** **to have + been + Participle II**
Present	The architect **has prepared** a drawing. Архитектор подготовил чертёж.	The drawing **has been prepared**. Чертёж подготовлен.
Past	The architect **had prepared** a drawing by yesterday evening. Архитектор подготовил чертёж вчера к вечеру.	The drawing **had been prepared** by yesterday evening. Чертёж был подготовлен вчера к вечеру.
Future	The architect **will have prepared** a drawing by tomorrow evening. Архитектор подготовит чертёж завтра к вечеру.	The drawing **will have been prepared** by tomorrow evening. Чертёж будет подготовлен завтра к вечеру.

- **Put in the correct verb for:**

Example:
I'<u>ve done</u> (I/do) all the work. The drawing is really ready now.
A young couple <u>bought</u> (buy) the cottage next door. But they didn't live there long.

1. I … (phone) the office at eleven to speak to the architect, but he isn't there today.
2. There's still a problem with the door. Someone … (repair) it, but then it broke down again.
3. The employee … (lose) his bank card. He can't find it anywhere.
4. This laborer … (earn) some money last week. But I'm afraid he's already spent it all.
5. Prices … (go) up. Housing is more expensive this year.
6. Our clients … (arrive). They're sitting in the reception.
7. I … (make) a plan. Would you like to see it?

- **Decide which word is correct:**

Example:
I'd like to borrow this specification. Has the architect read it yet?
a) done b) for c) just d) yet

1. The drafter draws very quickly. He's …… finished his project.
a) already b) been c) for d) yet
2. What are you going to do? I don't know. I haven't decided …….. .
a) just b) long c) since d) yet

3. The contractor hasn't rung …… week.
a) for b) last c) since d) this

4. I haven't seen that agreement before. How …… have you had it?
a) already b) for c) long d) since

5. The architects have …… to the office. They won't be back until ten o'clock.
a) already b) been c) gone d) just

6. I haven't seen the builders …… last Christmas.
a) already b) before c) for d) since

7. This project must be new. I've …… seen it before.
a) ever b) never c) since d) yet

- **Choose the correct verb form or preposition in the following text:**

The architects **have been/was being** very thorough. They **are discussing/have discussed** many options and **have prepared/are preparing** detailed contract documents. Last Thursday, the successful tendering company **have awarded/was awarded** the contract, and the project parties **were signing/signed** the documents. Work on site **has not yet commenced/is commenced not yet**. However, the pre-start meeting, which will bring the planning team and the contractor together, **was scheduled/has been scheduled** for next Friday. So far the client **is being very involved/has been very involved**. Especially last month, he **made/is making** lots of important decisions. He will now have to stand back and watch the work taking place on site.

- **Add a sentence with the past perfect using the notes:**

1. We rushed to the meeting, but we were too late.
…….. (the clients / just / go)

2. I didn't have the specification, but that didn't matter.
…….. (the owner / sign/ the contract)

3. When I got to the construction site, they wouldn't let me in.
…….. (forget / my helmet)

4. I was really pleased to see this expert again yesterday.
…….. (not see / him/ for ages)

5. Luckily the flat didn't look too bad when the buyers called in.
…….. (just / clean / it)

6. The boss invited me to lunch yesterday, but I had to refuse the invitation.
…….. (already / eat / my sandwiches)

- **Put the verbs in the present perfect (have done) or past perfect (had done):**

1. The construction site looked awful. People … (leave) litter everywhere.
2. You can have that contract. I … (finish) with it.
3. There's no more building material. We … (use) it all, I'm afraid.

4. There was no sign of a lorry, although I ... (order) one half an hour before.
5. This price isn't right. The contractors … (make) a mistake.
6. I spoke to the designer at lunch-time. Someone … (tell) him the news earlier.
7. The laborer was really tired last night. He … (have) a hard day.
8. Don't you want to see this architectural project? It … (start).
9. At last the designers were ready to announce their decision. They … (make) up their minds.
10. The construction firm had no crane at that time. It (sell) its old one.

- **Read the situations and write sentences from the words in brackets:**

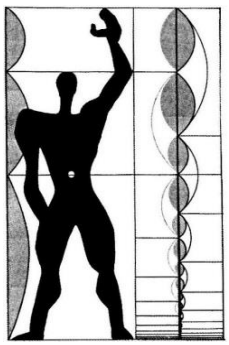
1. You went to the architect's house but he wasn't there. (he / go / out).
2. You went back to your home town after many years. It wasn't the same as before.
(it / change / a lot) ……..
3. I invited the owner to the business lunch but he couldn't come.
(He / arrange / to do something else) ……..
4. A contractor went to the meeting last evening. He arrived at the office late.
(the meeting / already / begin) ……..
5. I was very pleased to see this famous designer again after such a long time.
(I / not / see / him for five years) …….

- **Paul wants to be an architect. He's reading about a famous architect:**

«*He was a great architect, who had a wonderful career. He won lots of prizes before he was twenty. By the age of twenty-five he had had his own exhibition. He was the subject of a TV documentary by the time he was thirty. By the age of thirty-five he had become world-famous. He made millions of pounds from his pictures before he was forty».*

Paul is daydreaming about his own future career. What does he think?

I hope I'll have won lots of prizes before I'm twenty.



1. Perhaps …… my own exhibition by the age of twenty five.
2. I wonder if …… by the time I'm thirty.
3. Maybe ……..……. by the age of thirty-five.
4. I hope ……. by the age of forty.
5. …….. .
6. ……..…… .

- **How good is your maths? Can you work out the answers?**

1. It's seven o'clock in the evening, and a young architect is starting to make a project. He makes one page every fifteen minutes. He plans to finish the project at midnight. How many pages will he have made? He will have made …… pages.

2. It's Monday morning, and Sarah is travelling to work. It's twenty miles from her home to the office. How far will she have traveled to and from work by the time she gets home on Friday?

- **Use the verbs in the brackets in the correct Voice (Perfect Active or Passive):**

1. He … (to be interested) in architecture since his childhood.
2. They … (to determine) the main points of the agreement.
3. She … (to be offered) a very interesting job at the architectural firm.
4. All the necessary information about this project … (to be stored) in the computer.
5. After careful consideration your report … (to be published) in the architectural magazine.
6. The problem of the restoration of historical buildings … (to be studied) by the architects throughout the world.

- **Put the verbs in bold in Present, Past and Future Prefect changing the adverbial modifiers of time (обстоятельство времени) if necessary:**

Example: The team of architects has not produced detailed architectural solutions. a) They had not produced detailed architectural solutions by the previous month. b) They will not have produced detailed architectural solutions by the next week.

1. The time **has ruined** many architectural masterpieces.
2. **Had** his style **followed** the rational trend *till the 1980s*?
3. The town planning commission **has carried** out extensive research programs, hasn't it?
4. I **shan't have completed** these models *by tomorrow*.
5. The experimental design groups **had adopted** the new ideas *by the late 1990s*.
6. Many specialists **will have restored** these notable facades *by the next year*.

- **Translate the sentences into Russian:**

1. The architect has been the client's agent.
2. The quantity surveyor has prepared the contract documents.
3. By the time a laborer get home, he will forget everything I have told him.
4. The excavator will already have left by the time we come to the construction site.
5. By this time next week I'll have finished my agreement.
6. I'll have left the office by 3 o'clock tomorrow.
7. I'm not sure if he will have the drawing by the 1st of October.
8. The plan-making has become an everyday activity.
9. A series of apartment buildings for the towns have been developed by the Research and Design Institute of Model and Experimental Designing of residential and social buildings.
10. From the beginning of architecture many skill, systems, and theories have been evolved for the construction of the buildings that have housed nations and generations of men in all their essential activities.

1.2. READING

- **Read and translate the text and express the main ideas:**

TEXT A

PRINCIPLES OF ARCHITECTURE

(abridged from «Building systems» by Jonathan T. Ricketts)

«Architecture in general is frozen music»
(F. von Schelling)

A building is an assemblage that is firmly attached to the ground and that provides total or nearly total shelter for machines, processing equipment, performance of human activities, storage of human possessions, or any combination of these.

Building design is the process of providing all information necessary for construction of a building that will meet its owner's requirements and also satisfy public health, welfare, and safety requirements. **Architecture is the art and science of building design**.

Building construction is the process of assembling materials to form a building.

Building design may be legally executed only by persons deemed competent to do so by the state in which the building is to be constructed. Competency is determined on the basis of education, experience, and ability to pass a written test of design skills.

Architects are persons legally permitted to practice architecture. Engineers are experts in specific scientific disciplines and are legally permitted to design parts of buildings; in some cases, complete buildings. In some states, persons licensed as building designers are permitted to design certain types of buildings. Building construction is generally performed by laborers

and craftspeople engaged for the purpose by an individual or organization, called a contractor. The contractor signs an agreement, or contract, with the building owner under which the contractor agrees to construct a specific building on a specified site and the owner agrees to pay for the materials and services provided.

In the design of a building, architects should be guided by the following principles:

1. The building should be constructed to serve purposes specified by the client.

2. The design should be constructible by known techniques and with available labor and equipment, within an acceptable time.

3. The building should be capable of withstanding the elements[1] and normal usage for a period of time specified by the client.

4. Both inside and outside, the building should be visually pleasing.

5. No part of the building should pose a hazard to the safety or health of its occupants under normal usage, and the building should provide for safe evacuation or refuge in emergencies.

6. The building should provide the degree of shelter from the elements and of control of the interior environment—air, temperature, humidity, light, and acoustics—specified by the client and not less than the minimums required for safety and health of the occupants.

7. The building should be constructed to minimize adverse impact on the environment.

8. Operation of the building should consume a minimum of energy while permitting the structure to serve its purposes.

9. The sum of costs of construction, operation, maintenance, repair, and anticipated future alterations should be kept within the limit specified by the client.

The ultimate objective of design is to provide all the information necessary for the construction of a building. This objective is achieved by the production of drawings, or plans, showing what is to be constructed, specifications stating what materials and equipment are to be incorporated in the building, and a construction contract between the client and a contractor. Designers also should observe construction of the building while it is in process. This should be done not only to assist the client in ensuring that the building is being constructed in accordance with[2] plans and specifications but also to obtain information that will be useful in design of future buildings.

Notes to the text:

[1] **element** – *здесь:* стихия.

[2] **in accordance with** – в соответствии с … .

VOCABULARY

adverse – вредный
agreement – соглашение, договор
alteration – реконструкция
assemblage – сборка, монтаж
to attach – прикреплять
available – имеющийся в наличии
to complete – завершать
constructible – технологичный
contractor – подрядчик
cost – стоимость
craftspeople – мастера
degree – степень

design – проект, проектирование
drawing – чертеж
emergency – непредвиденный случай
to engage – нанимать
to ensure – гарантировать
environment – окружающая среда
to execute – осуществлять
hazard – опасность, риск
humidity – влажность
impact – воздействие
labor – труд, работа
laborer – рабочий
maintenance – осуществление техобслуживания
operation – эксплуатация
owner – собственник
to perform – выполнять
to provide – обеспечить
refuge – убежище
repair – ремонт
to sign – подписывать
shelter – укрытие
specification – положения технических условий
to state – утверждать
ultimate – основной
welfare – благосостояние
to withstand – противостоять

1.3. EXERCISES

- **Insert English words instead of Russian ones:**

1. Building construction is generally performed by (рабочие) and (мастера).
2. (Собственник) agrees to pay for the materials and services provided.
3. The building should provide for safe evacuation or refuge in (непредвиденные случаи).
4. The house should be constructed to minimize (вредный) impact on the environment.
5. (Положения технических условий) state what materials and equipment are to be incorporated in the building.
6. The design should be (технологичный) by known techniques and with (имеющийся в наличии) labor and equipment, within an acceptable time.
7. (Подрядчик) agrees to construct a specific building.

- **Replace the words in bold (A) by their contextual synonyms (B):**

(A)

1. A building is an assemblage that provides total **shelter** for machines, processing equipment, performance of human activities or any combination of these.
2. The **ultimate** objective of design is to provide all the information necessary for the construction of a building.
3. The contractor signs a **contract**.
4. The sum of costs of construction and anticipated future **alternations** should be kept within the limit specified by the client.
5. Building design may be legally **executed** only by persons deemed competent to do so by the state in which the building is to be constructed

(B) ***changes, agreement, main, performed, refuge.***

- **Using the vocabulary:**

- give English equivalents to the following:

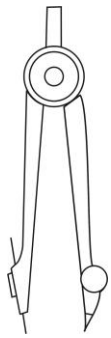
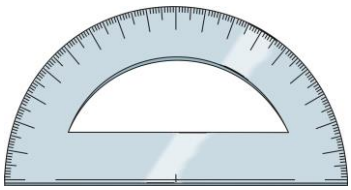
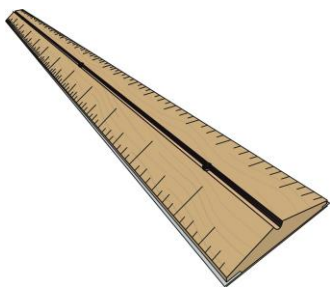
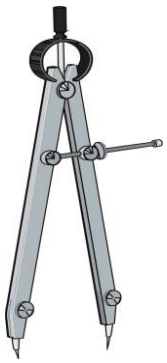
приемлемое время, вредное воздействие, опытный рабочий, собственник здания, технологичный процесс, нанимать ремесленников, основной вопрос, важный договор, изменения в строительстве, выполнять работу, благосостояние граждан, тяжелый труд.

- **give Russian equivalents to the following:**

future alterations, refuge in emergencies, to be attached to the ground, total shelter, owner's requirements, to provide information, assemblage of materials, to withstand the elements, control of humidity, impact on the environment, production of specifications, to sign an agreement.

- **Match the following words with their pictures:**

Picture №	Name of the instrument	Picture №	Name of the instrument	Picture №	Name of the instrument

					
1	Cutter	**2**	Pencil	**3**	Compasses
					
4	Calipers	**5**	Protractor	**6**	Ruler

- **Comprehension.**
  Are the following statements concerning the Text A true or false?

		True	False
1.	A building is an assemblage that is firmly attached to the soil.		
2.	Architects are persons illegally permitted to practice architecture.		
3.	Competency is determined on the basis of education, experience, and ability to pass a written test of design skills.		
4.	The sum of costs of construction should be kept within the limit specified by the contractor.		
5.	The building should be visually pleasing only inside.		
6.	Architecture is the art and science of building design.		
7.	Designers should observe construction of the building while it is in process.		
8.	Operation of the building should consume a maximum of energy while permitting the structure to serve its purposes.		

- **Match the questions on the left with the appropriate short answers on the right:**

1. Is building construction the process of assembling materials to form a building?
2. Are engineers legally permitted to design parts of buildings?
3. Does the contractor sign a contract with the building owner?
4. Is the building constructed to increase adverse impact on the environment?
5. Does the building provide the degree of shelter from the elements?
6. Should the design be constructible by known techniques?
7. Does the owner disagree to pay for the materials and services provided?
8. Should building be constructed to serve purposes specified by the contractor?

a. Yes, he does.
b. No, he doesn't.
c. Yes, it is.
d. Yes, they are.
e. No, it isn't.
f. No, it shouldn't.
g. Yes, it does.
h. Yes, it should.

- **Find in the text the sentences containing:**

1. … deemed competent … .
2. … on the basis of education … .
3. … certain types of buildings … .
4. … on a specified site … .
5. … within the limit … .
6. … normal usage … .
7. … to be incorporated in the building … .

- **Develop the following ideas. Make use of the words from Text A.**

1. Architecture is the art and science of building design.
2. In the design of a building, architects should be guided by certain principles.
3. The objective of design is achieved by the production of drawings, or plans, specifications and a construction contract.

1.4. READING

- **Read the Text B and find the sentences containing the new information for you:**

TEXT B

PROFESSIONAL AND BUSINESS REQUIREMENTS OF ARCHITECTS AND ENGINEERS

(abridged from «The building team managing the building process» by Alan D. Hinklin)

Management of the building process is best performed by the individuals educated and trained in the profession, that is, architects and engineers. While the laws of various states and foreign countries differ, they are consistent relative to the registration requirements for practicing architecture. No individual may legally indicate to the public that he or she is entitled to practice as an architect without a professional certificate of registration as an architect registered in the locale in which the project is to be constructed. This individual is the **registered architect.**

In addition to the requirements for individual practice of architecture, most states and countries require a certificate of registration for a single practitioner and a certificate of authorization[1] for an entity such as a corporation or partnership to conduct business in that locale.

An architect is a person who is qualified by education, training, experience, and examination and who is registered under the laws of the locale to practice architecture there. The practice of architecture within the meaning and intent of the law includes:

Offering or furnishing of professional services such as environmental analysis, feasibility studies, programming, planning, and aesthetic and structural design;

Preparation of construction documents, consisting of drawings and specifications, and other documents required in the construction process;

Administration of construction contracts and project representation in connection with the construction of building projects or addition to, alteration of, or restoration of buildings or parts of building.

All documents intended for use in construction are required to be prepared and administered in accordance with the standards of reasonable skill and diligence of the profession. Care must be taken to reflect the requirements of country and state statutes and county and municipal building ordinances. Inasmuch as architects are licensed for the protection of the public health, safety, and welfare, documents prepared by architects must be of such quality and scope and be so administered as to conform to professional standards. Nothing contained in the law is intended to prevent drafters, students, project representatives, and other employees of those lawfully practicing as registered architects from acting under the instruction[2], control, or supervision[3] of their employers, or to prevent employment of project representatives from acting under the immediate personal supervision of the registered architect who prepared the construction documents.

Notes to the text:

[1]**certificate of authorization –** лицензия.

[2]**under the instruction** – по поручению.

[3]**under supervision –** под руководством.

VOCABULARY

to administer – управлять
to conduct – вести, руководить
to conform – соответствовать
diligence – тщательность, усердие
drafter – автор проекта, чертежник
employee – работник
employer – работодатель
employment – работа
to entitle – давать право
locale – местность
offering – предложение
ordinance – постановление
partnership – сотрудничество
to prevent – предупреждать, предохранять
project – проект
entity – объект, организация
feasibility – рентабельность
furnishing – предоставление
inasmuch – так как
to indicate – указывать, свидетельствовать
intent – намерение, цель
law – закон
lawfully – законно
licensed – дипломированный
to reflect – отражать
registration – регистрация, учет
representative – представитель
scope – масштаб, компетенция
statute – законодательный акт
supervision – контроль, инспектирование

1.5. EXERCISES

- **Choose words above to put into the sentences below:**

1. Most states and countries require certificate of authorization for an entity such as a corporation or … to conduct business in that … .

2. All documents intended for use in construction are required to be prepared and administered in accordance with … of the profession.
3. Care must be taken to reflect the requirements of country and state … .
4. Documents prepared by architects must be of such quality and … and be so administered as to conform to professional standards.
5. An architect is a person who is registered under the laws of … to practice architecture there.
6. The practice of architecture includes offering or furnishing of professional services such as environmental analysis and … studies.

- **Arrange the following words in pairs of synonyms:**

employee, supervision, entity, drafter, legally, worker, labor, partnership, designer, intent, employment, to conduct, organization, objective, cooperation, lawfully, control, to administer.

- **Give the opposites:**

adverse -	to complete -	hazard
necessary -	capable -	to minimize -
safe -	to agree -	light -
legally -	pleasing -	restoration -
competent -	inside -	reasonable -

- **Match the following words with their definitions:**

drafter	a person or institution that hires workers
employee	a person who prepares technical drawings and plans
employer	a collaborative enterprise, involving research or design
employment	an association of two or more persons engaged in a business enterprise in which the profits and losses are shared proportionally
project	an individual who works part-time or full-time under a contract of employment
partnership	an occupation by which a person earns a living

1.6. EXPANDING YOUR VOCABULARY

Here are some steps to help you achieve a wider vocabulary, and become a more effective learner.

1. *Adding new meanings to familiar words.*

- **What are the different meanings of the word «*project*»? Consult the dictionary and give your phrase examples.**

2. Vocabulary building.

- **Complete these sentences with the correct form of the word in capital letters.**

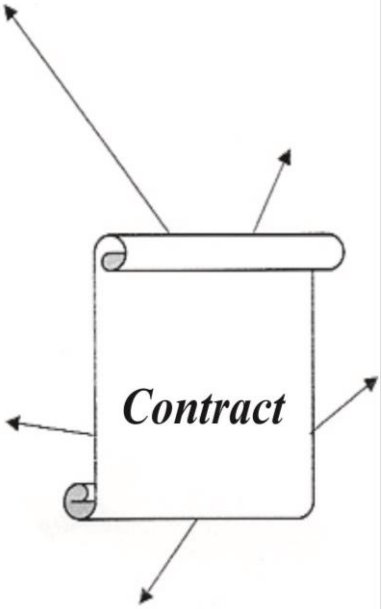
1. _____ of the building process is best performed by the architects and engineers **(manage)**.
2. Care must be taken to reflect _____ of country and state statutes **(require)**.
3. The design should be _____ by known techniques **(construct)**.
4. Engineers are experts in specific _____ disciplines **(science)**.
5. Building design is the process of _____ all information necessary for construction **(provide)**.

3. Expanding your knowledge of collocation. In English, we choose to combine certain words in order to express particular meanings.

- **Read and remember the following useful collocations with the word «contract»:**

Verb + noun collocations:

- to draw up a contract *составить договор*
- to sign a contract *подписать контракт*
- to prepare a contract *подготовить контракт*
- to award a contract *заключить договор*
- to terminate a contract *разорвать контракт*



Adjective + noun collocation:

- contractual relationship *договорные отношения*
- contractual liability *договорная ответственность*
- contractual obligation *договорное обязательство*
- legal/illegal contract *правовой/не законный договор*

Noun + noun collocations:

- building contract *договор строительного подряда*
- standard contract *типовой договор*
- employment contract *договор найма*

Noun + noun collocations:

- contract terms and conditions *условия договора*
- contract clauses *положения договора*
- contract contents *содержание договора*
- contract party/ies *стороны договора*

Useful expressions:

- to be bound by contract *– быть связанным договором*
- to fail to comply with contract terms *– при несоблюдении условий контракта*
- to be liable under contract to *– нести ответственность по контракту*

- **Put the sentences of this telephone conversation between the architect and the client into the correct order:**

- That sounds good. So how about our meeting then? How does Thursday late afternoon suit you?
- Yes that suits me fine. I'll be round at 5.
- I'm just phoning to let you know that I've spoken to Joe White and he'd be interested to do the structural planning for your house.
- George Brown.
- Oh, that's good news. Should I arrange a meeting with him?
- Goodbye.

- Yes, definitely, but there's no rush at the moment. I'd like you to take a look at some sketches first and confirm the brief. And once I have got some preliminary drawings prepared, we could all sit down together.
- Excellent, I look forward to seeing you. Goodbye George.
- Hello, George. It's Tim.
- Thursday would be fine. Shall we say 5 o'clock? Would you like to come round to the office?
- Hello, Tim. Nice to hear from you. What can I do for you?

1.7. RENDERING

- **Render the Text C paying attention to the key words in bold.**

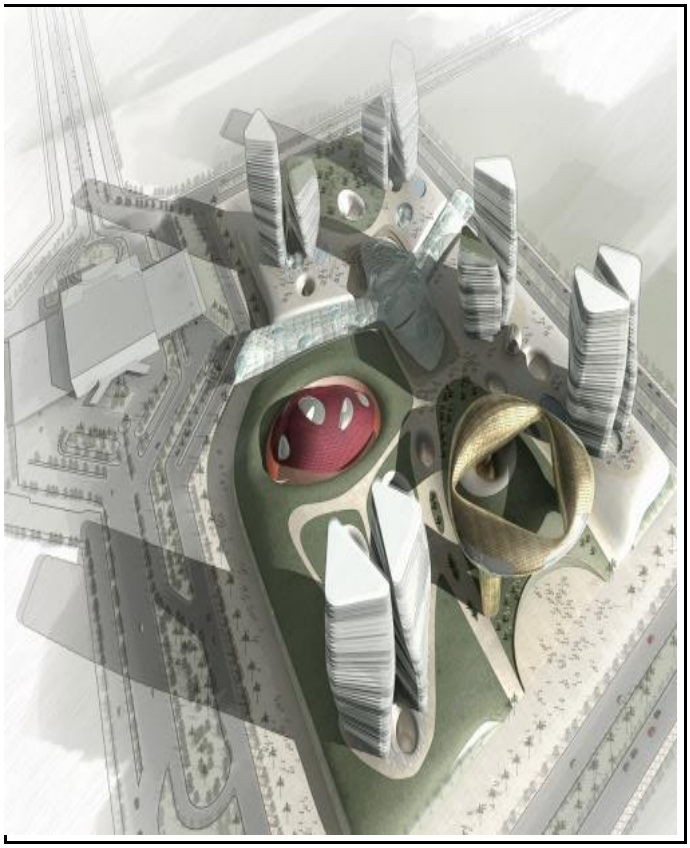
TEXT C

WHAT IS ARCHITECTURE?

«Arch» – a form of construction and «tecture» – the surface of the structure.

Architecture is defined as designing the structures with respect to their interiors, exteriors and also the surroundings of the structure. It is considered as a form of art and science. People who have the **creative ability** of imagination and then transforming it into concepts go for Architecture. If along with creative genius, a person is coupled with the technical aspects of construction, any kind of design made by such an architect could be very well and easily be executed since the architect himself would understand **the technicalities** involved in **the execution of a specific design**. Architects give a certain feel to the space depending on what structure it is.

Their understanding of architectural factors such as mass, texture, use of colors, use of appropriate materials, play of light and shadow in the interiors to create illusion etc.
Three major goals are to be accomplished in architecture: functional aspect; sustainability of constructions; aesthetic aspect.



That is, along with structure being functional, the structure also has to be aesthetically appealing which would make the people want to appreciate the structure. It is very crucial for architecture students, architects and all the designers to understand and feel the essence of real Architecture. architecture is not just designing buildings, it is an art of integrating the design of buildings with its surroundings which would include its environment and **the Urban fabric.**

The structure must stand out with its radiating beauty as well as give **a feel of belongingness** to that place. It means that it should merge with the surroundings.

Architects design spaces in which we live, hence it is important for an architect to study and understand the psychology of the people. It is to be remembered that psychology, culture, traditions, surroundings, influence of the people around **has an impact on** our lifestyles. Architecture has the power to change and influence the lifestyles of the people. Architecture has been used to denote power since ancient times in different ways. Sometimes, with the help of huge massing of structures and sometimes with ornamentation like in Baroque period.

«FACTS IN BRIEF»

INTERVIEW

The offer of an interview is the first hurdle every job-seeker strives to overcome. The interview is then concerned with matching the applicant's skills and experience with the employer's demands. It may not seem so for graduates, but interviews are two-way affairs and not only the interviewer must decide whether the applicant is suitable, but the interviewee must decide whether he/she wants the post.

Both parties should be well-prepared and, even if it is not specifically requested, the job-seeking professional or student should take along some excerpts from recent projects, e.g. plans or photos, to demonstrate acquired skills and experience.

- **Interview questions**
  Every interview contains awkward questions. The ability to deal with them depends on experience and competence. Decide which of the answers are more appropriate for these typical questions:

1. Why are you leaving your present post?
a. I would like to move on and see this post as an opportunity to meet new challenges.
b. I was made redundant.

2. Who is your favorite architect?
a. I haven't really thought about that question before.
b. I'm a great admirer of Frank Lloyd Wright, who created functional architecture conform to the setting.

3. What has been your greatest disappointment?
a. I failed to solve the escape route situation in Building X.
b. The award-winning design was not realized due to financial difficulties.

4. Where do you see yourself in 10-years' time?
a. I'd like to take early retirement. So I might be on a beach somewhere.
b. If the opportunities allow it, I'd like to concentrate on creating master plans and supervise a small group of planners.

5. Do you think you are too young for this post?
a. I may be young, but I'm motivated and willing to learn.
b. Has age got anything to do with experience?

6. How would you motivate others?
a. I'd bribe them and take them out for drinks.
b. I'd look for special talents and skills and praise them for these capabilities.

7. What salary are you looking for?
a. I'm looking for something between 22,000 and 25,000.
b. I'll take what is going.

8. Are you prepared to put in extra hours?
a. I like to be at home in time to watch the 6 o'clock news.
b. If deadlines have to be met I will do my utmost to ensure that work is finished on time.

1.8. SPEAKING

- **Work in pairs to role-play a telephone call between an architect and a member of the project team.**

***Student A*:** You are a member of a project team. You've lost your copy of the to-do list that the architect gave you. The architect will go through the list and ask if you've completed the tasks. Answer 'no' to each task and give a different excuse each time.

Example:
No, I'm sorry, I haven't.
I've been too busy today.

Student B: You are the architect. You gave your team member a to-do list. Phone him/her to check that the tasks have been completed. Note down the responses. Start like this:

Have you written a letter to the clients yet to explain the delays in the project?
To *do list*

- write letter to client (explaining the delays)
- organize delivery of new window frames to site
- print out project documentation
- order new software
- look at the new equipment
- update the chart

- **Work in pairs. Imagine you should hire an architect for your remodel. The person you select should be the brains behind your project, an invaluable problem solver, a good listener, and the one keeping your budget on track. Make up essential questions to ask candidates and the answers they should give.**

Example:

Here are some questions to use as a starting point to get the candidate that's right for you and your house.

- What are the biggest challenges and attractions of this job?
- Do you have a signature style?
- Who will design my project?
- What project management services do you provide?
- How do you charge?
- Can you provide three-dimensional drawings?
- Will you recommend two or three general contractors?

- **Make up a speech on the following topic: «A day in an architect life». Use the key points:**

- meet with clients;	- produce drawings;
- win contracts;	- present at public hearings;
- solve problems;	- draw up specifications;
- estimate costs;	- meet with consultants;
- visit construction sites;	- call tenders (bids).

- **Read the quotations of famous architect Vitruvius. Do you agree with them?**

1. *«The meaning of architecture lies in three qualities:*
1) functionality of the space;
2) firmness of the structure;
3) aesthetics of the building».

2. *«The ideal architect should be a man of letters, a skillful draftsman, a mathematician, familiar with historical studies, a diligent student of philosophy, acquainted with music, not ignorant of medicine, learned in the responses of Juris consults, familiar with astronomy and astronomical calculations».*

(Vitruvius)

- **Read the dialogue paying attention to the different types of contract. Make up your own based on it using the following situation.**

Situation: Imagine that you as a client should award a contract with an architect. You choose any type of the contract you like the best. You discuss contract terms and conditions and contract obligations.

A: What about types of contracts?
B: There are many different types of contracts.

A: What do you mean?
B: Well, let us take the simplest contract - a **lump sum contract**[1]. In this contract the client agrees to pay a fixed amount of money for the finished product.

A: I see. So the client knows exactly how much the project will cost?
B: Yes, exactly. But if there are any problems, the contractor has to pay the extra costs. The contractor is taking the risk.

A: I see. So it's good for the client?
B: Not always. A contractor might use cheap materials to lower the costs.

A: Ah, OK. What other types are there?
B: Another type is a **cost plus contract**[2]. This means that the client pays all the costs of the project, plus extra payment so that the contractor makes a profit.

A: I see. And how is the extra payment calculated?
B: There are different ways. For example, in a cost plus fixed fee contract the client covers all the costs, including any cost overruns, but the contractor only gets a fixed fee, so there is an incentive to finish the job quickly.

A: OK.
B: You could also have a cost plus fixed fee plus a bonus for work that is finished ahead of time. Or a bonus for any savings that the contractor makes. And so on.

A: Yes, yes, of course.
B: And then there are **turnkey projects**[3].

A: Turnkey?
B: Turnkey means that one person, or company, is responsible for all the work.
Normally a client has to work with a designer such as an architect and a contractor,
who is responsible for the building. In a turnkey solution, the client only has to speak to one person who is responsible for the whole project and at the end gives the key to the client.
Nice and simple.

Notes:

[1]**lump sum contract –** контракт с фиксированной ценой.
[2]**cost plus contract** – подряд с оплатой фактических расходов плюс прибыль.
[3]**turnkey project** – объект строительства под ключ.

- **Discuss the following creative questions about architecture and make your own definition of «architecture».**

1. What is architecture: art or profession? Why?
2. What differs architecture from painting and sculpture?
3. What is more important: functionality and durability or beauty?
4. What does an architect think when he designs a building: about beauty, glory or functionality, durability and comfort. Why?
5. What criteria do you use to judge the success of architecture (in other words, what makes a building «good»)?
6. What distinguishes a «building» from «architecture»?
7. What things do you take into account when building/designing architecture?
8. Why must architecture belong to more than just the architect?

1.9. TRANSLATING

- **Translate the text into English.**

ПРОФЕССИЯ – АРХИТЕКТОР

Профессия архитектора очень древняя. В русском языке слово, обозначающее этот вид деятельности, появилось еще в XV веке.

Востребованность профессии архитектора всегда была очень высокой. В современном обществе нужны люди, которые разрабатывают проекты, в состав этой работы входит и генерирование образов, и формирование объемных форм зданий, и расчет конструкций.

Работа архитектора заключается в том, что он создает архитектурные объекты разного типа, в зависимости от их назначения: жилые и общественные здания, промышленные объекты и сельскохозяйственные комплексы.

Выполняя проектную документацию для строительства, специалист должен учесть все нагрузки и воздействия на конструктивные элементы зданий, расход материалов, спроектировать схемы подключения всех коммуникаций, этапы организации строительных работ.

Профессию архитектора без преувеличения можно назвать творческой. Для осуществления всех поставленных задач ему надо иметь не только математические и конструкторские способности, пространственное мышление и умение мыслить логически.

Профессия архитектора относится к профессиям с высоким уровнем ответственности, поэтому и требования к ней соответствующие. Архитектору необходимо иметь навыки в графике, композиции и рисунке, но помимо этих знаний он должен быть сведущим в таких областях, как геодезия, экология, картография и т.д. В этом виде деятельности требуются еще и такие качества, как прекрасная зрительная память, наблюдательность, художественные способности, а также чувство пропорции и гармонии. Для качественного выполнения своей работы архитектору надо иметь высокий уровень интеллектуальных способностей.

Желающим получить профессию архитектора необходимо окончить соответствующий факультет в архитектурно-строительном университете или архитектурную академию. Без высшего профильного образования специалистом в области архитектурного проектирования не стать.

UNIT 2

CLASSIFICATION OF BUILDINGS AND STRUCTURES

2.1. GRAMMAR REVIEW

- **Complex prepositions (составные предлоги)**

Complex prepositions	**Examples**	**Translation**
1. **according to** *согласно чему-либо;*	Types of buildings may be classified **according to** the role in the community.	Типы зданий могут быть классифицированы *согласно* их роли в обществе.
2. **as far as** *до;*	I went with the young architect **as far as** the new factory.	Я дошла с молодым архитектором *до* фабрики.
3. **because of** *из-за; благодаря; вследствие;*	Any structure is built **because of** some definite human need.	Любое здание строится *вследствие* определенной потребности человека.
4. **by means of** *посредством; с помощью;*	We can easily lift the loads **by means of** cranes**.**	Мы можем легко поднимать грузы *с помощью* кранов.
5. **due to** *из-за; благодаря; вследствие;*	The buildings change **due to** cultural differences and also **due to** the local resources available to create them.	Здания изменяются *вследствие* культурных различий, а также *вследствие* местных ресурсов, имеющихся в наличии при их создании.
6. **in addition to** *в дополнение к; кроме;*	**In addition to** the creative imagination the architect must have a sufficient knowledge of engineering.	*Кроме* творческого воображения архитектор должен иметь достаточное знание инженерного дела.
7. **in front of** *перед; впереди; напротив;*	The museum is just **in front of** my house.	Музей находится как раз *перед* моим домом.
8. **in order to** *чтобы; для того чтобы;*	**In order to** improve living conditions the architects perfect standard types of buildings.	*Для того чтобы* улучшить жилые условия, архитекторы совершенствуют стандартные типы зданий.

9. **in spite of** *несмотря на;*	The bridge was erected **in spite of all** the difficulties.	Мост был возведен *несмотря на* все трудности.
10. **instead of** *вместо;*	The new hospital will be built **instead of** old one.	Новая больница была построена *вместо* старой.
11. **on account of** *вследствие; из-за; по причине;*	He couldn't make a drawing **on account of** poor light.	Он не мог сделать чертеж *из-за* плохого освещения.
12. **owing to** *благодаря; из-за; вследствие;*	**Owing to** the new equipment the construction has been completed in time.	*Благодаря* новому оборудованию, строительство было закончено вовремя.
13. **thanks to** *благодаря; из-за; вследствие*	**Thanks to** the help of contractor we finished the construction in time	*Благодаря* помощи подрядчика мы закончили строительство в срок

- **Translate the sentences paying attentions to the complex prepositions.**

1. The architect responded to the elaborate building program *in addition to* garage and outdoor installations with a solution based on independent structures.
2. Houses vary *according to* their location.
3. *In order to* appreciate the creative universe of Frank O. Gehry it is necessary to understand a number of factors which affect his designs for houses in a very specific way.
4. *Due to* the architect or engineer's position and the importance of a good relationship between client and contractor, the behavior of the planner should be impeccable.
5. Preventing excess solar gain *by means of* solar shading devices in the summer months is important.
6. Is there the new medical center in front of your house?
7. *Thanks to* his projects not only the problem was solved but a wholly new approach in architecture evolved.
8. *Because of* the regular repair, old, outdated, obsolete or even nonfunctional street furniture can be rare sights.
9. The team specialists went *as far as* the construction site without problems.
10. Who can repair this old building *instead of* him?
11. The contractor will complete his work *in spite of* bad weather.
12. The brickwork was delayed *on account of* heavy rain.
13. The building of homes in Britain has improved immensely since 1900, *owing to* important inventions.

- **Put in the correct complex preposition from the table above.**

1. School buildings can be divided into various categories … their layout and access systems.
2. I go by bus … State Library and then walk a few blocks to my office.

3. … to create common international contract terms for engineering work, the International Federation of Consulting Engineers was founded in 1913.
4. Industrial buildings may be divided into two classes … the size of machinery and movement of persons.
5. … the extra window in the dining room, the client also requested a second washbasin in the family bathroom.
6. The operation on the site are behind schedule … the delayed arrival of supplies.
7. … understand clearly what architecture constitutes, let us consider briefly its development.
8. Architecture is the art and science of designing and building structures ... aesthetic and functional criteria.
9. The modernity of the 19th century is … to the adoption of the typological approach just as much as to the use of new materials.

- **Complex conjunctions (составные союзы).**

Complex conjunctions	**Examples**	**Translation**
1. **as ….. as** *так(же)… как(и);* *такой(же)… как(и);*	The modern buildings are as beautiful as useful.	Современные здания *такие же* красивые, *как и* полезные.
2. **as long as** *(до тех пор) пока;* *при условии (что);*	I shall stay in your office **as long as** you need me.	Я останусь в вашем офисе, *пока* я вам нужен.
3. **as soon as** *как только;*	I'll telephone the contractor **as soon as** I return home.	Я позвоню подрядчику, *как только* вернусь домой.
4. **as well as** *так же как (и);* *и ... и;*	The orientation and design of a building, **as well as** careful choice of materials help to reduce the amount of energy consumed for additional heating.	Ориентация и проектирование здания *так же как* тщательный выбор материалов помогает сократить количество энергии, потребляемой для дополнительного отопления.
5. **both … and** *как ... так и;* *и ... и;*	The chief task of architects is to improve the quality of their creations, **both** artistically, **and** technically.	Главная задача архитектора – улучшать качество своих творений *как* художественно, *так и* технически.
6. **either … or** *или…или;* *либо…либо;*	Many elements which look well on a drawing may be **either** completely ineffective **or** definitely harmful in the actual building.	Многие элементы, которые выглядят хорошо на чертеже, *либо* полностью неэффективны, *либо* совершенно вредны в реальном здании.

7. **in order that** *(для того) чтобы;*	The invitations were sent beforehand **in order that** the young architects might arrive in time for the conference.	Приглашения были разосланы заранее, *чтобы* молодые архитекторы прибыли на конференцию вовремя.
8. **neither … nor** *ни … ни;*	I prefer **neither** this **nor** that department store.	Мне не нравятся *ни* этот, *ни* тот универмаг.
9. **so that** *(с тем) чтобы;* *для того чтобы;*	I gave him the project **so that** he could prepare all calculations.	Я дал ему проект, *чтобы* он смог подготовить все расчеты.
10. **the … the** *чем … тем.*	**The** longer I think of your plan, **the** more I like it.	*Чем* больше я думаю о вашем плане, *тем* больше он мне нравится.

- **Translate the sentences paying attentions to the complex conjunctions.**

1. The architectural forms of buildings are various, *as well as* their dimensions, materials, out of which they are executed, locations in the city space.
2. By changing *both* the shape *and* surface, each of these buildings is infused with its own, specific architectural style.
3. *As soon as* the client has approved the additional costs, I will release an official variation order.
4. Depending on the emphasis of the course, *either* a Master of Arts, Master of Science *or* a Master of Engineering is awarded on completion.
5. British guidelines see the architect or engineer not only *as* the client's representative but *as* a mediator charged with balancing the interests of both parties.
6. These engineers know *neither* German *nor* French.
7. The architect has the task of being an artist *as well as* an inventive engineer.
8. *As soon as* an operation has been completed, the tradesperson who undertook the work requests formal acceptance *in order to* leave the site and receive payment.

- **Put in the correct conjunction from the table above.**

1. Reinforced-concrete structures and elements are widely used … for residential houses and industrial buildings.
2. The profession of architect is … old … civilized life.
3. The building must be erected … economically … possible.
4. The contract documents are prepared … the client has approved the tender report.
5. The schedule should be placed in a prominent position in the planner's office … the site office.
6. Corridors can be … lit from the ends, through the staircase … artificially lit.
7. In Russia the art of landscape design is not … developed … in other countries.
8. The mass production of building parts was greatly developed in the 19th century … in England … the USA.
9. The measure can … be a dimension (meter, square meter, cubic meter), a time (hour, day, week) … a weight.

2.2. READING

- **Read the Text A and give the headline to each paragraph.**

TEXT A

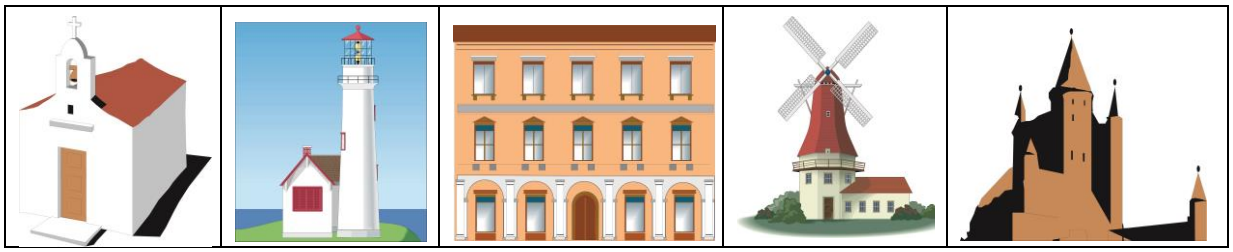
THYPOLOGICAL APPROACH IN ARCHITECTURE
(abridged from «Architecture of the 19th century and the turn of the century»
by Agnes Gyetvai-Balogn)

«I love doing it. Every building is
like a person. Single and unrepeatable».
(A. Rand)

The 19th century was a period when new functions appeared and spread in the architecture. The importance of this period is given not because of repetition of historical architectural styles, but because of the great development in the field of the functional planning.

The 19th century was a period when new functions appeared and spread in the architecture. The importance of this period is given not because of repetition of historical architectural styles, but because of the great development in the field of the functional planning.

The people who lived in an age of industrial revolution required hundreds of markets and stations, schools and town halls, hospitals and prisons, and hundreds of thousands of houses and blocks of flats. This massive renewal of the stock of buildings affected every type of structure. This change in quantitative scale inevitably had an impact on the nature and the quality of the architecture produced. In order to build quickly and on a large scale an attempt was made to perfect standard types, which could serve as examples.



a) b) c) d) e)

Some historic building types:
a – church; b – lighthouse; c – palazzo; d – windmill; e – castle

The nineteenth century is a golden age of model collections of every kind, from the cottage to the city apartment block, from the church to the prison and hospital. The period can boast masterpieces comparable in distinction to the great works of the Renaissance, but the originality of this period doubtless lies as much in the mass of average works as in the few masterpieces. The individual building is less significant than the series to which it belongs. Here we can see the effect of a major change in the system by which buildings are commissioned. It is not so much the conflict between architects and engineers. It became the practice to make

systematic comparisons between the costs of each design in terms[1] of construction, layout and style. Architecture became standardized, regulated and quantified.

The modernity of the 19th century is due to the adoption of the typological approach just as much as to the use of new materials. If one looks at any book on the history of western architecture from the beginnings to the middle of the 18th century, one will find that it is almost entirely made up of churches and castles and palaces. All this changed in the course of the 19th century; the architects were concerned with a multitude of building types in the course of his career. It should not be forgotten that to build, for example, a palace for democratic government or a palace for the instruction of the people was equally new. In fact to erect public buildings, specially designed as such, had been extremely rare before 1800. There were town halls, of course, and stock exchanges, but these were exceptions. If one tries to pick out the best examples of town architecture of all dates and all countries in the nineteenth century, the vast majority would be governmental, municipal, and later private office buildings, museums, galleries, libraries, universities and schools, theatres and concert halls, banks and stock exchanges, railway stations, department stores, hotels and hospitals. They will have to include a number of churches, palaces rarely, private houses, of course, as the traditional architectural tasks. But most of them were erected not for worship not for luxury, but for the benefit and the daily use of the people, as represented by various groups of citizens. In this a new social function of architecture appears.

At this time new schemes were worked out for special library stores with stacking apparatus. For hospitals, systems were tried for groups of separate wards and separate buildings for each kind of disease. For prisons the star-plan was invented and accepted. For banks and stock exchanges the glass-covered center hall or court proved the most serviceable solution. For museums and galleries an especially good system of lighting was essential, for office buildings the most flexible ground plan. And so every new type of building required its own treatment; and these principles were to follow changes in function and changes in planning.

The form could really be determined by the specification: the architectural simplicity of nineteenth-century French hospitals was the result of the economic policy of the hospital administration and of an aesthetic consequence. In other words the architects strove to build as inexpensively as possible, and also the utilitarian buildings must not be decorated.

Note to the text:

[1]**in terms –** с точки зрения.

VOCABULARY

apartment block – многоквартирный дом
approach – подход
benefit – польза
to boast – гордиться
comparison – сравнение
consequence – следствие, важность
cost – стоимость, цена
distinction – отличие
to erect – возводить
flexible – гибкий
government – правительство
instruction – обучение
layout – макет
luxury – роскошь
masterpiece – шедевр
multitude – множество
to quantify – определять количество
quantitative – количественный

renewal – реставрация, обновление
serviceable – практичный
to stack – нагромождать
stock – запас
stock exchange – фондовая биржа
to strive – стараться
term – срок
town hall – здание муниципалитета
treatment – подход
utilitarian – утилитарный
ward – палата
to worship – поклоняться

2.3. EXERCISES

- **Insert English words instead of Russian ones.**

1. The massive (реставрация) of the stock of buildings affected every type of structure.
2. This change in (количественный) scale inevitably had an impact on the quality of the architecture produced.
3. The modernity of the 19th century is due to the adoption of the typological (подход).
4. The architects were concerned with a (множество) of building types.
5. For hospitals, systems were tried for groups of separate (палаты).
6. The buildings were erected for (польза) and the daily use of the people
7. The period can (гордиться) masterpieces comparable in distinction to the great works of the Renaissance.
8. (Утилитарные) buildings must not be decorated.

- **Replace the words in bold (A) by their contextual synonyms (B):**

(A)

1. Every new type of building required its own **treatment**.
2. The architects **strove** to build as inexpensively as possible.
3. To build a palace for the **instruction** of the people was equally new.
4. For banks and stock exchanges the glass-covered center hall or court proved the most **serviceable** solution.
5. In order **to build** quickly an attempt was made to perfect standard types.
6. The originality of the period lies as much in the mass of average works as in the few **masterpieces.**
7. It became the practice to make systematic comparisons between the **costs** of each design in terms of construction, layout and style.

(B) ***practical, masterwork, to erect, education, prices, tried, approach***

- **Using the vocabulary.**
  Give English equivalents to the following:

высокая стоимость, множество деталей, макет дворца, количественный подход, нагромождать вещи, поклоняться богам, польза для жителей, посетить ратушу, работать

на фондовой бирже, гибкий план, практичное помещение, правительственное здание

- **Give Russian equivalents to the following:**

massive renewal, stock of buildings, democratic government, instruction of the people, for the benefit of the people, stacking apparatus, in terms of construction, separate wards, the most serviceable solution, system of lighting, an aesthetic consequence, utilitarian buildings.

- **Comprehension.**
  Are the following statements concerning the Text A true or false?

		True	False
1.	The 19th century was a period of the great development in the field of the functional planning.		
2.	The change in quality inevitably had an impact on the quantity of the architecture produced.		
3.	The nineteenth century is a silver age of model collections of every kind, from the cottage to the city apartment block.		
4.	The individual building is more significant than the series to which it belongs.		
5.	In order to build quickly an attempt was made to perfect standard types.		
6.	Most of the buildings were erected not for worship but for luxury.		
7.	For museums and galleries an especially good system of lighting was essential.		
8.	The architects strove to build as expensively as possible.		

- **Match the questions on the left with the appropriate short answers on the right:**

1. Did old functions disappear in the architecture?
2. Does the originality of this period lie in the few masterpieces?
3. Were the architects concerned with a multitude of building types?
4. Can we see the effect of a major change in the system by which buildings are commissioned?
5. Does a new social function of architecture appear?
6. Is the modernity of the 19th century due to the adoption of the typological approach?
7. Were new schemes worked out for special library stores?
8. Could the form really be determined by the specification?

a. Yes, they were.
b. Yes, it does.
c. No, they didn't.
d. Yes, it is.
e. Yes they were.
f. No, it doesn't.
g. Yes, it could.
h. Yes, we can.

- **Develop the following ideas and express your opinion:**

1. The nineteenth century is a golden age of model collections of every kind.
2. Architecture became standardized, regulated and quantified.
3. The modernity of the 19th century is due to the adoption of the typological approach just as much as to the use of new materials.

2.4. READING

- **Read the Text B and say which of the following issues are considered in it. If they are, say to which paragraphs they belong:**

- types of buildings;
- differences in building traditions;
- building houses from steel and other metals;
- wooden frame constructions;
- residential buildings;
- the role of knowledge and technological development;
- building as a place of comfort and safety;
- the use of plastics for construction;
- internal infrastructures of modern buildings;
- the basic functions of a good house;
- social needs for buildings (shelter, privacy, comfort, etc.);
- buildings of the future.

TEXT B

BUILDINGS AND THEIR TYPES

(abridged from Building Construction Handbook by R. Chudley)

«A real building is one on which
the eye can light and stay lit»
(E. Pound)

I. In architecture, construction, engineering and real estate[1] development the word «building» may refer to any human-made structure used for sheltering any use or for continuous residence.

II. 1. A building as a shelter represents a physical division of the human habitat standing more or less permanently. It is a place of comfort and safety which protects a human being and his property from direct harsh effect of weather like rain, wind, sun. The buildings all differ in the manner of their construction, use, or occupancy.

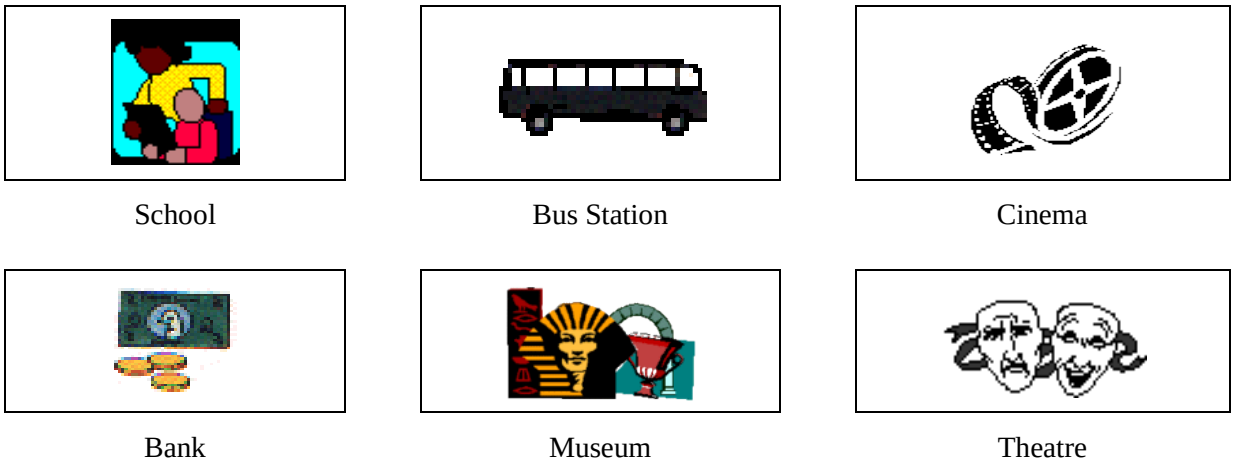
A building is a civil engineering construction which is raised on a foundation and is generally made of stone, concrete blocks, bricks and mortar or cement. Frame construction embraces all buildings with exterior walls of wooden framework sheathed with wood shingles or siding; veneered with brick, stone, or terra cotta; or covered with stucco or sheet metal. Such buildings naturally have floors and partitions of wood. Buildings serve several needs of society, primarily as shelter from weather and as general living space, to provide privacy, to store belongings and to comfortably live and work.

2. Types of buildings depend upon social functions and may be classified according to the role in the community. The types of buildings may be domestic, educational, office, industrial, recreational, etc.

Residential buildings are called houses/homes, though buildings containing large numbers of separate dwelling units are often called apartment buildings (blocks) to differentiate them from the more 'individual' house.

Building types may range from one-room wood-framed, masonry, or adobe dwellings to multi-million dollar high-rise buildings able to house thousands of people. Increasing settlement density in buildings (and closer distances between buildings) is usually a response to high ground prices resulting from many people wanting to live close to work or similar attractors.

Industrial buildings comprise another significant type of construction. This type of construction involves factories, laboratories, food processing plants, mines, office buildings, stores, garages, hangars and other storage facilities, exhibition halls, etc.



School | Bus Station | Cinema

Bank | Museum | Theatre

Some standard building types

3. Any building requires a certain amount of internal infrastructure to function, which includes such elements like heating and cooling, power and telecommunications, water and wastewater etc. Especially in commercial buildings (such as offices or factories), these can be extremely intricate systems taking up large amounts of space (sometimes located in separate areas) and require regular maintenance. The building of houses is fundamental for human development. It is very important for family and for general social development. The house is a place to live in, so it must be comfortable and healthy. So, to be a good house it must comply with a few basic functions.

• It should be a functional and healthy environment for those that live in it.

• Inside one must be protected from wind, cold, heat, rain, sand and dust.

• It should last for many years without requiring much maintenance.

4. Houses vary according to their location; they change due to cultural differences and also due to the local resources available to create them. In cold places houses must be more compact and have thick walls and small windows to resist the cold; they also have heating systems. In the forest areas the houses are made from wood, in the mountains they are made from stone, in areas with clay they are made from brick. In areas where there is seismic activity it is important to consider this when designing the structure of the house.

5. Many types of houses are difficult to build as they require a lot of knowledge and work to create them. The techniques of construction or the methods by which structures are formed from particular materials are influenced not only by the availability and character of materials but also by the total technological development of society.

VOCABULARY

adobe – глинобитный
attractor – универмаг
availability – наличие
belonging – собственность
cooling – кондиционирование
density – плотность
domestic – домашний
intricate – сложный
masonry – каменная кладка
mortar – раствор
partition – перегородка
property – собственность
real estate – недвижимость
residential – жилой
safety – безопасность
settlement – поселение
sheath – обшивать
dwelling – жилище, дом
dust – пыль
to embrace – включать в себя
exhibition – выставка
frame – каркас
habitat – место жительства
heating – отопление
shingle – плоская черепица
storage facility – склад
stucco – гипс
to raise – возводить
to refer to – ссылаться на
to require – требовать
to store – хранить
to vary – отличаться
veneer – кирпичная облицовка
wastewater – сточная вода

- **Choose words from the box to put into the sentences below:**

available; settlement density; foundation; regular maintenance; apartment buildings; human habitat; technological development; a good house; be protected; sheathed with; without requiring; seismic activity

1. A building as a shelter represents a physical division of the_____ standing permanently.
2. A building is a civil engineering construction which is raised on a _____ .
3. Frame construction embraces all buildings with exterior walls of wooden framework _____ wood shingles or siding.
4. Buildings containing large numbers of separate dwelling units are often called _____ (blocks).
5. Increasing _____ in buildings and closer distances between buildings is usually a response to high ground prices.
6. In commercial buildings there can be extremely intricate systems requiring _____ .
7. To be _____ the building must comply with a few basic functions.
8. The building should last for many years _____ much maintenance.
9. The types of houses change due to the local resources _____ to create them.

10. In areas where there is _____ it is important to consider this when designing the structure of the house.
11. The techniques of construction are influenced by the total _____ of the society.
12. Inside the house one must _____ from wind, cold, heat, rain, sand and dust.

- **Arrange the following words in pairs of synonyms:**

dwelling, cooling, real estate, due to, human being, significant, intricate, to involve, residential, habitat, domestic, important, to embrace, area, to differ, difficult, property, territory, person, to differentiate, owing to, air-conditioning.

- **Give the opposites.**

permanent –	heating –	healthy –
direct –	intricate –	serviceable –
exterior –	regular –	expensively –
natural –	important –	majority –
comfortable –	thick –	comparable –

- **Arrange the sentences in the logical sequence of the text B.**

1. The buildings all differ in the manner of their construction, use or occupancy.
2. The building protects a human being from harsh effect of weather like rain, wind, sun.
3. Increasing settlement density in buildings is usually a response to high ground prices.
4. Many types of houses are difficult to build as they require a lot of knowledge and work to create them.
5. Types of buildings depend upon social functions and may be classified according to the role in the community.
6. In areas where there is seismic activity it is important to consider this when designing the house.
7. The house is a place to live in, so it must be comfortable and healthy.
8. The word ‘building’ may refer to any human-made structure used for sheltering any use or for continuous residence.
9. Houses vary due to cultural differences and also due to the local resources available to create them.
10. Frame construction embraces all buildings with exterior walls of wooden framework.
11. Industrial buildings comprise factories, laboratories, office buildings, stores, garages, etc.

- **Add one of the prefixes dis-, un-, im-, in- to the following words and translate them:**

perfect, comparable, significant, flexible important, definite, comfortable, comfort, advantage, possible, skilled, suitable, appear, known, like, expensive.

2.5. EXPANDING YOUR VOCABULARY

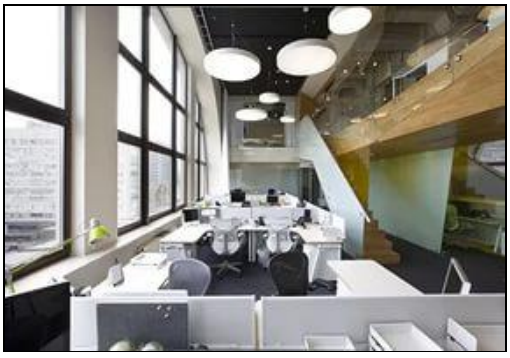
- **What are the different meanings of the word «*frame*»? Consult the dictionary and give your phrase examples.**

- **Complete these sentences with the correct form of the word in capital letters.**

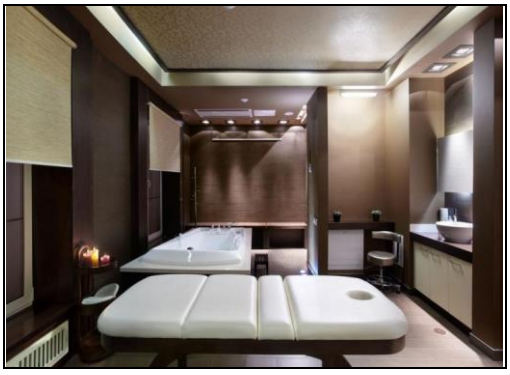
1. The buildings all differ in the manner of their construction, use, or … (occupy).
2. These systems require regular … (maintain).
3. Houses change due to cultural … (different).
4. The nineteenth century is a golden age of model … of every kind (collect).
5. Every new type of building required its own … (treat).

- **Match the kind of the public space and its features.**

Restaurants (cafes)



Office spaces



SPA-centers (salons)

– Soundproof rooms

– Bright elements

– Central lighting and small lamps (for each table)

– Symbolic division of space (glass walls and partitions)

– Proper zoning and sound insulation

– Typical stylization

– Functionality and comfort

– Smooth, easy lines

– The style is minimalism

– Relationship of style and cuisine

– Filled with light and air

– Furniture of simple shapes and calm colors

- **Match the idioms with their translations.**

Count the cost	–	Стоить баснословных денег
Cost (somebody) an arm and leg	–	Заранее подсчитывать полные расходы
Estimate the cost at	–	Взвесить все обстоятельства
Cost a pretty penny	–	Оценить стоимость
Cost something out	–	Влететь в копеечку
Civility costs nothing.	–	Во что бы то ни стало
At all costs	–	Вежливость ничего не стоит

- **Summarize the Text B. For each of the parts give the key statement and support it with the chosen additional information.**

2.6. RENDERING

- **Render the Text C paying attention to the key words in bold.**

TEXT C

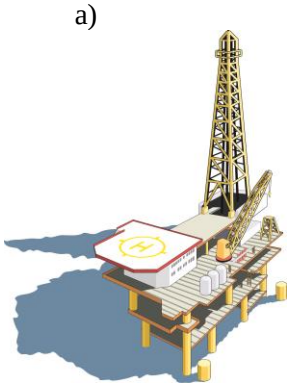
RESIDENTIAL AND INDUSTRIAL BUILDINGS

In technically developed countries the building industry, comprising skilled and unskilled workers in many trades building engineers and architects, managerial staff and designers employs a considerable proportion, of the available labour force.

a)

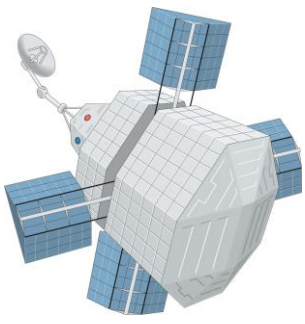
b)

c)



d)

f)



g)

Modern building types:
a, b, c – different types of dwelling houses; d, f, g – different types of industrial objects

Building industry including **residential (public) and industrial constructions** holds a considerable place in the National Economy and is being carried on a large scale. It is the largest single industry in the country. The problems of construction have grown into major, political issues in most countries. Housing is prominent, among the factors affecting the level of living. The improvement of the housing represents a concrete and visible rise in the general level of living. In many countries residential construction has constituted at least 12 percent and frequently more than 25 per cent of all capital formation.

Present-day designs for residential constructions envisage all **modern amenities** for a dwelling, they advocate larger, better built and better equipped flats and houses. There is a marked improvement in the **heating and ventilating systems** as well as in hot-water supply, kitchen and sanitary fittings. Many **tenants** now can afford better **furnishings**, refrigerators, washing machines, etc. A house which is a physical environment where a family develops is acquiring a new and modern look.

Industrial buildings comprise another significant type of construction. This type of construction involves factories, laboratories, food processing plants, mines, office buildings, stores, garages, hangars and other storage facilities, exhibitions halls, etc. Each of these functions demands its own **structural solution and techniques**. But in general they may be divided into classes according to whether the plan must give greater attention to the size and movement of machinery or of persons. The building techniques depend upon the types of buildings.

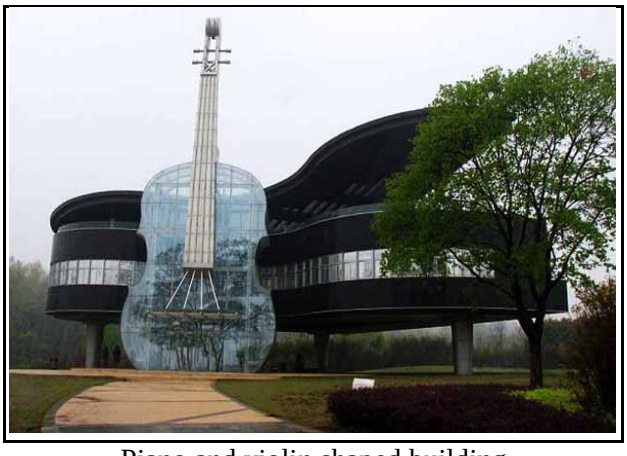
Modern industrial buildings have demonstrated the advantages of **reinforced concrete** arches, metal frames, glass walls and prefabricated standardized mass produce parts. Steel was gradually substituted for iron and permitted wider rooms and larger windows. Windows can be enlarged to the extent that they constitute a large fraction of the wall area.

«FACTS IN BRIEF»

PIANO AND VIOLIN SHAPED BUILDING

Huainan, China has the buildings architecture that display the pride of high art music. Architecture building shaped piano and violin is one of the cool architectural design of existing buildings in China. The building entrance is through a great violin in which there is an escalator that lifts people into a «grand piano».

Grand piano giants as its main building. Architecture building shaped piano and violin built in 2007, and serves as a showroom that shows the various plans and prospects for development as a newly developed area in Huainan City, China. Architecture building shaped piano and violin designed by Hefei University of Technology and has been built to a scale of 50:1. Besides having architecture that displays the pride of high musical art, the unique architecture building also has become



Piano and violin shaped building

popular tourist attractions and the most romantic building in China. Tourists can admire the king and queen of musical instruments, which stand proudly in a classic contrast of black and white, rising up and praising the city in all over the world. This landmark leads you to a dizzying musical world.

2.7. SPEAKING

- **Discussion questions.**

1. What are the main aspects to pay attention to while designing a school?
2. What do you think about the advantages and disadvantages of a large school?
3. Is it necessary to involve teachers and pupils in the design process?
4. Should architects pay attention to the pupils' age while designing the classrooms for young children and teenagers?
5. Do you think your school was a perfect type of school architecture?
6. Are there any differences between school building and university building?
7. Why do architects make different designs for town schools and village schools?
8. Is it necessary to use new building technologies while designing educational institutions?

- **Read and translate the dialogue. Make up your own based on it. The underlined words will be of help to you.**

– You have been building schools in the Netherlands since the 1960s. How do you implement your school concepts architecturally?

– I believe a school should be a kind of polls, a microcosm. In my spatial concepts, therefore, I am particularly concerned with the zones outside the classrooms. Through greater openness spatially, I ensure that corridors are not just circulation routes. In the Apollo School in Amsterdam, for example, just as many activities take place outside the classrooms as within them.

– Maria Montessori was also concerned with space in her educational theory. Is your architectural approach related to this in any way?

– No, not really. But I'm convinced that liberty can exist only within a certain framework. According to Montessori, pupils should be allowed as much latitude as possible within certain limits. I see my school architecture in that light: I provide the framework within which the pupils can develop freely.

– To what extent does the age of the children affect the architecture?

– Too much emphasis is placed on that aspect sometimes. People speak of finding the right scale for children, but they climb stairs just like adults. I am not aware that children need smaller steps. Of course, things like tables and chairs will be lower for younger children, but other aspects like natural lighting, visual links and spaces for withdrawal are more important. In traditional

school types, there are usually long corridors that serve solely as access routes. From the very outset, we wanted to develop a different type. In the Atlas College in Hoorn (2002-04), there will be study areas outside the actual classrooms - divided off by folding doors. In the De Elanden School in Amsterdam (1996-2002), we used sliding doors for this purpose.

– *Do you involve teachers and pupils in the design process?*

– I always attempt to develop a school design in collaboration with the teachers and pupils. This helps to achieve a stronger sense of identity with the school. In the case of the Montessori College Oost in Amsterdam, we sat down with 30 or 40 teachers every month. But that did not prove to be very productive. For the most part, they fought for the interests of their own classes. They were concerned with having as many socket outlets as possible, hot water, light and so on.

– *Do the different nationalities of the pupils play a role in your design?*

– No. I am interested in fundamental forms: that is what Structuralism means to me today. I attempt to develop a common spatial program for all pupils. There are two main aspects to this: enclosure or protection, and openness. In many cultures, "space" implies something enclosed, but to us as a seafaring nation, it can also mean something that extends over the horizon.

– *Can one trace your personal architectural development in your buildings?*

– As a rule, I design from the inside out. From the very beginning, I have provided a vertical link in all buildings that are more than two storeys high. In the Ministry of Social Affairs in The Hague (1979-90), I realized the concept of a large central hall, a space that links all parts of the building; but regrettably, I did not take the idea to its logical conclusion. That building marks the end of a certain line in my design development. Since then, there has been a bolder gesture and a larger urban-planning element in my architecture.

– *What is your favorite school project?*

– The newest project I am working on always means most to me and that is the De Elanden School. It was a difficult project, because the dwellings above the school were not planned by us. Crazy conditions, but one invests a great deal of time in difficult projects and is always delighted at unexpected successes. It is the same as with one's children.

- **Vocabulary List**

- *to implement concept* – реализовать идею
- *architectural approach* – архитектурный подход
- *convinced* – убежденный
- *latitude* – свобода, терпимость
- *to provide the framework* – обеспечить основу
- *to affect the architecture* – воздействовать на архитектуру
- *aware* – сознающий, знающий, осведомленный
- *in collaboration with* – в сотрудничестве с
- *spatial program* – территориальная программа
- *to be delighted* – наслаждаться

- **Design any type of building from the list below and describe your plan. Draw the sketch.**

	Airport		Church
	Hospital		Mosque
	Railway Station		Synagogue
	Garage		Restaurant
	Police Station		Hotel

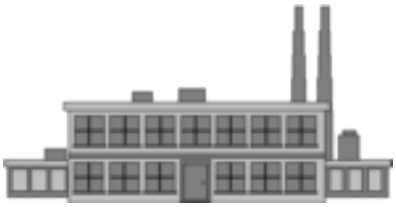
- **Speak about different types of residential buildings common in our country. Emphasize the special features, advantages and disadvantages. How does climate affect the choice of the styles of buildings?**

- **Choose some well-known building and describe the structure of a building you like according to the plan:**

- architect;
- appearance;
- form due to climate;
- types of structure;
- materials used in its construction;
- what the building is used for;
- surrounding of the building.

- **Describe the pictures below. Discuss the types of activities that could go on in each building.**

Office(s)



Factory (factories)

Skyscraper(s)

- **Explain the following facts:**

An African will be uncomfortable living in a house designed for a Japanese.
The doorway height in Britain is usually 2 100 mm although some Britons are taller than 2 100 mm.

- **Speak briefly about differences in industrial and residential buildings in a form of a dialogue.**

- **Read these quotations and discuss it. Find the information about the authors in the Internet.**

«The doctor can bury his mistakes, but an architect can only advise his clients to plant vines».

(F. Wright)

«We need houses as we need clothes, architecture stimulates fashion. It's like hunger and thirst – you need them both».

(K. Lagerfeld)

- **Work in pairs.**
  Imagine that you have invited an interior designer to decorate your flat or house. Discuss your preferences and wishes concerning the interior design of your dwelling. Use the information from appendix (Unit 2).

- **Warm-up discussion.**

1. Can you tell me about an interesting building in your home town?
2. Are there any famous buildings that you like?
3. Do you think it is better to live in a house or an apartment?
4. Describe a building you dislike. Why don't you like it?
5. There are many types of houses (underground, eco-friendly, rural, apartment). What kind of house would be your ideal house?

2.8. TRANSLATING

- **Translate the text into English.**

ТИПОЛОГИЧЕСКАЯ КЛАССИФИКАЦИЯ ЗДАНИЙ

Все постройки, которые нас окружают, созданные руками человека, называются зданиями и сооружениями. Между тем, **«здание»** и **«сооружение»** – это два разных термина и обозначают они разные вещи. «Сооружение» – понятие более широкое, оно включает в себя все, что может быть сделано руками человека. Это может быть и мост, и эстакада, и водонапорная башня, и телевизионная вышка, сюда же относятся и здания. Обычно слово «сооружение» подразумевает все, что предназначено для решения

технических задач. Здания же – это сооружения, предназначенные для размещения различных функциональных процессов жизнедеятельности человека.

Жизнь любого человека очень разнообразна. И в соответствии с этим, процессов жизнедеятельности человека очень много. Это работа, отдых, учеба, занятия спортом, питание, сон, общение с друзьями и еще многое другое. Соответственно, много и типов зданий, в которых размещаются эти разнообразные функциональные процессы.

Все здания можно разделить на три основные группы: гражданские здания; промышленные здания; сельскохозяйственные здания.

Гражданские здания предназначены для размещения и обслуживания бытовых и общественных потребностей людей. Они делятся на жилые и общественные здания.

Жилые здания:

а) квартирные дома – здания, предназначенные для постоянного проживания людей; жилые дома заселяются посемейно;

б) гостиницы – здания, предназначенные для временного проживания иногородних жителей (командированных, отдыхающих, приехавших на лечение и др.);

в) общежития – здания, предназначенные для временного проживания определенного контингента людей, например, студентов или сотрудников предприятий;

г) интернаты – здания, предназначенные для постоянного проживания особых категорий людей, например, инвалидов, престарелых или детей-сирот.

Общественные здания имеют определенное предназначение (или функцию), где люди проводят время и реализуют свои различные общественные потребности.

Выделяют следующие группы зданий:

а) учебные здания (функция – учеба) – это школы, лицеи, университеты;

б) зрелищные здания (функция – зрелищная) – это театры, кинотеатры, цирк;

в) предприятия общественного питания – столовые, кафе, рестораны, закусочные;

г) торговые здания – магазины, палатки, рынки, универсамы, супермаркеты;

д) предприятия здравоохранения – больницы, поликлиники, госпитали, санатории;

е) учреждения культуры – библиотеки, дворцы культуры, музеи, клубы;

ж) спортивные сооружения – стадионы, бассейны, спортзалы, лыжные базы;

з) административные здания – мэрия, муниципалитет, офисы.

Промышленные здания – это здания, где размещается производственный процесс и оборудование, необходимое для осуществления производственной деятельности.

К промышленным зданиям относятся: заводы ЖБИ, кирпичные заводы, автомобильные заводы, мебельные фабрики, ткацкие и обувные фабрики.

Сельскохозяйственные здания – это здания, предназначенные для выращивания животноводческой и сельскохозяйственной продукции и ее переработки. Одна часть из них – это здания, где выращиваются овощи, фрукты, цветы, рассада: теплицы, парники, оранжереи. Другая часть – это здания, где разводят птицу, рыбу, домашний скот, пушных зверей: это птицефабрики, рыбные хозяйства, фермы, конезаводы, зверосовхозы и другие.

UNIT 3

BUILDING DESIGN

3.1. GRAMMAR REVIEW

- **Indefinite pronouns (неопределённые местоимения)**

Pronouns	**+ thing**	**+ body, one**	**+ where**
some некоторый; какой-то; какой-нибудь; несколько	**something** что-то; что-нибудь	**somebody, someone** кто-то; кто-нибудь	**somewhere** где-то; куда-то; где-нибудь; куда-нибудь
any всякий; любой; какой-нибудь	**anything** всё; что-то; что-нибудь	**anybody, anyone** всякий; все; кто-то; кто-нибудь	**anywhere** везде; где-нибудь; куда-нибудь
no, not any никакой + *не;*	**nothing, (not anything)** ничто + *не*; ничего	**nobody (not anybody), no one** никто + *не*	**nowhere (not anywhere)** нигде; никуда + *не*
every всякий; каждый	**everything** всё	**everybody, everyone** все	**everywhere** везде; повсюду

- **Translate the sentences paying attention to the indefinite pronouns.**

1. Assigned the responsibility for construction of the building, this contractor may perform some, all, or none of the work.
2. Attention should be given to zoning, soils, and the potential of hazardous materials in any form.
3. No one can accurately predict what the future of architecture will bring.
4. Any true architectural design is no mere fantasy, no unreal dream, but contemplates an actual building, and for a building to exist there must be adequate structure.
5. Each year students spend some time on practice in the designing bureau.

6. The plot is the fundamental element in every new construction project.
7. The project diary should include anything that may affect the timely completion, the agreed cost or the executed workmanship.
8. The specialists have found nothing wrong in the design.
9. Construction work includes everything, from a tunnel to a skyscraper.

- **Answer each question, replacing the bold word with the pronoun that has the opposite meaning (choose from *no, none, nobody, nothing or neither*):**

Example.
Are any of these architects from Canada?
No, none of these architects are from Canada.

1. Did either of the solutions work?
   No, _____ of the solutions worked.
2. Does anybody here draw well?
   No, _____ here draws well.
3. Do any of your friends work on the construction site?
   No, _____ of my friends works on the construction site.
4. Did you see anything wrong in the contract?
   No, I saw _____ wrong in the contract.
5. Did something happen in the office?
   No, _____ happened in the office.
6. Did somebody engage the consultant?
   No, _____ engaged the consultant.
7. Do you have any interesting projects?
   No, we have _____ interesting projects.

- **Use the correct indefinite pronoun from the table above.**

1. The client is the initiator of … project and the ultimate owner of the building.
2. If … impermissible hazardous materials are encountered, clients should be advised so that they can obtain the services of a specialty consultant to determine what course of action to take.
3. … building exists for some particular purpose, it is built because of some definite human need, either practical or emotional, or both.
4. Ancient builders still have … to teach the twentieth-century architect who knows … way of achieving height except by erecting skyscrapers.
5. During the early design stages, it is the planner's task to decide whether … support regarding a particular feature or function of the development is required.
6. In … building there is a relationship between the exterior and interior.
7. The construction industry touches the lives of virtually … on a daily basis and occupies a fundamental position in national economy.
8. A plot may be developed, which means all services, water, electricity and possibly gas, are provided, partially developed or undeveloped with … services whatsoever.
9. … must plan new housing and new public buildings, parks, and playgrounds.

3.2. READING

- **Read the Text A and give the headline to each paragraph:**

TEXT A

TRADITIONAL DESIGN PROCEDURES

(abridged from «System Fundamental» by Jonathan T. Ricketts)

«Always design a thing by considering it in its next larger context – a chair in a room, a room in a house, a house in an environment, an environment in a city plan».

(Eliel Saarinen)

In the basic traditional design procedure, design usually starts when a client recognizes the need for and economic feasibility of a building and engages an architect, a professional with a broad background in building design. The architect, in turn, engages consulting engineers and other consultants. For most buildings, structural, mechanical, and electrical consulting engineers are required. A structural engineer is a specialist trained in the application of scientific principles to the design of load-bearing walls, floors, roofs, foundations, and skeleton framing needed for the support of buildings and building components. A mechanical engineer is a specialist trained in the application of scientific principles to the design of plumbing, elevators, escalators, horizontal walkways, dumbwaiters, conveyors, installed machinery, and heating, ventilation, and air conditioning. An electrical engineer is a specialist trained in the application of scientific principles to the design of electric circuits, electric controls and safety devices, electric motors and generators, electric lighting, and other electric equipment.

For buildings on a large site, the architect may engage a landscape architect as a consultant. For a concert hall, an acoustics consultant may be engaged; for a hospital, a hospital specialist; for a school, a school specialist. The architect does the overall planning of the building and incorporates the output of the consultants into the contract documents. The architect determines what internal and external spaces the client needs, the sizes of these spaces, their relative locations, and their interconnections. The results of this planning are shown in floor plans, which also diagram the internal flow, or circulation, of people and supplies.

Major responsibilities of the architect are enhancement of the appearance inside and outside of the building and keeping adverse environmental impact of the structure to a minimum. The exterior of the building is shown in drawings, called elevations. The location and orientation of the building is shown in a site plan. The architect also prepares the specifications for the building. These describe in detail the materials and equipment to be installed in the structure. In addition, the architect, usually with the aid of an attorney engaged by the client, prepares the construction contract.

The basic traditional design procedure is executed in several stages. In the first stage, the architect develops a program, or list of the client's requirements. In the next stage, the schematic or conceptual phase, the architect translates requirements into spaces, relates the spaces and makes sketches, called schematics, to illustrate the concepts. When sufficient information is

obtained on the size and general construction of the building, a rough estimate is made of construction cost. If this cost does not exceed the cost budgeted by the client for construction, the next stage, design development, proceeds. In this stage, the architect and consultants work out more details and show the results in preliminary construction drawings and outline specifications. A preliminary cost estimate utilizing the greater amount of information on the building now available is then prepared. If this cost does not exceed the client's budget, the final stage, the contract documents phase, starts. It culminates in production of working, or construction, drawings and specifications, which are incorporated in the contract between the client and a builder and therefore become legal documents. Before the documents are completed, however, a final cost estimate is prepared. If the cost exceeds the client's budget, the design is revised to achieve the necessary cost reduction.

In the traditional design procedure, after the estimated cost is brought within the budget and the client has approved the contract documents, the architect helps the owner in obtaining bids from contractors or in negotiating a construction price with a qualified contractor. For private work, construction not performed for a governmental agency, the owner generally awards the construction contract to a contractor, called a general contractor. Assigned the responsibility for construction of the building, this contractor may perform some, all, or none of the work. Usually, much of the work is let out to specialists, called subcontractors. For public work, there may be a legal requirement that bids be taken and the contract awarded to the lowest responsible bidder. Sometimes also, separate contracts have to be awarded for the major specialists, such as mechanical and electrical trades, and to a general contractor, who is assigned responsibility for coordinating the work of the trades and performance of the work.

Building design should provide for both normal and emergency conditions. The latter includes fire, explosion, power cutoffs, hurricanes, and earthquakes. The design should include access and facilities for disabled persons.

VOCABULARY

application – применение
to assign – поручать, *здесь:* принимать
attorney – юрист, адвокат
bid – предлагаемая цена
bidder – покупатель
circuit – схема
cutoff – отключение
to describe – описывать
disabled – нетрудоспособный
dumbwaiter – кухонный лифт
elevation – чертеж фасада
elevator – лифт
enhancement – усовершенствование
estimate – смета, расчет
to exceed – превышать
skeleton – каркас
sketch – эскиз
explosion – взрыв
hurricane – ураган
to incorporate – включить
interconnection – взаимосвязь
to negotiate – договариваться
outline – эскизный, наметочный
output – *здесь:* работа, результат работы
plumbing – водопровод и канализация
preliminary – предварительный
to proceed – выполнять
reduction – снижение
responsibility – ответственность
to revise – пересматривать, исправлять
rough – приблизительный
scheme – схема
subcontractor – субподрядчик
walkway – проход, коридор

3.3. EXERCISES

- **Insert English words instead of Russian ones.**

1. Major responsibilities of the architect are (усовершенствование) of the appearance inside and outside of the building.
2. The exterior of the building is shown in drawings, called (чертёж фасада).
3. The architect, usually with the aid of (юрист), prepares the construction contract.
4. Before the documents are completed, however, a final cost (смета) is prepared.
5. If the cost (превышать) the client's budget, the design is revised to achieve the necessary cost (снижение).
6. The architect helps the owner in obtaining (цена) from contractors.
7. The design should include access and facilities for (нетрудоспособные) persons.
8. The architect translates requirements into spaces, and makes (эскизы), called schematics.

- **Replace the words in bold (A) by their contextual synonyms (B).**
  (A)

1. A mechanical engineer is a specialist trained in the application of scientific principles to the design of **plumbing.**
2. The basic traditional design procedure is executed in several **stages**.
3. Consultants work out more details and show the results in **preliminary** construction drawings.
4. An electrical engineer is a specialist trained in the application of scientific principles to the design of electric **circuits.**
5. The architect **engages** consulting engineers and other consultants.
6. Emergency conditions include fire, explosion, power cutoffs, **hurricanes**, and earthquakes.

(B) ***previous, phases, storms, water supply system, hires, diagrams***

- **Using the vocabulary:**

- give English equivalents to the following:

совет юриста, скоростной лифт, усовершенствование проекта, тесная взаимосвязь, рассчитать смету, сильный ураган, большой взрыв, пересматривать план, ответственность за работу, снижение стоимости, эскиз здания, нанять субподрядчика, описывать события

- give Russian equivalents to the following:

application of scientific principles, output of the consultants, to make sketches, to describe in detail, with the aid of an attorney, a rough estimate, to exceed the cost, enhancement of the appearance, cost reduction, responsibility for construction, power cutoffs, disabled persons.

- **Comprehension.**
  Are the following statements concerning the Text A true or false?

		True	False
1.	Consulting engineers engage the architect and other consultants.		
2.	An architect is a professional with a broad background in building design.		
3.	The architect should keep adverse environmental impact of the structure to a maximum.		
4.	The interior of the building is shown in drawings, called elevations.		
5.	The location and orientation of the building is shown in a site plan.		
6.	The architect, with the aid of an engineer engaged by the client, prepares the construction contract.		
7.	When sufficient information is obtained a rough estimate is made of construction cost.		
8.	Building design should provide for emergency conditions.		

- **Match the questions on the left with the appropriate short answers on the right:**

1. Does design usually start when a client recognizes the economic feasibility of a building?
2. May the architect engage a landscape architect as a consultant?
3. Are the results of this planning shown in floor plans?
4. Does the architect prepare the specifications for the building?
5. Does the architect develop a list of the client's requirements in the final stage?
6. Do the owners generally award the construction contract to subcontractors?
7. Is the attorney assigned responsibility for coordinating the work of the trades and performance of the work?
8. Is much of the work let out to specialists, called subcontractors?

a. Yes, he does.
b. No, he isn't.
c. Yes, it does.
d. Yes, he may.
e. Yes, they are.
f. No, he doesn't.
g. Yes, it is.
h. No, they don't.

- **Find in the Text A the sentences containing:**

1. … with a broad background … .
2. … the overall planning of the building … .
3. … inside and outside of the building … .
4. … engaged by the client … .
5. … list of the client's requirements.
6. … in negotiating a construction price … .
7. … for a governmental agency … .
8. … the greater amount of information … .

- **Take a look at the list of phrasal verbs with their Latinate counterparts. Translate them with the dictionary. Then complete the dialogue between the architect and the building services engineer using one of them. Be careful to use the correct tense.**

to set up = to arrange	to make do = to manage
to bring down = to reduce	to work out = to calculate
to draw up = to prepare	to look forward = to be eager
to hang on = to wait	to keep to = to observe
to take on = to employ	to add up = to amount
to put together = to compile	to come up with = to produce

Tim Smith: So, that's the preliminary design. Now let's take a look at the building services.

Frank Miller: (1) ……..... ! Where did you say the plant room was?

Tim Smith: Well, it's here. Do you think you'll be able to (2) ……..... with this slightly limited space?

Frank Miller: Hmm, I'm not sure. But tell me first what you've got in mind.

Tim Smith: For hot water and heating, I'd like to suggest using solar collectors and a pellet burner to cover peak loads.

Frank Miller: Yes, that always works well. We've just (3) ……..... a solar expert. I'll have to ask her to put in some extra hours for this project. We'll have to (4) ……..... some new plans and (5) ……..... the costs.

Tim Smith: Talking about costs. Naturally the client is on a tight budget. I'd really like to (6) ……..... a list comparing the costs of a conventional building and what we've got in mind here. Of course, this should take into account the building's total life cycle.

Frank Miller: That's no problem at all. Let's try and (7) ……..... the budget. Eco construction doesn't have to (8) ……..... to more, quite the opposite, we could even try to (9) ……..... the total cost.

Tim Smith: Thanks, Frank. We're definitely on the same wavelength again. Let's (10) ……..... a meeting for this time next week. I'll (11) ……..... to hearing what you've (12) ……..... .

3.4. READING

- **Read the Text B and find the sentences containing the new information for you.**

TEXT B

DEFINITION OF PROJECT PHASES

(abridged from «Building design and construction» by Alan D. Hinklin)

The definition of the various phases of development for a particular project from initial studies through post construction should be understood by the client and outlined thoroughly in

the client-A /E (architect/engineer) agreement. The most-often-used phases of development include the following:

Feasibility Studies. To assist the client in determining the scope of the project and the extent of services to be performed by various parties, the architect may enter into an interim agreement for services relating to feasibility studies, environmental impact studies or reports, master planning, site selection, site analysis, code and zoning review, programming, and other predesign services.

Environmental Impact Studies. Determination of environmental studies and reports required for a project and preparation of such reports, special drawings, or other documents that may be required for governmental approvals are normally performed under separate agreements. Attention should be given to zoning, soils, and the potential of hazardous materials in any form. If any impermissible hazardous materials are encountered, clients should be advised so that they can obtain the services of a specialty consultant to determine what course of action to take.

Programming. If the architect is required to prepare the program of space requirements for a project, the program should be developed in consultation with the client to help the client recognize particular needs. Space requirements, interrelationships of spaces and project components, organization subdivision of usage, special provision and systems, flexibility, constraints, future expansion, phasing, site requirements, budgetary and scheduling limitations, and other pertinent data should all be addressed.

Conceptual Design. During this phase of development, the architect evaluates the client's program requirements and develops alternatives for design of the project and overall site development. A master plan may also be developed during this phase. The plan serves as the guide and philosophy for the remainder of the development of the project or for phasing, should the project be constructed in various phases or of different components.

Schematic Design. During this phase the project team, including all specialty consultants, prepares schematic design documents based on the conceptual design alternative selected by the client. Included are schematic drawings, a written description of the project, and other documents that can establish the general extent and scope of the project and the interrelationships of the various project components, sufficient for a preliminary estimate of probable construction costs to be prepared. Renderings[1] and finished scale models may also be prepared at this time for promotional and marketing purposes.

Design Development. After client approval of the schematic design, the architect and the specialty consultants prepare design development documents to define further the size and character of the project. Included are applicable architectural, civil, structural, mechanical, and electrical systems, materials, specialty systems, interior development, and other such project components that can be used as a basis for working drawing development.

Construction Documents. After approval of the design development documents, the architectural-engineering team, together with the applicable specialty consultants, prepares construction documents, consisting of working drawings and technical specifications for the project components. These include architectural, structural, mechanical, electrical, hydraulic, and civil work, together with general and supplementary conditions of the construction contract for use in preparing a final detailed estimate of construction costs and for bidding purposes.

Construction Phase Services. Diligent construction phase services are essential to translate design into a finished project. The A/E team continues with the development process by issuing clarifications of the bid documents and assisting in contractor selection. Also, during the construction period, the team reviews shop drawings, contractor payment requests, change-order requests, and visits the construction site to observe the overall progress and quality of the work. Architect and engineer personnel involved in the design of the project should be available during construction to provide continuity in the design thought process until project completion and occupancy.

Post construction Services. Follow-up with the client after construction completion is essential to good client relations. Periodic visits to the project by the architect through the contractor's warranty period is considered good business.

Note to the text:

[1]**rendering** – архитектурная подача (изображение проектируемого объекта или его части с художественным оформлением, включая цветовые решения, построение теней и материалы).

VOCABULARY

agreement – соглашение, договор
applicable – требуемый, компетентный
approval - утверждение
to assist – помочь, оказывать содействие
clarification – разъяснение
code – правила эксплуатации, технические условия
constraint – *здесь:* связь (в расчетных схемах)
data – данные
diligent – тщательно выполненный
to encounter – обнаруживать
expansion – развитие**,** расширение
feasibility – рентабельность
flexibility – гибкость
follow-up – мониторинг исполнения
hazardous – вредный
impact – воздействие
impermissible – недопустимый
interim – предварительный
interrelationship – взаимосвязь
limitation – ограничение
to outline – изложить, обозначить
payment – плата
pertinent – подходящий, приемлемый
phasing – поэтапное распределение
remainder – остальная часть
rendering – архитектурная подача
request – требование
review – анализ, рассмотрение
scheduling – планирование
scope – объем работ
subdivision – разделение
thoroughly – подробно, детально
warranty – гарантия
zoning – зонирование, планировка

3.5. EXERCISES

- **Choose words above to put into the sentences below:**

1. The most-often-used phases of development include environmental … studies.
2. Special drawings, or other documents may be required for governmental … .
3. The architectural-engineering team, together with … specialty consultants, prepares construction documents.
4. … construction phase services are essential to translate design into a finished project.
5. During the construction period, the team reviews shop drawings, contractor payment … .
6. … with the client after construction completion is essential to good client relations.
7. Periodic visits to the project by the architect through the contractor's … period is considered good business.

- **Arrange the following words in pairs of synonyms:**

development, applicable, fee, requirement, review, scheduling, warrant, agreement, to assist, impact, data, statistics, standard, influence, convenient, to help, contract, expansion, pertinent, payment, request, guaranty, analysis, code, planning, competent

- **Make up opposition pairs. Couple the following words from group A with words having the opposite meaning from group B:**

A	**B**
hazardous	acceptable
impermissible	useless
applicable	seller
bidder	smooth
disabled	narrow
feasible	undangerous
rough	uneconomical
broad	capable

3.6. EXPANDING YOUR VOCABULARY

- **What are the different meanings of the word «*rendering*»?**
  Consult the dictionary and give your phrase examples.

- **Complete these sentences with the correct form of the word in capital letters.**

1. Attention should be given to the potential of … materials in any form (hazard).
2. The architect evaluates the client's program … (require).
3. Major … of the architect are enhancement of the appearance inside and outside of the building (responsible) and keeping adverse … impact of the structure to a minimum (environment).
4. The architect and the specialty consultants prepare design … documents (develop).
5. The architect helps … in obtaining bids from contractors (own).

- **Read and remember the following useful collocations with the word «*payment*».**

make a payment – производить платеж
receive a payment – получить платеж
meet payment – выполнить оплату
monthly payment – ежемесячный платеж
cash payment – платеж наличными
down payment – оплата в рассрочку, авансовый платеж, наличный расчет
interest payment – выплата процентов
mortgage payment – платеж по закладным, ипотечный платеж

- **Choose collocations above to put into the sentences below:**

1. She agreed to repay the loan in … of £ 125.
2. They fell behind on their … .
3. The country cannot … on its £ 80 billion foreign debt.
4. You can … in any bank.
5. Discount are offered for … .
6. Employees may occasionally … bonus … .
7. The … on your credit card bill.

- **Match the following words with their definitions.**

agreement	a set of laws or regulations
code	a type of guarantee that a manufacturer or similar party makes regarding the condition of its product.
warranty	a contract or other document delineating such an arrangement
payment	the process of planning for land use by a locality to allocate certain kinds of structures in certain areas
zoning	an act of carefully looking at or examining the quality or condition of something or someone
review	the act of giving money for something

- **Use the following suffixes to form the new words from the words given bellow:**

nouns: -tion (-sion), -ance (-ence), -ment, -ness, -ty, -ture;
adjectives: -al, -able, -ant (-ent), -ful, -less, -ous;
adverbs: -ly.

agree, pay, thorough, approve, assist, special, develop, environment, determine, select, government, complete, tradition, profession, equip, circulate, appear, enhance , negotiate, revise.

- **There are numerous terms used to describe the various forms of project's presentation. Match the terms with the correct explanation.**

1.	a sketch	a.	drawing made with paint
2.	a diagram	b.	often used to express the preparation of a technical drawing and still found in many collocations such as draughts person (AE draftsperson) or draughting machine (AE drafting machine)
3.	a plan	c.	a free-hand drawing made quickly and not including a lot of detail
4.	a painting	d.	a computer-aided presentation offers the viewer a realistic understanding of the building by for example taking a virtual walk through the various rooms
5.	a drawing	e.	compilation of drawings showing all views
6.	to draft	f.	often used to sketch out the functional arrangement of rooms or routes within a building
7.	computer simulation	g.	a usually to-scale illustration in pencil or ink often made by using rulers, stencils or CAD

- **Read this newspaper article about the Cambridge Road Hospital project and correct the seven mistakes.**

Work on the Cambridge Road Hospital project is going to plan, says Arnold Smith, the government official responsible for the project. The new skyscraper has six floors and is 150 meters long. The design has a central passage with rooms on each side. The passage has different amenities, including shops and restaurants, and a wooden roof. The project manager in charge, Julita Zielinski of RamCo, says that the project includes a new underground car park. A local company, Hingewell Doors, are supplying the doors.

3.7. RENDERING

- **Render the Text C paying attention to the key words in bold.**

TEXT C

ARCHITECT / ENGINEER TEAM

It is the architect's task to translate the client's ideas into an acceptable design and produce a building that meets the client's needs. In the UK, architectural work is divided and

taken care of by two sometimes even three parties – an architect, a **quantity surveyor** and possibly a **clerk of works**. There is clear distinction in the UK between a **civil engineer**, who is responsible for civil engineering works, and a **structural engineer**, who is responsible for the structural design of buildings. Quantity surveyors were employed to prepare bills of quantities. A **building services engineer** is responsible for the mechanical and electrical aspects of a project. A **landscape architect** is involved in the design and supervision of external works. **Interior designers** specialize in designing architectural interiors and furnishing. The **building contractor** is responsible for turning the architect's design into reality. The construction company has a **site agent** who has control over all construction processes on site. **The clerk of works** is responsible for checking that the materials and **workmanship** conform to the drawings and specifications set out in the contract documents.

- **Who is who? According to the paragraph above decide which person fulfils the tasks described on the left.**

1. They know all about building structures. ……
2. He/she pays the bills. ……
3. In the UK, they offer advice on cost matters. ……
4. They plan tunnels and bridges. ……
5. The UK client's representative on site. ……
6. The contractor hires them for a specific task. ……
7. The architect needs one before he/she can practice. ……
8. They develop the design of a building. ……
9. They plan the supply and discharge of water. ……

«FACTS IN BRIEF»

THE PROJECT MANAGEMENT INSTITUTE (PMI) IDENTIFIES FOUR MAJOR PHASES OF A PROJECT AS CHARACTERISTICS OF THE PROJECT LIFE CYCLE

The phases of a project are initiation, planning, execution, and closeout:

1– The initiation phase, which PMI calls «starting the project», includes activities such as holding alignment and kickoff meetings, identifying the project team, developing the resources needed to develop the project plan, and identifying and acquiring the project management infrastructure.

2 – The planning phase, which PMI calls «organizing and preparing», includes developing detailed staffing, procurement, and project controls plans.

3 – The execution phase, which PMI calls «carrying out the work», includes the major activities needed to accomplish the work of the project.

4 – The closeout phase, which PMI calls «closing of the project», includes transferring staff, archiving documents, closing offices, completing punch list tasks, and turning over the results of the project to the client.

3.8. *TRANSLATING*

- **Translate the text into English.**

TEXT D

КОНСТРУКТИВНЫЕ ЭЛЕМЕНТЫ ЗДАНИЙ

Здания состоят из отдельных, но взаимосвязанных частей, имеющих определенное назначение, которые называют конструктивными элементами зданий. К ним относятся: фундаменты, стены, колонны, перекрытия, крыши, лестницы, перегородки, окна, двери.

Стены – это вертикальные конструктивные элементы, опирающиеся на фундамент и предназначенные для ограждения помещений от внешней среды. Стены бывают наружные и внутренние, несущие и ненесущие. Частный случай стен – перегородки. Перегородки – это тонкие внутренние стены, опирающиеся на перекрытия и служащие для разделения здания на отдельные помещения.

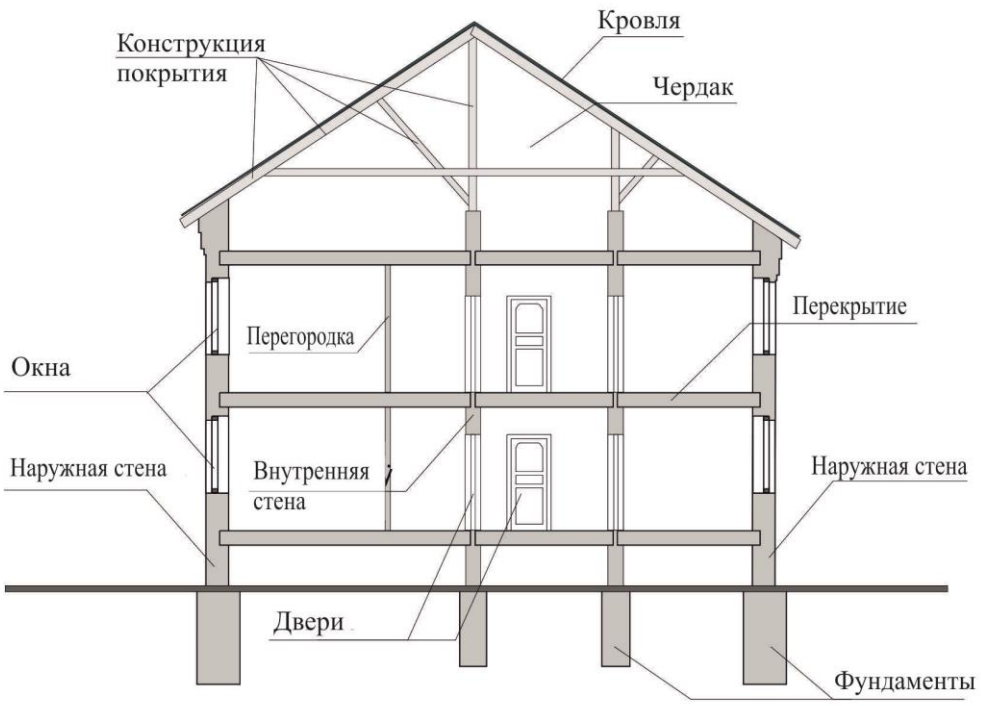
Фундаменты – конструкции, предназначенные для восприятия нагрузки от стен и всего того, что находится в здании, и передачи этой нагрузки на грунт. Фундаменты бывают ленточные, столбчатые, плитные и свайные.

Перекрытия – горизонтальные конструктивные элементы, предназначенные для разделения здания на этажи и воспринимающие нагрузки от массы людей, находящихся в здании, веса мебели, оборудования, предметов быта. Перекрытия опираются на стены.

Лестница – это наклонный элемент, служит для сообщения между этажами.

Окна – элементы для естественного освещения помещений и проветривания.

Двери – элементы для осуществления связи между помещениями.



Схематичный разрез здания

3.9. SPEAKING

- **Your project. Think about a project you are working on at the moment or have already completed. Which people or trades were represented in the project team?**

- **Work in pair.**
  Imagine that you own a plot (земельный участок) you would like to develop.
  You were recommended to an architect, whom you have contacted and with whom you have arranged a meeting on site.
  You should assume that the architect is competent and his current commitments allow him to take on another job.
  You should also discuss the terms of appointment, the program of work and costs in this meeting.

- **You may use the following conversation as an example:**

***Conversation:* A first meeting.**

George Brown: Hello, you must be Tim Smith, the architect.
Tim Smith: Yes, that's right.
George Brown: I'm George and this is my wife, Helen.
Tim Smith: Hello, pleased to meet you.
George Brown: This is the piece of land we inherited last year. We've spent quite a long time thinking about it, but we've decided we'd like to build a house and move to this part of the town.
Tim Smith: Well, it's a wonderful location, isn't it. And the plot is an adequate size, too.
George Brown: Yes, we think it should be big enough for a small house leaving a bit of garden.
Tim Smith: I presume there won't be a problem obtaining planning permission.
George Brown: No, I don't think so. We're not sure how far back we can build or how close to the neighbors, but surely that isn't a problem to find out.
Tim Smith: No, not at all. The local authority will be able to provide all the necessary information. So, what is it you actually have in mind?
Helen Brown: Well, we're thinking of something quite normal really. Living, dining, kitchen on the ground floor; the bedrooms, we'll be needing two for the children and one for us, maybe an extra guest bedroom, upstairs. I'd love either a cellar or a utility area to take care of all the technical equipment and offering storage facilities; oh, and of course, we'll need a garage.
Tim Smith: Okay, I've made a note of all of that. Have you got an idea how many square meters you're looking at.
Helen Brown: The house we're living in at the moment is a 4-bedroom *semi*. It would be great to have a bit more space.
George Brown: I suppose we're thinking of something between 150 and 200 sq.m. But of course a lot depends on the costs.
Tim Smith: Yes, I can understand that. I'll tell you what. Let me speak to the local authority, take some measurements of the site and I'll get back to you in a week or two with some first ideas and thoughts.
George Brown: That sounds wonderful. I'll give you my card so that you know where we are and I look forward to hearing from you soon.

- **Read the passage describing a plot. Try to imagine what it looks like.**

The plot is rectangular measuring about 20 by 80 meters. It is on a slope and slightly wider at the top than at the bottom. In total the difference in height is about 5 meters. There is a small area of woodland beyond a small path at the top of the site, which faces north. To the east and south there is a quiet road. There are three plots with detached two-storey houses to the west – none of the houses border the plot directly. There is a view from the top of the plot; the town centre with about 500,000 inhabitants is 10 minutes walking distance away.

- **Think about a plot for which you are planning or have planned a structure. It could also be the piece of land you are living on. Extract the lexical phrases from the box and give an appropriate description highlighting the main characteristics.**
  Use the example above

in town, on a slope, constricted, spacious, small, rural, commercial, wide, busy, narrow, in the countryside, close, urban, noisy, friendly, dense, peaceful, distant, quiet, large

- **Read the part of the interview with the famous modern architect Ar. Javed Kachchhi:**

He is an Architect, Structural Engineer and an Interior Designer. That is the reason why I was so hung up on trying to get in touch with him and write about his experiences about site inspection.

Here we go….

Me: Sir, could you tell us, what exactly is "Site Inspection" or "Site Visit"?

Ar. Javed Kachchhi: Well, let me be very specific. I am sure your readers would like that. On a site inspection, an Architect/Engineer has to take a complete survey of the site. He has to inspect each and every element that is constructed on site and make sure that the construction is being carried on as per the drawings given by the Architect.

Me: Who monitors the site?

Ar. Javed Kachchhi: Monitoring the site is the work of Site Engineers. Site Engineers have to have a degree in Civil Engineering in order to qualify for the job.

Me: Who appoints the site engineers?

Ar. Javed Kachchhi: It is the Architect who suggests or appoints the site engineer in case of a small scale project. In case of large scale project, Project Management consultant is hired to do the job.

Me: What does Project Management Consultants team comprise of? What is their job on site?

Ar. Javed Kachchhi: Project Management Consultants (PMC) comprises of a number of site engineers, project managers, assistants etc. They all have the knowledge of building construction so that they could supervise the work efficiently.

Me: What does an Architect do?

Ar. Javed Kachchhi: Let's me give you an example of a Small project. Say a Villa… . When I design a villa which is a project with a single structure, it is easier for me to supervise the work since the contractor is always in touch with me.

Now I will tell you what is my job on site?

Identifying the mistakes in construction made by the workers. Clarification of any or all doubts that the workers or the Contractors might have. Sometimes, the workers end up making terrible mistakes. To correct the mistakes in construction, we generally ask the workers to

demolish that particular part and reconstruct it again. But sometimes, it so happens that it becomes very difficult to demolish the incorrectly constructed part because demolishing it could make the venture end in loss. Such cases have to be scrutinized by Architects and Engineers. A solution for the problem is to be looked for.

Me: What are the types of mistakes committed by the workers on the construction site?

Ar. Javed Kachchhi: Let's begin with foundation…

When the design for isolated foundation is given with a sloping pedestal. Workers generally make a mistake while making the pedestal of the footing which is to be strictly avoided. This is where the role of a site engineer comes in. He keeps a watch on all the activities of the workers on site and of course the quality of construction. Quality control engineers are also hired for large scale projects. Say for a housing project where 2000 villas are to be constructed.

Mistakes made while connecting columns and beams:

The joint where columns and beams meet have to be taken care of. Poor joints could result in structural instability.

Mistakes made in the elevation of the building:

Elevation is the toughest part to deal with. You really need highly skilled labor if you want to get your elevation right without any wastage of material as a result of reconstruction.

Me: Who appoints a contractor?

Ar. Javed Kachchhi: One must always be careful while suggesting or appointing a contractor for a project. This becomes a problem for many architects. Once you suggest someone, it becomes your responsibility that the contractor is not corrupt and works efficiently. The client will keep complaining or might even refuse to pay your fees in case the contractor or the workers you suggested are not efficient enough.

With this, we come to the end of the discussion on «Site Inspection during Building Construction».

- **Express the main ideas of the interview above. Retell it using the following expressions.**

1. One of the most interesting aspects of the interview focused upon … .
2. Another area of dialogue focused upon … .
3. One of the key aspects of the dialogue is … .
4. During the discussion with … and … .
5. Another subject for discussion was … .
6. Both … and … discussed … .
7. During the interview, … talked about the importance … .

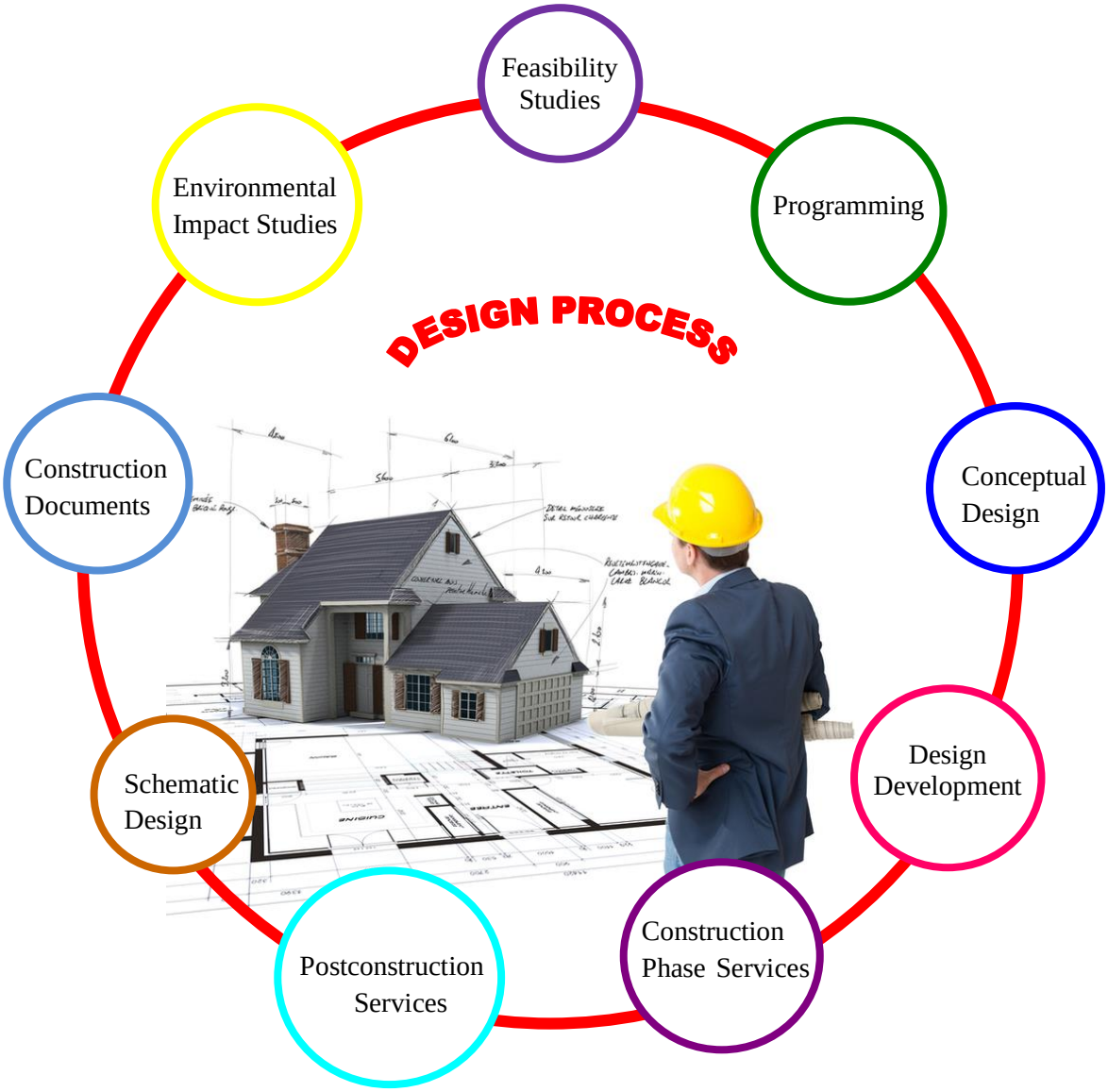
- **Work in pairs. Situation*: Launch a design competition among your peers who may be designing the same (or a different) building. The building that best exemplifies creative strategies that incorporate green sustainable design wins. Points to keep in mind when evaluating a building:***

- What materials are presented in the design? Do they help reduce greenhouse gas emissions?
- What types of energy does your building use? At what rate of consumption?
- Does the building develop on-site renewable energy?
- Is the design inviting and comfortable for guests? How? Be as specific as possible.
- Does the building honor the culture of the community? In what ways?

- **Here you see questions architects are frequently asked. Answer them using your own experience and information you have got from the Unit.**

1. Do you design to a budget?
2. Do you specialize?
3. How much do you charge?
4. We hear you need a big budget to use an architect for a house?
5. What's the difference between an architect and a building designer?
6. What style of houses do you design?
7. What if we don't like what you design?
8. Do you do residential renovations?
9. Is it feasible?
10. What are the boundaries of this project (what is outside the scope of the project)?

- **Arrange the project phases in the correct order and describe them.**



UNIT 4

BUILDING MATERIALS

4.1. GRAMMAR REVIEW

- **Participles (причастия)**

Tense	**Participle I**		**Participle II**
	Active	**Passive**	
Indefinite	**building** 1.определение: *строящий* 2.обстоятельство: *строя*	**being built** 1. определение: *строящийся; который строится* 2. обстоятельство: *будучи построенным*	**built** 1. определение: *построенный* 2. обстоятельство: *когда (его)построили; так как (его) построили*
Perfect	**having built** обстоятельство: *построив*	**having been built** *обстоятельство:* *когда его построили; после того как (его) построили*	

- **Find Participle I and define its function.**

1. Plastics are among the most important materials resulting from scientific discoveries of the last hundred.
2. Yellow bricks, white concrete units and aluminum are the three main materials characterizing the outside of the buildings of the new plant.
3. The front wall is made of organic glass letting through ultraviolet rays.
4. The corridors connecting the buildings are built with special ultra-violet light absorbent glass.
5. When using concrete the structural engineer requires a material as adaptable as fresh concrete and as reliable as steel.
6. Concrete wearing surfaces are often treated with silicate of soda.
7. The roof of the block consists of prefabricated concrete slabs resting on beams which are supported in turn on reinforced concrete columns.
8. Sand rock has various colors depending upon the presence of minute quantities of iron and other mineral matter in it.
9. The building has been described as «a classic example of brick being expressed in large areas in an architectural way as a finishing material».

- **Combine two sentences using Participle I according to the model.**

Model:
Below the floor there is a basement.
It contains several reinforced concrete tanks and other equipment.
Below the floor there is a basement, ***containing*** *several reinforced concrete tanks and other equipment.*

1. The architect talked about the design of the new sporting center.
   The architect said, that he was proud of the recreational features included in the plans.
2. The panels are made in a highly automated factory.
   The factory uses a moving belt system.
3. There are two house building plants in Moscow.
   They produce floor and wall slabs for multi-storey buildings.
4. The corridor connects the changing rooms.
   It has separate access for use during outdoor activities.
5. Between the two blocks a conference hall to seat 1000 is under construction.
   It has arched floor and acoustic control.
6. The exterior walls are set back 10 feet from the edge of the roof.
   These walls form an arcade around the entire building.

- **Find Participle II and define its function.**

1. The only imported materials used in the construction of this hotel are the metal windows and lighting fittings.
2. Polish design is represented by sections devoted to lightning, ceramics, glass and fabrics.
3. The facing materials employed for the internal walls of the airport are marble, stainless steel, aluminum and specially processed timber.
4. The school building is steel framed with its members spaced at 10 ft. intervals; structural floors are in concrete.
5. The house in California is a steel-framed building with the exposed steel members painted blue.
6. Large panels made from concrete are not easy to transport and erect.
7. All cement plants are designed and built according to standards developed in the research institutes.
8. Before the contract commenced, various detailed designs were considered in steel prestressed concrete and reinforced concrete.
9. Molded in reinforced plastics, the units would be practicable if produced in sufficient quantity and could be offered in a variety of colors.
10. The frame and cladding of the structure are in pine covered with copper.

- **Open the brackets and insert the Participle II instead of the Infinitive.**

1. Glass and aluminum (to use) in office buildings give them a contemporary appearance.
2. Steps (to make) of reinforced concrete are used in a form of unit construction.
3. The walls of the building are of double-thickness pine (to separate) by insulation.

4. This method is only applicable to small houses (to build) of timber.
5. The upper layer consists of concrete (to make) with gravel aggregate and is air-entrained; the lower layer is of limestone aggregate.
6. The brick is an artificial material (to make) of clay then (to burn) to harden it.

- **Form Participle 1 and Participle 2.**
  Translate them according to the following patterns:

do: P1 – doing – *делающий, делая;*
P2 – done – *сделанный.*
use: P1 – using – *использующий, используя;*
P2 – used – *использованный, используемый.*

attach, achieve, break, build, deliver, design, dig, drive, excavate, improve, know, mount, read, say, transmit, take, write, diminish, dissipate, fasten

- **Express the following in English:**

материал, используемый в строительстве; здание, возведенное в прошлом году; бетон, залитый в форму; полученные результаты; металл, доставленный вовремя; чертеж сделанный архитектором; конструируя новое оборудование; рабочие, строящие новый офис; предложив свою помощь; вернувшись на строительную площадку; информация, полученная недавно; разрушенная постройка; стекло, разбившееся по дороге; строя дороги; открыв новый элемент; работая на стройке; закончив работу; получив необходимый раствор; смешав два вещества; отреставрированный театр; реконструируя музей; облицовывая кирпичом; покрыв краской.

- **Read and translate the sentences into Russian paying attention to Perfect Participle.**

1. The aluminum window industry, **having made** considerable penetration into all other types of construction is now preparing to meet the requirement of both local authority and private sector housing developments.
2. **Having limited** the overall area to 1400 sq.ft and fixed the main living area at about 450 ft the architect had to reduce the size of bedrooms.
3. **Having** never **lived** in a modern house, even for a short he was greatly surprised with its conveniences.
4. **Having placed** in position all service pipes and ducts they poured concrete into the forms.
5. **Having used** steel reinforcement they considerably increased the weight of the structure.
6. **Having been connected**, the corridor had direct separate access for use during outdoor activities.
7. **Having settled** on the type of construction we must fix the spacing of columns.

4.2. READING

- **Read the Text A and give the headline to each paragraph.**

TEXT A

NEW MATERIALS IN THE ARCHITECTURE
(abridged from «Architecture of the 19th century and the turn of the century» by Agnes Gyetvai-Balogn)

«Marble, I perceive, covers a multitude of sins».
(A. Huxley)

In the 19th century people believed that the new industrial civilization would give birth to new architectural forms. They had high hopes of the newly introduced materials: cast and wrought iron, glass and concrete. Wood and stone were the two natural materials, which were available to architects up to the beginning of the industrial age. In addition there were tiles, which were not really natural building material. Whereas wood and stone, which are worked upon only by hand or by machine, keep their original consistency, iron and concrete are produced by industrial processes.

Iron began to qualify as a building material only when it became possible to mass produce it to a reliable standard of quality. One of the most important steps towards this was the intensified mining of coal in Great Britain in the 18th century. This made it possible to use coke instead of wood, which was becoming increasingly scarce, as a fuel in the smelting process.

Cast and wrought iron have different characteristics. Wrought iron has ten times the strength of wood under compression and one hundred times that of stone. Cast iron is twice as strong as wrought iron under compression, but is less strong under tension. This explains why wrought iron has always been used for suspension bridges and cast iron for arched bridges. Iron has been defined as a linear two-dimensional fragile-looking material, in contrast to the solid, three-dimensional sturdiness of masonry. Elegant linearity is iron's most rational form. These characteristics led away from the solid, block-like, closed type of building, towards an open, linear, articulated frame[1]. The frame principle can be seen in its earliest form in the tent and in its most ingenious form in the Gothic cathedral. New about the iron frame was simply the range of possibilities it opened up.

Iron and after 1860 steel, made it possible to achieve spans wider, to build higher, and develop ground plans more flexible than ever before. Glass in conjunction with iron and steel,

enabled the engineer to make whole roofs and whole walls transparent. Reinforced concrete, introduced at the end of the century, combines the tensile strength of steel with the crushing strength of stone.

The most perfect examples of early iron architecture, the suspension bridges are the work of engineers, not of architects. The early culmination of the iron-architecture was perceptible in the constructions of large greenhouses. The gardeners and horticulturists used to the iron- and glass-work of conservatories. These giant greenhouses were made of cast-iron and glass. The elements could be fabricated industrially and rapidly erected on a light foundation. The semicircular vault and the ceiling were glazed throughout. The modular system, the new scale, the fantastic dimensions, the simplicity of the architectural design, the repetition of simple forms and the rapid erection had consequence for architecture.

Parallel to the development of iron construction, which tended to produce arched and domed spaces, there was another school, concerned exclusively with the rectangular relationship between support and beam. In 1801 Boulton and Watt built a seven-floor cotton mill in Salford, in which the whole of the interior was constructed, for the first time, with iron supports and beams. The exterior walls were of masonry.

In 1848, James Bogardus supported the external walls of his New York cast-iron factory with pre-fabricated cast iron columns and beams, and filled the space between them with huge windows. The use of pre-fabricated parts made it possible to erect buildings very quickly. It is true that Bogardus invoked the Venetian Renaissance in his façades, yet they were similar to the façades of the skeletal buildings, which were to come later. Building with skeleton frames tended not to have prominent façades, and since they were built out of pre-fabricated parts, variations in grade between different storeys began to disappear. The structural functions were performed by a network of upright and horizontal beams, which were given lightness and transparency by huge areas of glass.

In the early period of the iron architecture the steel pillars were decorated as if they were made of stone. The architects didn't use steel structures without decorations, ornaments. Although these steel columns were thin, they had such capitals and pedestals as the stone columns in the historical architecture. The importance of these buildings lies in the way the architects have solved a comparatively new building problem with the techniques available at the time, nonetheless respecting historical tradition. This principle was to become very important in the new architecture. Already Viollet-le-Duc claimed that structural design might constitute the universal principle of modern architecture.

Note to the text:

[1]**articulated frame** – рама из двух частей, соединенных шарниром.

VOCABULARY

cast iron – чугун
coal – уголь
coke – кокс
compression – сжатие
consequence – значение, важность
conjunction – соединение
conservatory – теплица
crushing strength – предел прочности при сжатии
dimension – размер
flexible – гибкий

fragile – хрупкий
fuel – топливо
greenhouse – теплица, оранжерея
to invoke – обращаться к
mill – фабрика
mining – добыча
pre-fabricated – сборный
prominent – видный, выдающийся
reinforced concrete – железобетон
reliable – надежный
skeleton – каркас
skeleton frame – каркасная конструкция
smelting – плавка
span – пролет
steel – сталь
sturdiness – прочность
suspension – подвесной
tensile strength – предел прочности при растяжении
tension – растяжение, напряжение
upright – вертикальный
wrought iron – кованое железо

4.3. EXERCISES

- **Insert English words instead of Russian ones.**

1. (Кованое железо) has always been used for (подвесной) bridges.
2. Iron and (сталь) made it possible to achieve (пролеты) wider, and develop ground plans more (гибкий) than ever before.
3. These giant (оранжереи) were made of (чугун) and glass.
4. The use of (сборный) parts made it possible to erect buildings very quickly.
5. Wrought iron has ten times the strength of wood under (сжатие) and one hundred times that of stone.
6. The modular system, the new scale, the fantastic (размеры) had (значение) for architecture.
7. New about the (железная) frame was simply the range of possibilities it opened up.

- **Replace the words in bold (A) by their contextual synonyms (B):**

(A)

1. The **frame** principle can be seen in its earliest form in the tent.
2. The early culmination of the iron-architecture was perceptible in the constructions of large **greenhouses**.
3. The builders filled the space with **huge** windows.
4. Building with skeleton frames tended not to have **prominent** façades.
5. The structural functions were performed by a network of **upright** and horizontal beams.
6. In the early period of the iron architecture the steel **pillars** were decorated.

(B) ***columns, vertical, remarkable, big, conservatory, skeleton.***

- **Using the vocabulary.**

- **give English equivalents to the following:**

добыча угля, надежный документ, опытный садовод, стальной предмет, работать в теплице, плавка металла, использовать железобетон, сборные части, ощутимый результат, вертикальная балка, гибкий план, каркас здания, подвесной потолок, видный фасад

- **give Russian equivalents to the following:**

reliable standard, smelting process, to become scarce, fragile-looking material, suspension bridge, sturdiness of masonry, in conjunction with steel, cast iron columns, skeletal building, pre-fabricated part, upright and horizontal beams, available at the time, consequence for architecture, giant greenhouse, under compression.

- **Comprehension.**
  Are the following statements concerning the Text A true or false?

		True	**False**
1.	Wood and tiles were the two natural materials.		
2.	The newly introduced materials were cast and wrought iron, timber and concrete.		
3.	Cast and wrought iron have the same characteristics.		
4.	Iron and steel made it possible to achieve spans wider.		
5.	The early culmination of the iron-architecture was perceptible in the constructions of large greenhouses.		
6.	The use of pre-fabricated parts made it possible to erect buildings very quickly.		
7.	In the early period of the iron architecture the steel pillars weren't decorated.		
8.	Viollet-le-Duc claimed that structural design might constitute the universal principle of modern architecture.		

- **Match the questions on the left with the appropriate short answers on the right:**

1. Are iron and concrete produced by industrial processes?
2. Was stone becoming increasingly scarce?
3. Is elegant linearity iron's most rational form?
4. Did glass enable the engineer to make whole roofs transparent?
5. Does reinforced concrete combine the tensile strength of steel with the crushing strength of brick?
6. Was the suspension bridge work of engineers?
7. Were the giant greenhouses made of cast-iron and glass?
8. Did the architects use steel structures without decorations?

a. Yes, it is.
b. Yes, they are.
c. No, it doesn't.
d. No, it wasn't.
e. Yes, it did.
f. No, they didn't.
g. Yes, it was.
h. Yes, they were.

- **Find in the Text A the sentences containing:**

1. … by hand or by machine … .
2. … fragile-looking material … .
3. … on a light foundation.
4. … repetition of simple forms … .
5. … façades of the skeletal buildings … .
6. … available at the time … .
7. … crushing strength of stone.
8. … these steel columns … .

- **What materials do these tradespeople use?**
  Match materials A-F to tradespeople 1-6.

Picture №	Tradespeople	Picture №	Tradespeople	Picture №	Tradespeople
	1.carpenter		3.glazier		5.concrete finisher
	2.painter		4.welder		6.bricklayer and mason

					
a	**wood**	b	**paint**	c	**concrete**
					
d	**brick and stone**	e	**metal**	f	**glass**

4.4. READING

- **Read the Text B and find the sentences containing the new information for you.**

TEXT B

WOOD AS AN ENGINEERING MATERIAL
(abridged from «Wood handbook»)

Throughout history, the unique characteristics and comparative abundance of wood have made it a natural material for homes and other structures, furniture, tools, vehicles, and decorative objects. Today, for the same reasons, wood is prized for a multitude of uses. All wood is composed of cellulose, lignin, hemicelluloses, and minor amounts (5% to 10%) of extraneous materials contained in a cellular structure. Variations in the characteristics and volume of these components and differences in cellular structure make woods heavy or light, stiff or flexible, and hard or soft. The properties of a single species are relatively constant within limits; therefore, selection of wood by species alone may sometimes be adequate. However, to use wood to its best advantage and most effectively in engineering applications, specific characteristics or physical properties must be considered.

Historically, some species filled many purposes, while other less available or less desirable species served only one or two needs. For example, because white oak is tough, strong, and durable, it was highly prized for shipbuilding, bridges, cooperage, barn timbers, farm implements, railroad crossties, fence posts, and flooring. Woods such as black walnut and cherry were used primarily for furniture and cabinets. Hickory[1] was manufactured into tough, hard, and resilient striking-tool handles, and black locust was prized for barn timbers. What the early builder or craftsman learned by trial and error[2] became the basis for deciding which species were appropriate for a given use in terms of their characteristics. It was commonly accepted that wood from trees grown in certain locations under certain conditions was stronger, more durable, more easily worked with tools, or finer grained than wood from trees in other locations. Modern research on wood has substantiated that location and growth conditions do significantly affect wood properties.

Hickory tree and it’s materials

The gradual reductions in use of old-growth forests[3] in the United States have reduced the supply of large clear logs for lumber and veneer. However, the importance of high-quality logs has diminished as new concepts of wood use have been introduced. Second-growth wood[4], the remaining old-growth forests, and imports continue to fill the needs for wood in the quality required. Wood is as valuable an engineering material as ever, and in many cases, technological advances have made it even more useful.

The inherent factors that keep wood in the forefront of raw materials are many and varied, but a chief attribute is its availability in many species, sizes, shapes, and conditions to suit almost every demand. Wood has a high ratio of strength to weight and a remarkable record for durability and performance as a structural material. Dry wood has good insulating properties against heat, sound, and electricity. It tends to absorb and dissipate vibrations under some conditions of use, and yet it is an incomparable material for such musical instruments as the violin. The grain patterns and colors of wood make it an esthetically pleasing material, and its appearance may be easily enhanced by stains, varnishes, lacquers, and other finishes. It is easily shaped with tools and fastened with adhesives, nails, screws, bolts, and dowels.

Damaged wood is easily repaired, and wood structures are easily remodeled or altered. In addition, wood resists oxidation, acid, saltwater, and other corrosive agents, has high salvage[5] value, has good shock resistance, can be treated with preservatives and fire retardants[6], and can be combined with almost any other material for both functional and esthetic uses.

In the United States, more than 100 wood species are available to the prospective user, but all are unlikely to be available in any one locality.

Notes to the text:

[1]**hickory** – древесина пекана.

[2]**by trial and error** – путем проб и ошибок.

[3]**old-growth forest** – перестойный лес; девственный лес.

[4]**second-growth wood** – древесина порослевых пород; низкорослый лес.

[5]**salvage** – *здесь:* вторичное сырьё.

[6]**fire retardant** – огнезащитное средство.

VOCABULARY

acid – кислота
adhesive – клей
agent – химическое вещество
barn – амбар, сарай
bolt – болт
cellular – пористый
cooperage – бочарная продукция
crosstie – шпала
dowel – деревянный болт
to diminish – уменьшать
to dissipate – рассеивать
to fasten – скреплять
fence – ограда
grain pattern – текстура
grained – волокнистый, с грубой текстурой
handle – ручка
implement – орудие, инструмент
inherent – характерный
lacquer – лак
locust – акация белая
lumber – пиломатериал
log – бревно
nail – гвоздь
oxidation – окисление

post – столб
screw – шуруп
shock resistance – ударопрочность
specie – вид, порода
stain – краска, морилка
stiff – жесткий
strength ratio – коэффициент прочности
to substantiate – доказывать
tough – твердый
varnish – лак
veneer – шпон, фанера
vehicle – транспортное средство

4.5. EXPANDING YOUR VOCABULARY

- **Choose words above to put into the sentences below:**

1. The importance of high-quality … has diminished as new concepts of wood use have been introduced.
2. The … factors that keep wood in … of raw materials are many and varied.
3. Dry wood tends to absorb and … vibrations under some conditions of use.
4. Wood resists …, acid, saltwater, and other corrosive … .
5. It is easily fastened with … .
6. Hickory was manufactured into tough, hard, and resilient striking-tool … .
7. … and colors of wood make it an esthetically pleasing material.

- **Arrange the following words in pairs of synonyms:**

inherent, column, agent, glue, varnish, barn, vehicle, stiff, bolt, dowel, stain, lacquer, substance, tough, tool, implement, adhesive, to fasten, paint, post, shed, characteristic, car, to fix.

- **Give the opposites:**

1. stiff –
2. natural -
3. hard –
4. constant –
5. dry –
6. modern –
7. strength –
8. comparable –
9. advantage –
10. to diminish –

- **What are the different meanings of the word «*handle*»?**
Consult the dictionary and give your phrase examples.

- **Complete these sentences with the correct form of the word in capital letters.**

1. Wood was becoming … scarce (increase).
2. The elements could be fabricated … (industry).

3. … and growth conditions do significantly affect wood properties (locate).
4. The gradual … in use of old-growth forests in the United States has reduced the supply of large clear logs for lumber and veneer (reduce).
5. Wood is a valuable … material (engineer).
6. … wood is easily repaired (damage).

- **Match the idioms with their explanations.**
  Think of the situations in which you can use these idioms.

1.	**black as coal**	a)	to take something to a place or a person that has a lot of that thing already
2.	**carry coal**	b)	to speak angrily to someone because they have done something wrong to Newcastle
3.	**drag someone over the coals**	c)	speed up
4.	**pour on the coal**	d)	completely dark

- **Match the following words with their definitions.**

crosstie	a chemical species that donates protons or hydrogen ions and/or accepts electrons
acid	a substance used to coat something
lacquer	wood that is to be used for building, construction, paper, or other similar purposes
lumber	a beam that connects and supports the rails of railroad
veneer	a long, thin piece of metal that is sharp at one end and flat at the other end and that is used chiefly to attach things to wood
nail	any of the thin layers of wood glued together to form plywood

- **What suffixes help to form abstract nouns describing properties of materials? Make up nouns out of the following adjectives:**

A) hard, durable, strong, light, compact, porous, available,
B) fire-resistant, decay-resistant, weather-resistant.

- **Complete the table below.**

WOOD	
advantages	lightness; workability; strength; swelling; hygroscopicity; elasticity; low heat conductivity; decay; non-homogeneity; good mechanical properties; shrinkage; combustibility
disadvantages	

- **Speak on the properties of wood using the Text B, the table and the following:**

on the one hand, on the other hand, to possess, in fact, to have advantages / disadvantages, unsuitable

- **Read these extracts from suppliers' websites and match extracts 1-6 to photos a-f.**

1. **Thomson's Aggregates**: *We offer a wide range of construction aggregates, including gravel and sand. We also stock concrete mix.*
2. **Watson's Goods Ltd**: *We specialize in acoustic, thermal and fire protection insulation for walls and floors.*
3. **Morris and Sons Ltd**: *Our timber comes in a range of standard sizes, but can also be made to order. It is perfect for flooring, roofing and general building work. We also stock plywood and chipboard.*
4. **Williams Brothers**: We *design, produce and install high quality* steel *staircases, gates and railings made to your specifications*. We *also have a range of standard products.*
5. **Shockingly Good**: *We supply a wide range of electrical products, cables, alarm systems, conduits (PVC and steel) and other electrical fittings.*
6. **Penter's Paint Supplies**: *We supply everything you need to paint, including brushes, rollers, clothing, spray equipment and, of course, paint.*

					
a	Williams Brothers	b	Thomson's Aggregates	c	Watson's Goods Ltd
					
d	Penter's Paint Supplies	e	Shockingly Good	f	Morris and Sons Ltd

- **Enter the following words to complete the sentences below in a meaningful way.**

durable, airtight, opaque, rigid, combustible, brittle load-bearing, malleable, monolithic, sustainable

1. A building that is well sealed and does not leak is ... ……. ……..…….
2. Structural elements that are able to support a lot of weight are … …….
3. Glass breaks easily. It is … ……. …….
4. Before concrete sets, it is … …….
5. The opposite of transparent is … ……. ……..….

6. A wall made of a single material, such as earth, is … …….
7. The opposite of flexible is … ……..…….…….
8. If an object does not cause harm to our environment during its life-cycle, it is ……...
9. A material that burns easily is …. ……..……..….
10. The opposite of fragile is … …….

4.6. RENDERING

- **Render the Text C paying attention to the key words in bold.**

TEXT C

BUILDING WITH REINFORCED CONCRETE

New materials have made possible a new kind of building. Steel girders and reinforced concrete, plywood, plastics and aluminum can now be used as well as the familiar stone, brick and timber. Steel girders form the framework of a **block of flats**, and the walls, floors, windows and doors are built on to this frame. As the steel framework **carries** all **the weight**, and the external and internal walls do not carry any, all rooms, windows and doors can **be placed in the best position** for convenience, sunlight and fresh air. And there is no limit to the size of a window. Scores of families can have their homes in a tall block of flats on a ground space which would otherwise house only a few. This means that more ground can **be left free** for lawns, flowers, trees and shrubs, for tennis courts and playgrounds.

Blocks of flats have their own electric lifts, and often their own public dining and recreation rooms. When carefully planned and sited, they can be as beautiful in their way as were the best homes of the past, and, with their extra space, sunlight and fresh air, they can be even more convenient and pleasant to live in.

«FACTS IN BRIEF»

The use of green or eco-friendly building materials and products represents one important strategy in the design of a sustainable building. Whilst promoting the conservation of dwindling non-renewable resources, the most important benefits for building owner or occupants are improved health and therefore productivity. In addition, integrating green building materials into building projects can help reduce the environmental impact associated with the extraction, transport, processing, fabrication, installation, reuse, recycling, and disposal of these building industry source materials. Selection of material should include careful research to gather all technical information, including manufacturers' information, test data, durability information, an evaluation of the data gathered and then the identification of the product with the highest environmental attributes.

4.7. SPEAKING

- **Work in pairs. Ask your partner about things in any building.**

Example:

A:		**B:**
What's that?	–	It's a window.
What's it made of?	–	Glass and wood.

- **Read this quotation and discuss it.**

«The secret of architectural excellence is to translate the proportions of a dachshund into bricks, mortar and marble».

(Christopher Wren)

- **Describe the properties of the following building materials using the Internet:**

concrete, steel, stone, brick, ceramic tile, timber, etc.

You can use the following characteristics:

waterproof, thermal conductivity, fire resistance, thermal insulation, sound insulation, attractive finish.

- **Discuss what material is the best suitable for this or that part of a building.**
  Say why you have chosen this material.
  You can use the following examples:

external wall, roof, suspended ceiling, partitions, etc.

- **Think of a product you know well.**
  In pairs, discuss the materials used in it and what properties make the materials suitable.
  Discuss whether alternative materials could be used.

- **Speak on the classification and usage of building materials using additional information from the appendix.**

- **Speak on the advantages of building with wood, brick and reinforced concrete.**

Use the words and phrases which are given in the table below.

Useful Words and Phrases of Scientific Communication:

at a scientific meeting, conference, round-table discussion, symposium, colloquium, seminar, session, congress, etc.

Situation: One of you will be the speaker, the other – the chairman, and the rest are the audience.

Chairman		Speaker
• **Opening a meeting**	I declare the meeting open. Right, can we start? Ladies and Gentlemen, are we ready to begin? OK then, perhaps we could make a start?	- Introducing the report: Mr. Chairman, Ladies and Gentlemen. It is a great honour to address this meeting (conference); I'd like to talk in my report about... First of all (in the first place) I'd like to name the main points of my paper.
• **Introducing a speaker**	I have a great pleasure to introduce Dr. (Prof.) Baker, an expert in... Our first speaker, Dr Baker, will speak on ...	- While reporting: Now, let us turn to the point ... - The second point is ... - Moving to point three … - And finally …
• **Opening a discussion**	Now I'd like to open the discussion on the presentation given by Dr Baker. Are there any questions to Dr Baker?	- So much about … - I'd like to attract your attention to ... - Allow me to call your attention to ... - I should like to note (emphasize) … - If you look at this diagram …
• **Ending a discussion**	May I propose that we stop there?	- Have a look at ... - If you remember, I mentioned ... - As I've already mentioned …
• **Thanking**	Thanking: I'm sure I'm speaking for everyone when I say how grateful we are to Dr Baker for his informative (excellent) presentation, (talk, speech, lecture). I'd like to thank everybody here.	- Do you see what I mean ... - Do you follow me... - As far as I know ... - Sorry, I got lost ... - Ending the report … - In conclusion I'd like to stress the importance …
• **Ending a meeting**	I declare the meeting closed.	- Thank you for your attention.

Stages of a meeting Phrases

Agreement with the speaker

1. I think you are entirely right speaking about … .
2. I'd like to express agreement with the speaker … .

Disagreement with the speaker

1. I am very sorry to have to say that I don't agree with … .
2. Unfortunately, I cannot agree with your final statement. I wish I could agree with you but … . We are not yet certain … .

Making remarks

1. This is an interesting work but has a lack ... .
2. It is surprising ... It is unbelievable ... .
3. I'm not surprised that it is possible ... .
4. I find it's hard to believe ... .
5. I'd like to make a comment of general nature ... .
6. I'd like to make two more remarks ... .
7. I have a few points to make ... .
8. I have just a small point, but it may make things more clear a bit.
9. Excuse me, but I'd just like to point out ... .
10. Making contribution to the discussion … .
11. I'd like to add … in connection with … .
12. In addition I'd like to mention … .

4.8. TRANSLATING

- **Translate the text into English.**

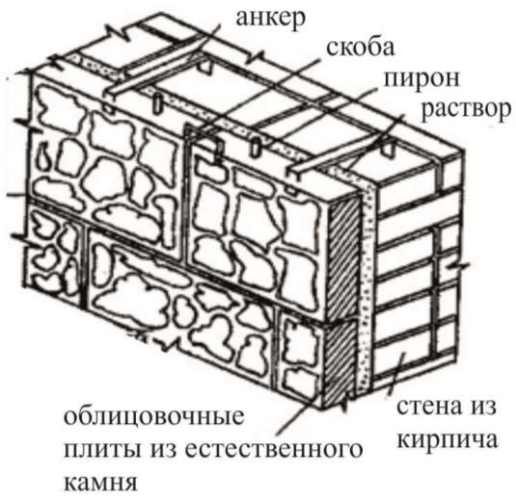
ОБЛИЦОВКА СТЕН ИЗ КИРПИЧА

Все конструкции здания в основном делятся на две группы – несущие и ограждающие. К несущим конструкциям относятся, в том числе, и стены.

Стены являются наиболее дорогостоящими конструкциями. Стоимость наружных и внутренних стен составляет до 35% стоимости здания. Эффективность решения стен существенно отражается на показателях экономичности всего здания.

Долгие тысячелетия традиционными стеновыми материалами оставались камень и кирпич, которые хорошо работают на восприятие вертикальных нагрузок и придают стенам жёсткость и устойчивость.

В строительстве при возведении стен из кирпича широко применяется их облицовка атмосферостойкими отделочными материалами с декоративной поверхностью. Наружная облицовка зданий увеличивает долговечность стен и улучшает их внешний вид. Облицовывают стены (главным образом фасад) различного рода естественными и искусственными материалами. Облицовка может вестись одновременно с кладочными работами или после них.

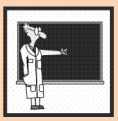


В качестве керамических облицовочных материалов, укладываемых в конструкцию одновременно с их возведением, чаще всего применяют лицевой кирпич, лицевые керамические камни и фасадные керамические закладные Г-образные плиты, а в качестве облицовочных материалов, прикрепляемых к кирпичной стене после ее осадки, – прислонные фасадные керамические плиты.

При облицовке закладными керамическими плитами перевязка их с кладкой достигается заделкой в нее хвостовой части плиты на глубину не менее 7,5см. Облицовку прислонными керамическими плитами, прикрепляемыми к стене без перевязки с кладкой, производят на растворе, приготовленном на портландцементе марки 300-500. Облицовку из лицевых керамических камней перевязывают с кирпичной кладкой тычковыми рядами облицовки, укладываемыми через 6 слоев кирпичной кладки. При облицовке лицевым кирпичом стен из обыкновенного дырчатого, пористого и других видов кирпича кладку и облицовку перевязывают по многорядной системе.

UNIT 5

BUILDING CONSTRUCTION



5.1. GRAMMAR REVIEW

- **Time terms.**

Timing is very important throughout the course of every project. A good architect or engineer will often be recognized for the quality of his or her time management. However, from time to time, even good timekeepers find that there are not enough hours in the day and are often given a hard time.

- **Time management.**

There are lots of useful expressions and idioms dealing with time. Take a look at the following overview for more.

Expression/ Meaning/Idiomatic expression

Example:

on time – according to schedule, punctual – вовремя;
in time – before a time limit expires – заблаговременно, вовремя;
high time – the appropriate or urgent time – пора;
in no time – almost instantly, immediately – моментально, необыкновенно быстро;
from time to time – once in a while – время от времени, временами;
to waste time – тратить время впустую;
to make up for lost time – наверстать упущенное время;
to give sb a hard time – устроить кому-либо неприятности;
to take time – занимать время;
to have time on ones hands – болтаться без дела, иметь массу свободного времени;
date – a time stated in terms of day, month, year – дата, время, срок;
date can also mean appointment, but a social one and often with a romantic interest – свидание;
to set / arrange / cancel / observe a date – установить / договориться / отменить / соблюдать дату, время;
to update sth – обновить, модернизировать что-либо;
schedule – a plan for performing work with a specified order and an allotted time – расписание, план, график;
to be ahead of / on / behind schedule – досрочно / вовремя / отставать от графика;
duration – the time required for a certain task – продолжительность, длительность;
durability – the period of withstanding wear and tear or decay – длительность, долговечность;
deadline – a time limit with a target date by which sth must be completed – крайний срок, предел;

to meet a deadline – выполнить в срок;
exceed a deadline – превышать срок;
postpone a deadline – отложить срок;
to set / fix a deadline – установить крайний срок;
period – a length of time – период, время;
to extend a period – продлить срок;
a period is expired – время истекает;
stint – a period spent doing a particular activity – ограничение, урочная работа, предел;
spell – a short period, especially weather – короткий промежуток времени;
appointment – an arrangement to do sth or meet sb at a particular time and place – встреча;
to make an appointment with sb – устроить встречу;
arrange an appointment with sb – организовать встречу;
cancel an appointment with sb – отменить встречу;
the other meaning of **appointment** is the act of designating sb for a position/task – назначение.

- **Translate the following sentences paying attention to the words in bold dealing with time.**

1. The contractor took so much time preparing the site, now they are going to have **to make up for lost time.**
2. The **date** set for completion is 23 June 2015.
3. Work on site is absolutely **on schedule.**
4. **The period** assigned for tiling **has expired**.
5. The carpenters did a **stint** on another building site.
6. Let's make use of the **spell** of good weather.
7. The structural engineer has arranged an **appointment** with the client on site.
8. The roofing company is not going **to meet the deadline**; we'll have to postpone the starting **date** for subsequent trades.
9. The architect has selected high-quality goods; their **durability** is excellent.
10. The clerk of works will be on site for the **duration** of the construction.

- **Enter the following words into the text below.**
  Make sure to use the correct tense.

Postpone, period, make up for lost time, just in time, deadline, interrupt, delay, take time, spell of good weather, on schedule, meet deadlines, waste time, behind schedule, date, update

George Brown's project is more or less ….. . The procurement ….. was quite tense as the tenders all only arrived ….. . Then the evaluation ….. and a few items had to be negotiated with the lowest bidder. The pre-start meeting had to be ….. by a week. Luckily the contractor ….. by bringing the ….. to take possession of the site forward. The ….. set for completion is realistic. The contractor does not want ….., but make use of the ….. before winter sets in. The contractor is optimistic and wants ….. . Hopefully nothing unpredictable will ….. building operations, which would cause ….. and put work ….. . The contractor is obliged to keep the client and the site engineer ….. .

- **Prepositions of time.**

When talking about periods, dates and deadlines, prepositions are indispensable. There are many different prepositions, which are used in different cases. What they all have in common, in the case of time factors, is that they are placed before nouns.

Preposition	**Uses**	**Examples**	**Exceptions / Notes**
at	+ clock time	- at 4.30 p.m. - at 9 o'clock	-
on	+ day / date	- on Monday - on 4 June	- at the weekend - at Christmas
in	+ time of the day / week / month	- in the morning / afternoon - in week 23 - in August - in 2007	- at night - at noon
by	+ a deadline	- by 4 p.m. - by Friday - by May	-
during	+ period of time	- during the next week - during October	While and during have the same meaning but are used while differently.
while (conjunction)	+ subject + verb	- while they were planning - while the plumbers are fitting	
from … to / until / till	+ time / date	- from 8 to 4 o'clock - from Monday to Friday	-
Since	+ point in time	- since 10 a.m. - since Monday - since this morning	Always used with a perfect tense, e.g. The foreman has been waiting for the delivery since this morning.
For	+ period of time	- for 3 hours - for 2 weeks - for ages	Often used with a perfect tense, e.g. The foreman has been waiting for 4 hours.
-	this, next, last	- next Monday - last month - this morning	No prepositions are used!

- **Complete the memo. If no preposition is required, leave the space blank.**

The construction work for the Brown single family home is due to start ..…….. week 30. The main contractor, John White, will be on site ….…. a total of 8 weeks. Their work has to be completed …….. 14 September in order to allow enough time for the other trades. The joiner Williams is due to start work ……. 3 September. Once he has fitted the windows, he will be off site …….. 17 September …….. 29 October. The companies Frazer and T + P will also suspend their work …….. 3 weeks while the plastering and screeding work is being carried out. It is absolutely essential that the screeder finishes …….. 9 October in order to allow the screed to dry sufficiently before the oak-strip parquet flooring is installed. The painters should be out …….. the end of week. 44. However, there is a buffer of 5 days for overruns and remedial work.

5.2. READING

- **Read and translate the text and express the main ideas.**

TEXT A

TRADITIONAL CONSTRUCTION PROCEDURES
(abridged from «System Fundamental» by Jonathan T. Ricketts)

«*Engineering is an activity other than purely manual and physical work which brings about the utilization of the materials and laws of nature for the good of humanity».*

(R. E. Hellmund)

During construction, standards, regulations, and procedures of the Occupational Safety and Health Administration[1] should be observed. Following is a description of the basic traditional construction procedure for a multistory building:

After the award of a construction contract to a general contractor, the owner may ask the contractor to start a portion of the work before signing of the contract by giving the contractor a letter of intent or after signing of the contract by issuing a written notice to proceed. The contractor then obtains construction permits, as required, from governmental agencies, such as the local building, water, sewer, and highway departments.

The general contractor plans and schedules construction operations in detail and mobilizes equipment and personnel for the project. Subcontractors are notified of the contract award and issued letters of intent or awarded subcontracts, then are given, at appropriate times, notices to proceed.

Before construction starts, the general contractor orders a survey to be made of adjacent structures and terrain, both for the record and to become knowledgeable of local conditions. A survey is then made to lay out construction.

Field offices for the contractor are erected on or near the site. If desirable for safety reasons to protect passersby, the contractor erects a fence around the site and an overhead protective

cover, called a bridge[2]. Structures required to be removed from the site are demolished and the debris is carted away.

Next, the site is prepared to receive the building. This work may involve grading the top surface to bring it to the proper elevations, excavating to required depths for basement and foundations, and shifting of utility piping. For deep excavations, earth sides are braced and the bottom is drained.

Major construction starts with the placement of foundations, on which the building rests. This is followed by the erection of load-bearing walls and structural framing. Depending on the height of the building, ladders, stairs, or elevators may be installed to enable construction personnel to travel from floor to floor and eventually to the roof. Also, hoists may be installed to lift materials to upper levels. If needed, temporary flooring may be placed for use of personnel.

As the building rises, pipes, ducts, and electric conduit and wiring are installed. Then, permanent floors, exterior walls, and windows are constructed. At the appropriate time, permanent elevators are installed. If required, fireproofing is placed for steel framing. Next, fixed partitions are built and the roof and its covering, or roofing, are put in place.

Finishing operations follow. These include installation of the following: ceilings; tile; wallboard; wall paneling; plumbing fixtures; heating furnaces; air-conditioning equipment; heating and cooling devices for rooms; escalators; floor coverings; window glass; movable partitions; doors; finishing hardware; electrical equipment and apparatus, including lighting fixtures, switches, outlets, transformers, and controls; and other items[3] called for in the drawings and specifications. Field offices, fences, bridges, and other temporary construction must be removed from the site. Utilities, such as gas, electricity, and water, are hooked up to the building. The site is landscaped and paved. Finally, the building interior is painted and cleaned.

The owner's representatives then give the building a final inspection. If they find that the structure conforms with the contract documents, the owner accepts the project and gives the general contractor final payment on issuance by the building department of a certificate of occupancy, which indicates that the completed building meets building-code requirements.

Notes to the text:

[1]**Occupational Safety and Health Administration** – Управление по охране труда (в США).

[2]**bridge** – защитный козырек (над входом, проходом, тротуаром).

[3]**item –** элемент, отдельная операция.

VOCABULARY

bottom – основание (фундамента), грунт
to brace – укреплять
to cart away – вывозить
certificate of occupancy – акт приемки здания в эксплуатацию
conduit – электропровод
contract award – заключение договора подряда
to demolish – сносить (здание)
to drain – осушить
elevation – высота, отметка (высоты)
field office – контора прораба
fireproofing – противопожарная защита
fixture – деталь
furnace – котел
grading – выравнивание
hoist – подъемное устройство
item – элемент, отдельная операция (в перечне технологических операций)
knowledgeable – ознакомленный

to lay out – планировать
letter of intent – протокол о намерениях
load-bearing wall – несущая стена
multistory – многоэтажный
notice – уведомление
to notify – уведомлять
outlet – розетка
overhead – подвесной
piping – трубы, система труб
to proceed – приступить к чему-либо
record – отчет
to schedule – разрабатывать, планировать
sewer – канализация
shifting – перестановка, перемещение
subcontract – субконтракт
survey – исследование, съемка
terrain – местность, рельеф, грунт
tile – кафель, плитка
transformer – трансформатор
utility *(pl).* – коммунальные услуги
wallboard – обшивочный лист
wiring – электропроводка

5.3. EXERCISES

- **Insert English words instead of Russian ones.**

1. The general contractor plans and (разрабатывать) construction operations in detail.
2. Before construction starts, a survey is made of (прилежащий) structures and (местность).
3. (Конторы) for the contractor are erected on or near the site.
4. If desirable for safety reasons to protect (прохожий), the contractor erects (ограждение) around the site.
5. An (подвесной) protective cover is called a bridge.
6. Subcontractors are notified of (заключение подрядного договора).
7. This work may involve (выравнивание) the top surface to bring it to the proper (высота).
8. (Подъемные устройства) may be installed to lift materials to upper levels.

- **Replace the words in bold (A) by their contextual synonyms (B):**

(A)

1. **A survey** is made **to lay out** construction.
2. This work may involve excavating to required depths for **basement**.
3. This work may involve shifting of utility **piping**.
4. The contractor obtains construction permits from governmental agencies, such as the local building, water, **sewer**, and highway departments.
5. Structures required to be removed from the site are **demolished**.
6. **Temporary** flooring may be placed for use of personnel.

(B) ***tubing, to plan, destroyed, short-life, bottom, plumbing, investigation.***

- **Using the vocabulary.**

- give English equivalents to the following:

многоэтажное здание, убрать мусор, выравнивание земельного участка, перестановка труб, высокое ограждение, проводка в стене, соответствовать договору, белый кафель, временное устройство, инструкция по противопожарной защите, стальные трубы

- give Russian equivalents to the following:

contract award, issued letters of intent, shifting of utility piping, to brace sides, to drain bottom, erection of load-bearing walls, temporary flooring, to install electric conduit, to place fireproofing, plumbing fixtures, finishing hardware, other items, certificate of occupancy.

- **Comprehension.**
  Are the following statements concerning the Text A true or false?

		True	**False**
1.	Subcontractor mobilizes equipment and personnel for the project.		
2.	The contractor erects an overhead protective cover, called a ceiling.		
3.	For deep excavations, earth sides are braced and the bottom is drained.		
4.	Permanent flooring may be placed for use of personnel.		
5.	After the final completion all temporary construction must be removed from the site.		
6.	Utilities are hooked up to the building.		
7.	The site is landscaped and unpaved.		
8.	The owner's representatives give the building a final inspection.		

- **Match the questions on the left with the appropriate short answers on the right:**

1. Should standards be observed during construction?
2. Does contractor obtain construction permits from governmental agencies?
3. Does owner mobilize equipment and personnel for the project?
4. Are subcontractors notified of the contract award?
5. Is the site prepared to receive the building?
6. Does major construction start with the placement of floors?
7. Do the contractor's representatives give the building a final inspection?
8. Do the owners give the general contractor final payment?

a. Yes, he does.
b. No, he doesn't.
c. Yes, they should.
d. Yes, it is.
e. No, it doesn't.
f. Yes, they are.
g. Yes, they do.
h. No, they don't.

- **Find in the Text A the sentences containing:**

1. … obtains construction permits … .
2. … grading the top surface … .
3. … shifting of utility piping.
4. … other temporary construction … .

5. … of adjacent structures and terrain … .
6. … in the drawings and specifications.
7. … before signing of the contract … .
8. … from floor to floor … .

- **Match a-g to 1-7 to complete the conversations.**

1.	I'm looking for Susan.	a.	They're over there. They're taking a break.
2.	So, what do you do?	b.	He's sitting over there. Look, he's waving. (to wave – махнуть, подавать знак рукой).
3.	Excuse me. I 'm looking for the supervisor.	c.	She's in the timber yard with Janet. They're checking stock.
4.	What about maintenance? Do crane operators maintain their cranes?	d.	He's an electrician.
5.	Do you know where Manuel and Carlos are?	e.	Yes, I am. Is he here?
6.	Are you looking for Ken?	f.	I'm a building inspector. I check systems in new buildings.
7.	What does Ahmed do?	g.	In general, yes. But mechanics help, too.

5.4. READING

- **Read the Text B and find the sentences containing the new information for you.**

TEXT B

MAJOR BUILDING SYSTEMS

(abridged from «System Fundamental» by Jonathan T. Ricketts)

«An architect knows something about everything.
An engineer knows everything about one thing».
(M. Frederick)

The simplest building system consists of only two components. One component is a floor, a flat, horizontal surface on which human activities can take place. The other component is an enclosure that extends[1] over the floor and generally also around it to provide shelter from the weather for human activities.

The buildings consist of numerous subsystems. Major subsystems generally include structural framing and foundations, enclosure systems, plumbing, lighting, acoustics, safety systems, vertical-circulation elements, electric power and signal systems, and heating, ventilation, and air conditioning (HVAC)[2].

The portion of a building that extends above the ground level outside it is called the superstructure. The portion below the outside ground level is called the substructure. The parts of the substructure that distribute building loads to the ground are known as foundations. In most

buildings, the superstructure structural system consists of floor and roof decks, horizontal members that support them, and vertical members that support the other components.

Buildings are enclosed for privacy, to exclude wind, rain, and snow from the interior, and to control interior temperature and humidity. A single-enclosure type of system is one that extends continuously from the ground to enclose the floor. A multiple-enclosure type of system consists of a horizontal or inclined top covering, called a roof and vertical or inclined side enclosures called walls.

Roofs may have any of a wide variety of shapes. A specific shape may be selected because of appearance, need for attic space under the roof, requirements for height between roof and floor below, desire for minimum enclosed volume, structural economy, or requirements for drainage of rainwater and shedding of snow. The basic element in a roof is a thin, waterproof covering, called roofing.

Exterior walls enclose a building below the roof. The basic element in the walls is a strong, durable, water-resistant facing. A layer of insulation should be incorporated in walls to resist passage of heat. Generally, walls may be built of unit masonry, panels, framing, or a combination of these materials.

Openings are provided in exterior walls for a variety of purposes, but mainly for windows and doors. A window usually consists of transparent glass or plastics (glazing) held in place by light framing, called sash.

Doors are installed in exterior walls to give access to or from the interior or to prevent such access. For similar reasons, doors are also provided in interior walls and partitions. Thus, a door may be part of a system for enclosing a building or a component of a system for enclosing interior spaces.

The interior of a building usually is compartmented into spaces or rooms by horizontal dividers (floor-ceiling or roof-ceiling systems) and vertical dividers (interior walls and partitions). (The term «*partitions»* is generally applied to non-load-bearing walls.)

The underside of a floor or roof and of beams supporting it, including decorative treatment when applied to that side, is called a ceiling.

Interior space dividers do not have to withstand such severe conditions as do exterior walls. For instance, they are not exposed to rain, snow, and solar radiation.

Walls are usually given a facing that meets specific architectural requirements for the spaces enclosed. Such requirements include durability under indoor conditions, ease of maintenance, attractive appearance, fire resistance, water resistance, and acoustic properties appropriate to the occupancy of the space enclosed. The finish may be the treated surface of the exposed wall material, such as the smooth, painted face of a sheet-metal panel, or a separate material, such as plaster, gypsum board, plywood, or wallpaper.

Openings are provided in interior walls and partitions to permit passage of people and equipment from one space to another. Doors are installed in the openings to provide privacy, temperature, odor and sound control, and control passage.

The major systems for conveyance of liquids and gases in pipes within a building are classified as plumbing. Plumbing pipes usually are connected to others that extend outside the building to a supply source, such as a public water main or utility gas main, or to a disposal means, such as a sewer.

Part of the environmental control systems within buildings, along with lighting and sound control, HVAC is often necessary for the health and comfort of building occupants. HVAC usually is used to control temperature, humidity, air movement, and air quality in the interior of buildings.

For health, safety, and comfort of occupants, a building interior should be provided with an adequate quantity of light, good quality of illumination, and proper color of light. The required illumination may be supplied by natural or artificial means.

The science of sound, its production, transmission, and effects are applied in the building design for sound and vibration control. A major objective of acoustics is provision of an environment that enhances communication in the building interior, whether the sound is created by speech or music.

Electric power is generally bought from nearby utility and often supplemented for emergency purposes by power from batteries or a generating plant on the site.

Escalators, or powered stairs, are installed in such buildings as department stores and transportation terminals, or in the lower stories of office buildings and hotels, where there is heavy pedestrian traffic between floors.

Elevators are installed to provide speedier vertical transportation, especially in tall buildings.

Notes to the text:

[1]**to extend** – *здесь:* пристраивать.

[2]**HVAC** (Heating, Ventilation and Air Conditioning) – Отопление, вентиляция и кондиционирование.

VOCABULARY

appearance – внешний вид
artificial –искусственный
attic – чердак
conveyance – подача
divider – перегородка
drainage – водосток
enclosure – ограждающая конструкция
to exclude – устранять
to expose- – воздействовать
face – лицевой слой
facing – наружное покрытие, отделка
finish – отделка
framing – каркас (здания)
glazing – остекление
gypsum board – гипсокартон
humidity – влажность
insulation – теплоизоляция
liquid – жидкость
maintenance – техническое обслуживание
partition – перегородка
plaster – гипс, штукатурка
plywood – фанера
to prevent – препятствовать
roof deck – кровля, настил крыши
sash – оконная рама
sheet – лист
shedding – удаление
smooth – ровный
substructure – подземная часть здания
superstructure – надземная часть здания
to compartment – разделять
transparent – прозрачный, проницаемый
wallpaper – обои
waterproof – водоотталкивающий

5.5. *EXERCISES*

- **Choose words above to put into the sentences below:**

1. The portion of a building that extends above the ground level outside it is called … .
2. The portion below the outside ground level is called … .
3. The basic element in a roof is a thin, … covering, called roofing.
4. Doors are installed to give access to or … such access.
5. The interior of a building is compartmented into rooms by horizontal … and vertical … .
6. HVAC is often necessary for the health and comfort of building … .
7. A window usually consists of … glass.

- **Arrange the following words in pairs of synonyms:**

to extend, artificial, partition, to expose, divider, framing, water, gypsum, durable, maintenance, humidity, clear, resistant, sash, moisture, to build, repair, plaster, finish, liquid, facing, natural, to influence, transparent.

- **Match the following words with their definitions.**

attic	A mixture of lime or gypsum, sand, water, that hardens to a smooth solid and is used for coating walls and ceilings.
sash	The part of a building, especially of a house, directly under a roof.
plaster	The framed part of the window which holds the sheets of glass in place.
plywood	Capable of flowing freely like a water.
wallpaper	A structural material made of layers of wood glued together.
liquid	Paper, usually with printed decorative patterns in color, for covering the walls or ceilings of rooms, etc.

5.6. *EXPANDING YOUR VOCABULARY*

- **Complete these sentences with the correct form of the word in capital letters.**

1. … provides shelter from the weather for human activities (enclose).
2. A specific shape may be selected because of … (appear).
3. … are provided in exterior walls for a variety of purposes (open).
4. The … illumination may be supplied by natural or artificial means (require).
5. Walls are usually given (face).
6. Part of the … control systems within buildings is often necessary for the health and comfort of building (environment).

- **What are the different meanings of the word «sheet»?**
  Consult the dictionary and give your phrase examples.

- **Read and remember the following useful collocations with the word «survey».**

to survey – to study, inspect or examine sth, to describe the general condition of sth – обследовать, произвести геодезическую съемку

a survey – the result of surveying, either a map, plan or report – съемка
in everyday English it can also mean an opinion poll – социологический опрос

surveying – the process of a person preparing a map, plan or report – процесс съемки

Noun + noun collocations:

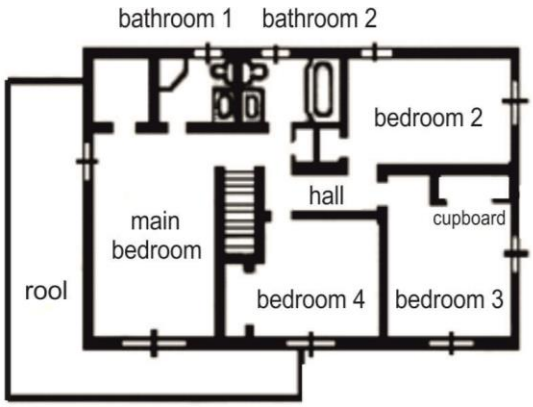
building surveyor – геодезист
land surveyor – землемер
quantity surveyor – сметчик
surveying authority – геодезическое управление

Verb + noun collocations:

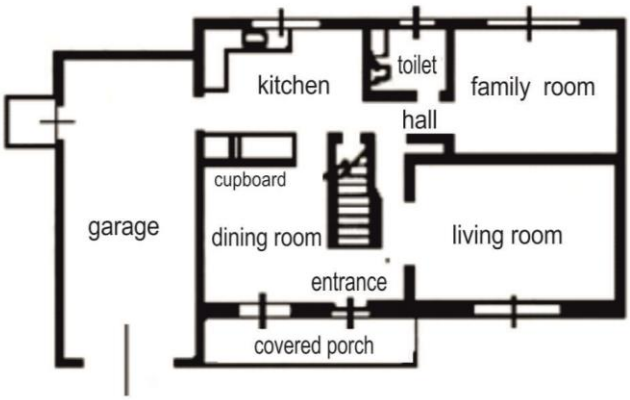
to make / perform a survey – сделать съемку
prepare a survey – подготовить съемку
to commission / employ a surveyor – назначить на должность / принять на работу геодезиста
to recommend a surveyor to sb – рекомендовать геодезиста кому-либо
to brief a surveyor about sth – информировать геодезиста о чем-либо
to instruct a surveyor to do sth – поручить геодезисту делать что-либо

- **Make some sentences of your own using the collocations above.**
  Think of the situations in which you can use these collocations.

- **Study these plans of a two-storey house.**
  Describe the house correctly according to these plans.



First floor plan



Ground floor plan

- **Now say whether these statements are true or false.**
  Correct the false statements.

1. The dining room is located under the main bedroom.
2. A hall is located in the center of the first floor.
3. There are three adjacent bathrooms оп the first floor.
4. There is a toilet between the kitchen and the dining room.
5. Bedroom 2 is situated over the family room.
6. There is a cupboard under the stairs.
7. Bedrooms occupy most of the ground floor.
8. Viewed from the front, the dining room is оп the left of the entrance.
9. Viewed from the rear, the living room is behind the family room.
10. The entrance is situated at the bottom of the stairs.
11. The kitchen and family room are located оп either side of the toilet.
12. A door in the garage leads to the kitchen.

- **Say where these rooms are in relation to each other:**

1. kitchen – dining room
2. bathroom 1 – kitchen
3. cupboard – bedroom 2, bedroom 3

- **Complete the table below.**

	Part of the building	Definition	Purpose
1.	**roof**	upper part of a building	1– to keep out rain and wind 2 – to tie walls
2.	**foundation**		
3.	**wall**		
4.	…..		
5.	…..		

5.7. RENDERING

- **Render the Text C paying attention to the key words in bold.**

TEXT C

BUILDING HOUSES

In the construction the first step to make is a careful **survey** of the site. A surveyor measures the **plot of land** or site and makes a plan of it. After the plot of land has been chosen, and it is then time to decide what kind of house is to be built. An architect draws pictures of what the house will look like when it is built. The building process takes place **under the supervision**

of foremen and engineers, and the structure is put up by bricklayers, carpenters, plasterers, plumbers, painters, locksmiths, glass-cutters, etc. Copies of the plan are made and are given to the builder. The builder then marks out **the shape of the house** on the site. He does this with wooden pegs and tape. Everything is now ready for the workmen to start. They dig away the top-soil and **cut trenches** about two or three meters deep along the tapes. The workmen mix cement, sand, pebbles and water in a cement mixer to make concrete. They use the concrete to fill in the **bottoms of the trenches**. This is called laying the foundations. The walls of the house will be built on the concrete foundations.

«FACTS IN BRIEF»

A JOB IN THE CONSTRUCTION INDUSTRY

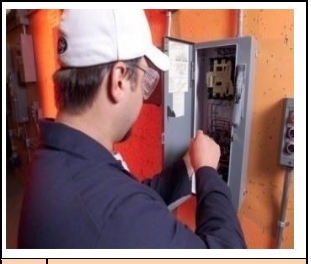
The construction industry has different trades or «crafts». A tradesperson is a specialist and normally has a qualification from a vocational school or other training institute. Plumbers, electricians and roofers are all tradespeople. Other tradespeople on residential housing projects include carpenters, painters and concrete finishers. Tradespeople are often subcontractors and work for a general contractor or a client.

You can refer to tradespeople in several ways:

- tradesperson / tradespeople (for men and women);
- tradesman / tradesmen (for men);
- tradeswoman / tradeswomen (for women).

- **Label tradespeople 1-8 with the words in the box.**

№№	Tradespeople	№№	Tradespeople
1.		5.	
2.		6.	
3.		7.	
4.		8.	

			
1 concrete finisher	**2** welder	**3** carpenter	**4** electrician
			
5 plumber	**6** glazier	**7** painter	**8** roofer

- **Complete these sentences. Write one word in each gap.**

1. I'm a bricklayer. I lay _____ .
2. I'm a(n) _____ . I do the wiring.
3. I'm a(n) _____ technician. I do the heating, ventilation and air conditioning.
4. I'm a carpenter. I work with _____ .
5. I'm a(n) _____ . I install windows.
6. I'm a painter. I use _____ to decorate houses.
7. I'm a welder. I weld _____.

- **Who does what?**

mason, joiner, carpenter, tiller, plasterer, roof plumber, blacksmith, steel fixer

- **Using words above, decide which tradesperson performs the work below.**

1. They work with a *trowel* and are responsible for creating the shell of a building.
2. They will be on site to fit *built-in wardrobes* in the bedrooms.
3. When it comes to a roof conversion, they will erect dormers.
4. They are responsible for wall and floor finishes in kitchens and bathrooms.
5. They use wet materials to prepare internal walls for painting.
6. The owner commissions one to repair a *leak* in a flat roof.
7. They will produce and install a railing on a balcony.
8. They work with wire and *pliers* to make the building *tension resistant*.

Focus on Poetry

- **Read the passage from the poem «This is the house that Mark built» written by Mark Twain.**

THIS IS THE HOUSE THAT MARK BUILT

These are the bricks of various hue
And shape and position, straight and askew,
With the nooks and angles and gables too,
Which make up the house that Mark built.
This is the sunny and snug retreat,
At once both city and country seat,
Where he grinds out many a comical grist,
The author, architect, humorist,
The auctioneer and dramatist,
Who lives in the house that Mark built…

- **Match the idioms with their explanations.**

1.	Every nook and cranny	–	to run away
2.	Like a cat on hot bricks	–	to cause great suffering to (people, who are poor or without power) by cruel or unjust treatment
3.	A hue and cry	–	every part of place
4.	Beat a retreat	–	very nervous or worried
5.	Grind the face of	–	loud public opposition or annoyance

- **Study the words and word combinations and say what we can call: a) element of a building; b) compound unit; c) unit; d) material.**

roof, roof structure, joist, mechanical system, timber, wall, cladding, corrugated sheet, room, ceiling, steel, floor, wearing surface, tile, vinyl, door, floor, foundation, column bases, framework, parapet, basement, concrete, waterproof covering, floor framing, trimmer, wood-wool asphalt, cellar, wall structure.

- **Fill in the gaps in the text using the information below.**

1.	When the architect designs the house, he places the bedrooms away from the drawing-room because …	a.	people need to wash before going to bed
2.	He also places the rest-room next to the pool and baths because …	b.	people need protecting from the weather
3.	and the bathrooms near the bedrooms because …	c.	the noise from the drawing-room may disturb people sleeping
4.	On the outside of the house he places a covered porch over the entrance because …	d.	it is good for relaxation

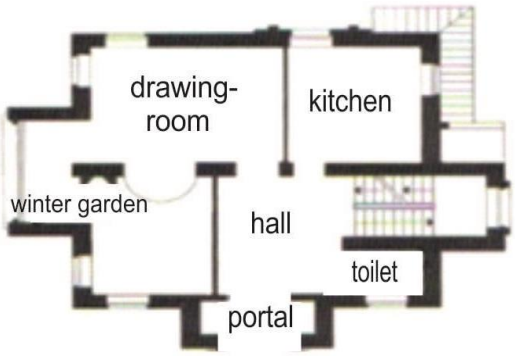
- **Match the sentence halves in A and B.**

	A		**B**
1.	We haven't all met before so	a.	with the explanation of necessity of construction of the object we are presenting.
2.	I'm going to be talking about	b.	determine the expenditures for the construction of the building.
3.	I'll start	c.	I'd like to introduce myself.
4.	Then I'll move on	d.	pay attention to its shape.
5.	Finally, I'm going to	e.	a new building which we are planning to present
6.	If you don't mind	f.	for a discussion and any questions.
7.	I'll be developing the elevations	g.	to a presentation itself.

- **Say where the rooms of House 1 (next page) are located in relation to each other.**

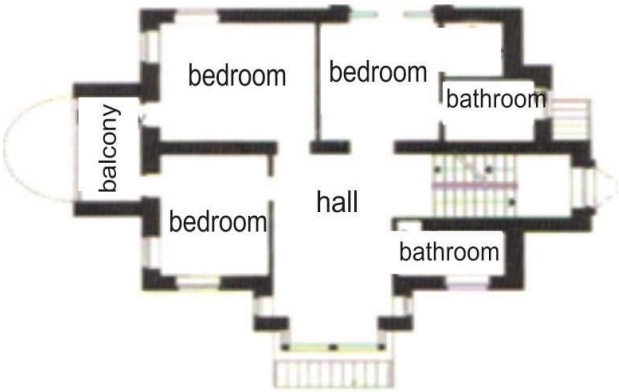
1. kitchen – garage
2. rest-room – drawing-room
3. boiler-room – toilet
4. kitchen – drawing-room

- **Look at the drawings illustrating the plans and the elevations of House 1 and answer the questions given below using the drawing.**



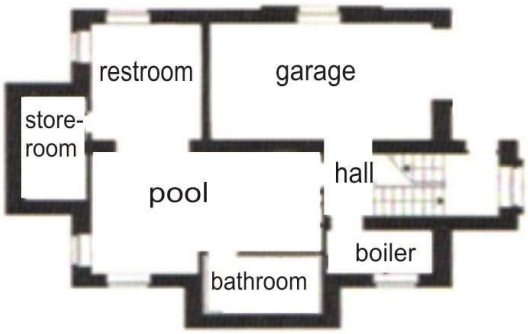
First floor plan

Front elevation

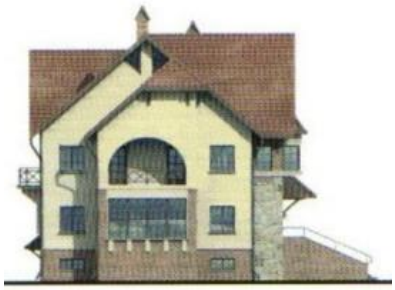


Second floor plan

Back elevation



Ground floor plan



Side elevation

1. What is under the winter garden?
2. What extends beyond the top of the roof?
3. Which rooms are in front of the bathrooms?
4. Which elevation has more windows?
5. Which wall is parallel to the front?
6. Which walls are at right angles to the front wall?

5.8. TRANSLATING

- **Translate the text into English.**

ОХРАНА ТРУДА И ТЕХНИКА БЕЗОПАСНОСТИ
НА СТРОИТЕЛЬНОЙ ПЛОЩАДКЕ
ПРИ ПРОИЗВОДСТВЕ СТЕКОЛЬНЫХ РАБОТ

При производстве стекольных работ необходимо руководствоваться строительными нормами и правилами СНиП 12-03-2001 «Безопасность труда в строительстве. Часть 1. Общие требования», СНиП 12-04-2002 «Безопасность труда в строительстве. Часть 2. Строительное производство». В соответствии с требованиями указанной нормативной литературы не допускается выполнять монтажные работы по остеклению окон на высоте в открытых местах при скорости ветра более 15 м/с, при гололедице, грозе или тумане, исключающих видимость в пределах фронта работ.

Руководители строительства должны своевременно оповещать монтажное подразделение о резких изменениях погоды – ураганном ветре, грозе, снегопаде и т.п. При ветре силой выше 6 баллов, тумане, ливне монтажные работы следует прекратить.

Не допускается нахождение людей под монтируемыми элементами конструкций и оборудования до установки их в проектное положение и закрепление. При необходимости нахождения работающих под монтируемыми конструкциями должны осуществляться специальные мероприятия, обеспечивающие безопасность монтажа.

К самостоятельной работе по производству стекольных работ допускаются лица, прошедшие обучение, сдавшие экзамены квалификационной комиссии и получившие соответствующий разряд. Кроме специального обучения, каждый поступающий на работу должен получить вводный инструктаж по технике безопасности и по безопасным методам работы, который, как правило, производится непосредственно на рабочем месте.

Электрифицированные инструменты перед началом работы должны быть проверены, токоведущие провода тщательно изолированы. Работать неисправным инструментом запрещается.

Рабочие монтажники-высотники должны быть обеспечены спецодеждой согласно существующим нормам.

5.9. SPEAKING

- **Define some peculiarities between these trades – a constructor and an architect. What kinds are they? How should they cooperate and add each other? Compose a dialogue between a constructor and an architect discussing work over any project that you are doing now.**

- **Read these quotations and discuss them.**
  Using the Internet find information about their authors.

1. «*We shape our buildings; thereafter they shape us».*

(W. Churchill)

2. «*A man builds a fine house; and a now he has a master, and task for life: he is to furnish, watch, show it, and keep it in repair, the rest of his days».*

(R. Emirson)

3. *«A proper building grows naturally, logically, and poetically out of all its conditions».*

(L. Sullivan)

- **Work as an interpreter in the following dialogue:**

- Чем я могу вам помочь?
- Well, we'd like some background information about the project...

- Я могу попросить своего помощника дать вам информацию в деталях. Да, кстати, мы отправляли вам сообщение пару недель назад.
- Yes, we have a copy of that, thank you. We're interested in finding out more information about the people working here. How many workers do you have on site? What do they do? Where are they from? Are they all local people?

- Это зависит от того, чем мы заняты. У нас развитой бизнес, мы имеем большое количество субподрядчиков и поставщиков, которые постоянно меняются.
- OK.

- Отвечая на ваш вопрос, скажу, что у нас около 100 человек работают на строительной площадке и они в основном из нашего региона.
- And you're in charge of the site?

- Да, наша компания – это генеральный подрядчик проекта. Мы координируем субподрядчиков и следим, чтобы работа велась по плану и в соответствии с бюджетом. Я представляю отчет управляющей проектом, Сабине Том.
- I see. And your father is Kasper Karp?

- Да. Иногда в больших проектах мы работаем и с другими компаниями.
- Could you tell us something about...?

- Извините, я вижу М. Смита. Он наш клиент и у нас встреча с ним и Анной Блэк через несколько минут.
- Anna Black?

- Да, Анна работает в компании поставщика цемента, который снабжает нас цементом в течение всего проекта. Одну минуту, мой помощник, Роберт Лейн ответит на все ваши следующие вопросы.
- Thank you.

- **Project «Building Houses».**
  Divide into teams of 3 or 4 students.
  Using the knowledge you got in the Unit make up a Power Point presentation based on the structure given below.

1. Main Part - Introduction

- **Location**, **orientation (**front of the building, back, sides, elevation, short axis, long axis, pedestrian access, vehicular access, etc.);

- **Function, purpose (**residential, education, religion, recreation, welfare, transport and industry, administration and commerce, block of flats, housing estates, etc.);

- **Size (**total area, volume, length, width, depth, height, etc.);

- **Materials used (**plastics, clay, glass, aluminum, concrete, reinforced concrete, etc.; transparency, corrosion resistance, conductivity, light weight, heavy weight, hardness, fire-resistance, etc.);

- **Description of Construction Site** (climatic parameters, relief of the average type, boundary, climatic region, green plantations, marked inclination etc.).

2. Architectural Concepts

- **Layout roads** (main traffic artery, motorway, roads, transport lines, direction, junction, pedestrian precinct, pavement, heavy passenger traffic flow, parking lots, access roads, congested places, etc.);

- **Equipping with services and utilities (**municipal land improvements, planting of greenery, sanitary' gaps, uninhabited place, town areas, creation of plantation system, etc.);

- **Spatial Planning Concepts** (structure, territory, zone, floor, evacuation, multistory building, roof, foundation, wall, underground parking area, basement floor, fire-safety standards, stair, etc.);

3. Constructional Concepts

- **Foundation (**shallow foundation, footing consolidation, differential settlement, secondary consolidation, primary consolidation, frost heave, frost boil, mat foundation, etc.);

- **Framework (**frame, skeletal structure, braced frame, rigid frame, linear members, joint, moment-resisting frame, plastic hinge, fixed frame, sides way, hinged frame, pin joist, A-frame, three-hinged frame, bent, knee, etc.);

- **Wall** (upright construction, bearing wall, nonbearing wall, exterior wall, interior wall, partition, bearing partition, nonbearing partition, screen, movable partition, demountable partition, etc.);

- **Roof** (covering, flat roof, pitched roof, pitch, rise, run, gable, roof, hip roof, curb roof, mansard, butterfly roof, shed roof, lean-to, penthouse, pavilion roof, hipped gable, gambrel roof curb, rainbow roof, barrel roof, skylight rake, etc.);

- **Floor** (flooring, wearing surface, finish floor, subfloor, blind floor, rough floor, floor framing, rim joist, header, bridging, solid bridging, trimmer, tailpiece, beam pocket, deck, decking, acoustic decking, etc.);

- **Stair:** (straight-run stair, flier, flight of stairs, straight flight, landing, quarter-turn stair, pace, footpace, half-turn stair, dog-leg stair, three- quarter, turn stair, winding stair, circular stair, spiral stair, etc.);

- **Engineering Systems** (heating, ventilation, air-conditioning, lift, radiator, illumination, temperature, electricity, boiler, cavity, relative humidity, prevailing, wind, water vapour, moisture, noise level, sunlight, condensation, climate effects, protection of environment, living and working conditions, etc.);

- **Bar chart of the sequence of trades of the building site** (erecting steelwork, excavating ground, supervision, building brickwork, laying roof covering, installation of heating equipment, manufacture of screens, etc.).

- **Useful Words and Phrases of Project's Presentation.**

1.	Right, ladies and gentlemen, shall we begin? Right then. Shall we begin? Are we ready to begin? etc.
2.	We'd like to introduce our building firm; May we introduce? Our building company has been operating for a year now; etc.
3.	Our purpose today is to present the object you may be interested in; Our objective today is to attract your attention to the structure; The subject of our talk is to present an object of a new block of flats; The theme of our presentation is; We'd like to give you an overview of construction; etc.
4.	We've divided our talk into (three) parts; next, then, finally, lastly; To start with we'll describe; Then we'll mention some of the problems etc.
5.	Our talk will take about ten minutes; The presentation will take about two hours but there will be a twenty minute break in the middle; etc.
6.	Having supposed that; We have chosen this performance because; We've solved this problem using; These figures say that; etc.
7.	It's known, obvious, clear; No doubt; Referring to; To remind; Don't forget; Appealing to; Opening the debates; As a primary consideration; etc.

8.	Have a look at this graph; Let’s have a look at the floor plan; Please, pay your attention to the front elevation of this object; This plan illustrates; etc.
9.	What we are getting at this is; The crux of the matter is; our thesis is; What we have to do is; It should be said that; It is interesting to note that; That's one thing we'd like to stress very heavily; etc.
10.	Any other points? Is that clear? Have we made my point clear? If there’s anything you don't understand, please, ask me; etc.
11.	We mean to say that; In other words; That is to say; To all this must be added that; As we have already mentioned; We have forgotten to say that; The following fact speaks for itself; etc.
12.	We’d like to end by emphasizing the main points; We'd like to finish with a summary of the main points; To put it briefly; To put it simply; Finally; To conclude; Summing up; etc.

APPENDIX «A»: TEXTS FOR SPECIAL PURPOSES

ARCHITECTURE AS A PROFESSION

ARCHITECTURE: ITS FORMS AND FUNCTIONS

Architecture is the art or science of planning, building and structures. Without consideration of structural principles, materials, social and economic requirements a building cannot take form. But without aesthetical quality inherent in its form a building cannot be considered as a work of architecture as well.

From the very beginning of construction in human history lots of architectural skills, systems and theories have been evolved for the construction of the buildings, which have housed nations and generations of people in any kind of their activity. Writings on architecture are almost as old as writing itself. Books on the theory of architecture, on the art of buildings, and on the aesthetical view of buildings exist in great number. The oldest book, which sets forth the principles, upon which buildings should be designed and which aim is to guide the architect, is the work of Markus Vitruvius Pollio written in the first century B. C.

Architecture is an art. Its nowadays expression should be creative and consequently new. The heritage of the past cannot be ignored, but it must be expressed in modern terms. There exists an evident paradox in the coexistence of change and survival in every period of human civilization. This paradox of change and repetition is clearly illustrated in any architectural style.

Architecture is also the style or manner of building in a particular country or period of history. There are widely known examples of Gothic architecture all round the globe. During many centuries mankind admires the architecture of ancient Greece or Roman Empire as well.

Nearly two thousand years ago the Roman architect Vitruvius listed three basic factors in architecture. They are convenience, strength and beauty. These three factors have been present and are always interrelated in the best constructions till the 21st century. No true architect could think of any of them without almost automatically considering the other two as well. Thus, architectural design entails not only the necessity to study various solutions for convenience, structure and appearance as three separate processes. Architectural design also includes the necessity to keep in mind the constant interaction of these factors. It's impossible for an architect first plan a building from the point of view of convenience, and then make the design of a strong construction around his plan to shelter it. Then, as a final touch, try to adjust and decorate the whole to make it pretty. Any design evolving from such kind of work will produce only a confused, incoherent, and unsatisfactory building. When speaking about any truly great building we cannot but say that every element in it has a triple implication or significance.

This triple nature of architectural design is one of the reasons why architecture is a difficult art. It needs some unique type of imagination as well as long years of training and experience to

make a designer capable of getting requite in the light of these three factors—use, construction and aesthetic effect – simultaneously. The designer must have a good knowledge as of engineering so of building materials. This knowledge will enable him to create economically strong and practical construction. The designer, in addition, must possess the creative imagination, which will enable him to integrate the plan and the construction into the harmonious whole. The architect's feeling of satisfaction in achieving such integration is one of his/her (their) greatest rewards.

LANDSCAPE ARCHITECTURE

Landscape architecture is a multi-disciplinary field, incorporating aspects of: botany, horticulture, the fine arts, architecture, industrial design, geology and the earth sciences, environmental psychology, geography, and ecology. The activities of a landscape architect can range from the creation of public parks and parkways to site planning for campuses and corporate office parks, from the design of residential estates to the design of civil infrastructure and the management of large wilderness areas or reclamation of degraded landscapes such as mines or landfills.

Landscape architects work on all types of structures and external space – large or small, urban, suburban and rural. The most valuable contribution can be made at the first stage of a project to generate ideas with technical understanding and creative flair for the design, organization and use of space. The landscape architect can conceive the overall concept and prepare the master plan, from which detailed design drawings and technical specifications are prepared.

In some states, provinces, such as Ontario, Canada and Santa Barbara, California, all designs for public space must be reviewed and approved by licensed landscape architects. Landscape architecture is the design of outdoor public areas, landmarks and structures to achieve environmental, social-behavioral or aesthetic outcomes. It involves the systematic investigation of existing social, ecological and geological conditions and processes in the landscape, and the design of interventions that will produce the desired outcome.

The scope of the profession includes: town or urban planning; environmental restoration; parks and recreation planning; visual resource management. A practitioner in the profession of landscape architecture is called a landscape architect. The project of the park was designed by architects Frederick Law Olmsted and Calvert Vaux later founded a large Prospect Park in Brooklyn. Despite the fact that the park looks very natural, almost all landscapes are created manually. The park has several artificial lakes, a large number of paths, two ice rinks, beautiful landscapes and wildlife, and lawns that are used for different sports, as well as children’s playgrounds and a zoo. The park migratory birds fly, and so it is very popular with birdwatchers. 10-km road that surrounds the park, often used by joggers, bikers and inline skating enthusiasts, especially on weekends and after 7 p.m., when automobile traffic is prohibited. Central park is often called the green lungs of Manhattan.

In Russia the art of landscape design is not as developed as in other countries.The variety of the professional tasks that landscape architects and examples of project types:

1 – the planning, form, scale and sitting of new developments;

2 – civil design and public infrastructure;

3 – sustainable development;

4 – campus and site design for public institutions and government facilities;

5 – parks, botanical gardens, arboretums, nature preserves;

6 – recreation facilities; i.e.: playgrounds, gold courses, theme parks and sports facilities;

7 – housing areas, industrial parks and commercial developments;

8 – highways, transportation structures, bridges and transit corridors;

9 – urban design, town and city squares, waterfronts, pedestrian schemes and parking lots;

10 – natural park, tourist destination, and recreating historical landscapes and historic garden appraisal and conservation studies;

11 – reservoirs, dams, power stations.

An integral part of landscape architecture is the Street furniture. Street furniture is a collective term (used mainly in the United Kingdom) for objects and pieces of equipment installed on streets and roads for various purposes. It includes benches, bollards, post boxes, phone boxes, streetlamps, traffic lights, traffic signs, bus stops, tram stops, taxi stands, public lavatories, fountains, watering troughs, memorials, public sculptures. An important consideration in the design of street furniture is how it affects road safety.

A ***bench*** is essentially a chair made for more than one person, usually found in central parts of settlements (such as plazas and parks).

Bollards are posts, short poles or pillars with the purpose of preventing the movement of vehicles onto sidewalks or grass.

Post boxes, also known as mail boxes, are found throughout the world, and have a variety of forms. ***Phone boxes*** or telephone booths are prominent in most cities.

Streetlamps are designed to illuminate the surrounding area at night, serving not only as a deterrent to criminals but more important to allow people to see where they are going. The color of streetlamps bulbs differ, but generally are white or yellow.

Traffic lights usually include three colors: green to represent “go”, amber to inform drivers that the color will alternate shortly, and red to tell drivers to stop. They are generally mounted on poles or gantries or hung from wires. But there are more original.

Traffic signs warn drivers of upcoming road conditions, speed limits, etc. There are signs for pedestrians.

Public lavatories allow pedestrians the opportunity to use restroom facilities, either for free or for a fee.

Street furniture itself has become as much a part of many nations’ identities as dialects and national events, so much so that one can usually recognize the location by their design; famous examples of this include:

a). the red telephone boxes of Britain;

b). the residential mail boxes of the United States;

c). the streetlights and metro entrances of Paris.

The Tiergarten park in Berlin has a collection of antique streetlamps from around the world, both gas and electric.

Since most items of street furniture are of a utilitarian nature, authorities generally keep them up-to-date and replace them regularly (usually to conform to regulations, safety codes, etc.). Because of this, old, outdated, obsolete or even nonfunctional street furniture can be rare sights. Street furniture is often used for advertising. In Europe there is a heavy competition for public spots to do advertising in different poster formats since these spots generate high contact figures — means many people can possibly remember a presented advertising message on a major road or square.

The presentation of this advertising has to fit in the overall urban planning rules of cities and their architecture. These requirements lead to interesting design approaches for poster presentation in different formats.

HOW DO I BECOME A HOME ARCHITECT?

Home architects design residences of all types, from small housing complexes to huge mansions and estates. They draft the initial blueprints for a home along with detailed schematics for various systems, including plumbing, ventilation, and electrical units. A person who wants to become a home architect is usually required to obtain at least a bachelor's degree, gain several years of internship experience, and pass extensive licensing exams. In addition to the formal requirements, an individual can improve his or her chances of finding employment by developing strong communication and computer skills.

The minimum educational requirement to become a home architect in many states and countries is a bachelor's degree from an accredited university. Bachelor's degree programs in architecture typically take about one year longer than most programs; full-time students can expect about five years of coursework. Students have the opportunity to learn about the history and theory of architecture in classroom lectures, as well as gain hands-on experience in specialized drafting and design courses.

Many people are able to find internship positions after obtaining bachelor's degrees, but some students choose to pursue additional two-year master's degree plans to further their education and improve their chances of finding work. A master's program in home architecture can better prepare an individual for the business side of the profession. Since a large number of professional architects are self-employed, an education in business principles can help prospective workers determine the best ways to find jobs and deal with clients.

Graduates of accredited degree programs are required to work as assistants or interns for up to three years in most countries. During an internship, an individual who wants to become a home architect has the chance to learn about the profession firsthand from established experts in the field. Internship programs are commonly found at large architectural firms, where new workers assume a variety of responsibilities.

EDUCATION AND CONSTRUCTION: A TYPOLOGY OF SCHOOL-BUILDINGS

Modern school building covers a broad spectrum, from free and open forms to strict, rational *layouts*. In part, these reflect different architectural *approaches*; but other factors also play a role, such as the type of school, requirements for the development of social competence, the need for individual instruction, ecological *constraints*, and the use of new technology.

In Germany, the educational system is divided into a number of *tiers*: primary level, secondary level 1, and a secondary level 2 (roughly equivalent to the sixth-form college). In some states of Germany, the comprehensive school is the basic type. Although the federal states have their own guidelines for schools, school building is the responsibility of the municipal or district authorities, with the superior school authority and the various ministries for cultural affairs granting final *consent*. In Austria, the Federal Property Corporation (BIG) has been responsible since 1992 for property development on behalf of the republic - including school building. The BIG also decides on the award of contracts, few of which are granted to younger architects or smaller practices, however. On the other hand, the high architectural quality of public building in Austria shows that the BIG is not solely concerned with cost efficiency. In France, many aspects of the country's administration have been decentralized since 1982. The central government has delegated responsibility for certain schools to the various regions and departments. This reform led to the creation of many new schools in the 1980s, with opportunities for younger architects to gain commissions. The public education system in the US is also largely decentralized, with considerable differences existing between the various states in the financing and construction of schools. Architects are selected mainly by interview.

Competitions are the exception. The Pisa Study, which provided an international comparison of educational standards, has caused something of a stir in Germany with its disappointing assessment of that country's teaching system. Up to now, the traditional classroom has remained the normal place of instruction. A great deal of thought has been given to its design and fitting out. In most cases, classrooms receive daylight only from one side. A floor area of 1.8-2.2 m^2 per pupil is the required standard, and the recommended number of pupils per class is between 8 and 14 in schools that provide special educational support and between 30 and 35 in mainstream schools leading to higher educational levels. Since the tight constraints of the normal school brief allow architects little latitude, spatial quality usually manifests itself in the concept and design of the intermediate zones, which play a major role in terms of communication. Acoustics is also an important aspect. Reverberation times of 0.3-0.5 seconds are recommended with background noise levels of 30 dB (A).

A further design criterion in schools is the location of the various functions. Areas with noisy activities should be separated from the classrooms. At the same time, direct links are desirable between all areas. School buildings can, therefore, be divided into various categories, according to their layout and access systems: central, linear, combined linear, linear with a central focus, and additive.

The school in Markt Indersdorf by Allmann Sattier Wappner is an example of a layout with central access, necessitated in part by the extensive spatial programme and the large number of pupils. The linear access routes, laid out in the form of a rectangle around a central space, allow a clear articulation of the individual areas. At the center are *recreation* zones and the sports hall. The integration of large volumes into the existing surroundings, which is normally difficult with this form of layout, has been skillfully resolved here. Both the Strawberry Vale School in Canada by Patkau Architects and the school in Vienna by Helmut Wimmer are variations on a linear type of organization. In the former case, the modest spatial brief and the relatively small number of pupils (448) allowed a freer layout. Teaching takes place mainly in classrooms, so that there is no great volume of traffic within the school. This is of advantage with linear forms of access. The area with stepped seating functions as a communal zone, compensating for the lack of a recreation hall and providing direct access to the classrooms. The architectural design of the single-storey school in Vienna by Helmut Wimmer is more *restrained*. The creation of courtyard spaces *enables* the building to be divided into a three bay layout with natural lighting in all rooms. Here, too, open corridor zones compensate for the lack of communal spaces. Special uses are housed in separate volumes along the corridors, with glazed facade areas between these units providing visual links with the outside world. The classrooms are lined up in pairs between the main access routes and are day lighted via the courtyard spaces. Combined linear forms of access are found in schools with a comb-like layout or where two or more tracts meet at an *angle*. In such cases, it is possible to locate central functions at the points of intersection of the tracts, and distinct teaching areas can be organized independently of each other.

The school by Benedito and Orteu is an example of this. The main entrance and administration are located at the junction of the two wings, which contain different uses and function as separate units. As a result, the canteen and the sports hall do not disturb lessons in the classrooms. Circulation in the three-bay classroom tract is via an "internal street" with enclosed courtyards that allow the *ingress* of daylight. In the comb-like layout of the school by Diezinger and Kramer in Eichstatt, the various tracts are united by a spine structure. The classrooms, all of which have a south or west aspect, are linked in three-room units, with group spaces between them. The comb-like layout also facilitated the integration of fire-escape staircases at the *requisite* spacing.

The complex by Stephan Eberding is laid out with three linear tracts radiating from a central point - a hybrid form, in which the node serves as a common assembly hall for the separate schools housed in each of the wings. The access routes are in the form of internal corridors with rooms laid out on both sides. By separating the various school functions in this way, mutual disturbance *is avoided*. The classrooms receive daylight from one side. Each of the three *tracts* has its own coloration, which serves as a means of orientation and also helps pupils to identify with "their house". Schools with additive layouts are usually *extensive*, low-rise developments, in which the structure, access system and spatial distribution are closely integrated, and all *realms* are linked with each other. Day lighting the internal zones is often a problem in multi-storey developments, and repetitive spatial sequences may make orientation difficult. In the school for mentally and physically disabled children by Gruntuch and Ernst, the layout is divided into five similar "classroom houses" linked by a linear access route or play strip. The uniform organization is interrupted by the great hall, which, like the colour concept, provides

a means of orientation. The classroom units, in which between six and eight pupils receive tuition, consist of a 50 m^2 main space and a 20 m^2 group room.

The more compact volume of the five-storey, inner-city school in Basle by Miller & Maranta is vertically articulated, with the entrance hall functioning as a distribution space for the various classroom levels. These, in turn, are divided into four strip-like sections with an offset layout and a circulation route that *meanders* through the middle. Light *wells* allow the classrooms to receive daylight from two sides. The many visual links and views out of the building are also an aid to orientation. The problem of integrating the large volume of the sports hall was resolved by burying it in the ground at the base of the building. The projects presented here not only illustrate various layout types; they also cover a broad architectural spectrum. One thing they have in common, though, is that they all contain exciting spatial sequences that in various ways form a stimulating environment for learning.

DESIGNING AND CONSTRUCTION OF INDUSTRIAL BUILDINGS AND FACILITIES

Industrial buildings are a basic element of any manufacturing company, where manufacturing facilities, warehouse premises, office and utility rooms as well as auxiliary areas are located. A properly designed industrial building must strictly meet not only the regulatory requirements but also logistics requirements, such a building must fit in the current infrastructure, have high technical and economic parameters assuring capital investment efficiency, it must insure the possibility for further extension of manufacturing scope without shutdown of the plant's technological process.

Industrial buildings designing is based on the future manufacturing process technology. While designing a manufacturing building it is necessary to take into account all conditions of planned technological processes. A project under development must strictly correspond to the manufacturing process purpose, take into account all its process and other specific features. Properly designed engineering utilities and systems assure not only safety and non-stop operation of an enterprise, but also reduce total consumption of energy recourses.

While designing a manufacturing building due attention is paid to up-to-date industrial design both of interior and exterior elements, to use of up-to-date and easy producible materials for buildings facing, to assurance of comfortable working environment inside of a building for working personnel observing all sanitary regulations, aesthetic and other requirements.

Designing of industrial buildings, elaboration of operational documentation is realized in accordance with all technical requirements of normative standard documentation, including:

- SNiP (Construction Norms and Rules) 31-03-2001 «Manufacturing buildings».

- GOST 27751-88 (ST SEV 384-87) «General Principles on Reliability for Structures. Basis of Structural Design».

- SNiP 2.03.11-85 «Corrosion Protection of Buildings Structures».

It becomes comfortable for the staff, aesthetically pleasant and gives the opportunity to use it for meetings, shows and things like that. Meeting rooms can be separated from the conveyer only by the transparent panoramic glass in order to help the visitors see the process of producing something. The designer can start his work at the very start of the construction. Then

the designer defines the construction expenditures. The designer understands how to make an attractive construction without growing of the budget.

WILLIS TOWER

Willis Tower, formerly Sears Tower, is located on Wacker Drive in the heart of the West Loop, Chicago's premier submarket and home to its largest corporations and commuter rail stations. The building was renamed Willis Tower in July 2009. Completed May 3, 1973, Willis Tower rises to a height to 1,450 feet. The building held the record for the world's tallest building for 25 years until the Petronas Towers in Kuala Lampur, Malaysia were built in 1998. In 1982, the antennas added to the building increased its total height to 1,704 feet. In 2000, one of the building's antennas was extended to 1,729 feet, making it the world's tallest building to the tip of its antenna. The building held this title until early 2009 when Burj Dubai topped out at over 2,600 feet, making it the tallest man-made structure ever built.

Designed by the architectural firm Skidmore, Owings & Merrill for Sears, Roebuck & Company Willis Tower is one of the most recognizable landmarks in the Chicago skyline and in the world. The building contains approximately 3.8 million rentable square feet. The Property also features a 160-car executive parking garage. Other amenities include a world-class broadcast platform, tallest sky deck, full-service conference center, fitness facility, and exceptional technology features.

The Willis Tower Conference Center located on the 33rd floor offers an upscale conference facility consisting of seven meeting rooms that provide a distraction free meeting environment and state-of-the-art audio/visual equipment, Internet connectivity, and catering service. The Willis Tower Conference Center can accommodate groups up to 300 persons for a theatre-style meeting and as many as 250 people for a seated dinner.

The architect and structural engineer designed the Tower's curtain wall with a modernistic masterwork of glass and aluminum. The curtain wall system consists of bronze-tinted vision glass and black anodized aluminum spandrel panels captured in a striking black anodized aluminum framing. Granite panels, with aluminum-framed glass storefront windows, accent the ground level facade on the east, north and south building elevations. The structural framing consists of steel columns and beams in a «mega-module» system consisting of nine modules. The foundation system consists of belled, reinforced concrete caissons with reinforced caisson caps.

Willis Tower has one of the most complete life safety systems ever devised for a high-rise building. All steel is fireproofed. Automatic sprinklers cover each of the 4.5 million gross square feet of space. Duct-mounted smoke detectors are designed to pinpoint the source of the smoke and a computer-activated system will exhaust the smoke from affected areas. The self-contained backup emergency power supply supports the alarm system, fire pumps, communication system, emergency lighting and select elevators in the event of an electrical failure. There are four two-hour, fire-rated stairwells, one of which is specifically ventilated for smoke free evacuation. Each stairwell has a phone every four floors to communicate with the Command Center.

BIONIC ARCHITECTURE

Bionic architecture is a movement for the design and construction of expressive buildings whose layout and lines borrow from natural (i.e. biological) forms. The movement began to mature in the early 21st century, and thus in early designs research was stressed over practicality. Bionic architecture sets itself in opposition to traditional rectangular layouts and design schemes by using curved forms and surfaces reminiscent of structures in biology and fractal mathematics.

One of the tasks set themselves by the movement's early pioneers was the development of aesthetic and economic justifications for their approach to architecture. There's a look at some of the most incredible examples of bionic architecture and some of the leading bionic architects in the world.

Anti-Smog Building. This is one of the projects from Vincent Callebaut, a young French architect who is making some serious waves in the world of bionic architecture. It's a mixed-use building, erected over abandoned railroad tracks in Paris and turn it into useful recycled energy resources, and is designed using green technologies that actually suck the smog from the streets of. A natural lagoon, as well as a rooftop view of Paris is both bonuses that make people want to spend time in this eco-friendly building.

The Ascent at Roebling Bridge. This building was constructed by Daniel Libeskind, an architect best known for winning the Masterplan competition to rebuild the World Trade Center in New York City. This building isn't of quite such historic importance, but it reflects the architect's goals in relation to bionic architecture. The sloping crescent roof takes design cues from the natural environment and also offer residents of the building an uncluttered view of the city. The natural tones of the building were specifically chosen to reflect the earth and sky of the area.

Ark of the World. The buildings created by Greg Lynn are based on a type of architecture for which he coined the term “blobitecture”. This type of building relies on the 'blob-like' shapes of amoebas and other naturally occurring forms to create the basic bulbous design of the buildings. One of the best examples of this is his plans for the Ark of the World, a building located in the Costa Rica rainforest which is planned to serve as an eco-center and location of eco-education. A tensile fabric roof serves as a platform for people interested in looking out over the rainforest and a column-based water garden keeps the place cool.

Treescraper Tower of Tomorrow. Leading architect William McDonough shows his commitment to creativity, intelligent building and designs that feed ecosystems. As the name suggests, this is a skyscraper that has been designed in a way that mimics the growth and change of a tree. A curved, aerodynamic building, it uses minimal construction materials, while making maximum use of the enclosed space. All of the water in the building is recycled in a manner similar to that of how a tree would re-use water and nutrients. Wastewater from sinks flows into the building's three gardens and the water from the gardens is subsequently re-used in the toilets.

Urban Cactus is a 19-storey residential building, shaped in a way that is inspired by an irregular pattern of outdoor spaces. Natural sunlight and a unique design on the harbor give it the semblance of bionic architecture and of course its interesting and curvy aesthetics make it an appealing building.

Turning Torso is the tallest building in Scandinavia and was created by Santiago Calatrava, an architect who has taken a lot of flak from people who say that his designs aren't realistic. There is some concern over the longevity of his designs, despite the fact that they are built in such a way as to feature traits natural to the environment. It is unclear at this point whether or not those fears are warranted. What is clear, is that he's got a unique design perspective that is featured in buildings (such as this one) located all around the world.

Jumptown Building aims to become the greenest building in the already-green city of Portland, Oregon. It's already getting assistance from leading Malaysian architect Ken Yeang. Green features of this design include solar power, sewage and storm water recycling, use of sustainable materials and a unique garden design which turns a rooftop garden into one which cascades down the side of the building.

The Eden. The Eden Project is a visitor attraction in Cornwall in the United Kingdom, including greenhouse. Inside the artificial biomes are plants that are collected from all around the world. The complex is dominated by two gigantic enclosures consisting of adjoining domes that house plant species from around the world. The domes consist of hundreds of hexagonal and pentagonal, inflated, plastic cells supported by steel frames. The first dome emulates a tropical environment, and the second a Mediterranean environment. The project was conceived by Tim Smith and designed by architect Nicholas Grimshaw and engineering firm Anthony Hunt and Associates (now part of Sinclair Knight Merz). Davis Langdon carried out the project management, MERO designed and built the biomes. The project took 2½ years to construct and opened to the public on 17 March 2001.

Layout. Once into the attraction, there is a meandering path with views of the two biomes, planted landscapes, including vegetable gardens, and sculptures that include a giant bee and towering robot called RSA WEEE Man created from old electrical appliances.

Biomes. At the bottom of the pit are two covered biomes: The Tropical Biome, covers 1.56 hectares (3.9 acres) and measures 55 meters (180 ft.) high, 100 meters (328 ft.) wide and 200 meters (656 ft.) long. It is used for tropical plants, such as fruiting banana trees, coffee, rubber and giant bamboo, and is kept at a tropical temperature and moisture level.

The Mediterranean Biome covers 0.654 hectares (1.6 acres) and measures 35 meters (115 ft.) high, 65 meters (213 ft.) wide and 135 meters (443 ft.) long. It houses familiar warm temperate and arid plants such as olives and grape vines and various sculptures.

The Outdoor Biome (which is not covered) represents the temperate regions of the world with plants such as tea, lavender, hops, hemp and sunflowers. The covered biomes are constructed from a tubular steel space-frame (hex-trihex) with mostly hexagonal external cladding panels made from the thermoplastic ETFE. The cladding panels themselves are created from several layers of thin UV transparent ETFE film, which are sealed around their perimeter and inflated to create a large cushion. The resulting cushion acts as a thermal blanket to the structure. The ETFE material is resistant to most stains, which simply wash off in the rain. Although the ETFE is susceptible to punctures, these can be easily fixed with ETFE tape. The structure is completely self-supporting, with no internal supports, and takes the form of a geodesic structure. The panels vary in size up to 9 meters (29.5 ft) across. The entire build project was managed by McAlpine Joint Venture.

The Core. It provides the Eden Project with an education facility, incorporating classrooms and exhibition spaces designed to help communicate Eden's central message about the relationship between people and plants. Accordingly, the building has taken its inspiration from plants, most noticeable in the form of the soaring timber roof, which gives the building its distinctive shape. Grimshaw developed the geometry of the copper-clad roof in collaboration with a sculptor, Peter Randall-Page, and Mike Purvis of structural engineer Anthony Hunts. The copper was obtained from traceable sources. The services and acoustic design was carried out by Buro Happold. The photovoltaic array on the roof of the core building was arranged in an inclined circle for aesthetic reasons. However this arrangement ensures that more than half of the panels never receive direct sunlight. At the time of installation the electrical engineer making connections deemed that it was not worthwhile to connect these panels, as their potential to generate electricity was so limited. The value of the panels at the time of installation was around £260,000.

Environmental aspects. The Eden Project includes environmental education focusing on the interdependence of plants and people; plants are labeled with their medicinal uses. The massive amounts of water required to create the humid conditions of the Tropical Biome, and to serve the toilet facilities, are all sanitized rain water that would otherwise collect at the bottom of the quarry. The only mains water used is for hand washing and for cooking. The complex also uses Green Tariff Electricity — the energy comes from Cornwall, which were among the first in Europe. In December 2010 the Eden Project received permission to build a Geothermal electricity plant which will generate approx. 4MWe, enough to supply Eden and about 5000 households.

THE SMALLEST HOUSE IN THE WORLD. THE TYPOLOGY OF DEFICIT

Small-scale architecture has its own, relatively multi-furcated structure of types. Each piece of small stuff is a product of the extreme conditions in which it was designed. Usually, this is a shortage of something or other -space, material, funds, time, or even some physical limitation of the client such as, for instance, his being disabled. For this reason, the various examples of small-scale architecture may be divided into types according to the limitation that gave rise to them. However, it should be made clear from the start that in many cases the limitation is one imposed by the architect himself/herself. This is, after all, a lucid genre, which may in many respects be described as architectural posing. One of the main limitations - and one that is so untypical for the history of architecture and yet so natural for today - is the short-lived nature of materials.

Architecture is rapidly turning into something like disposable packaging; and this is giving rise to some strange creations. Take, for example, the temporary pavilion by Atelier Kempe Thill, where the walls are made of packing cases - like Soviet boxes for beer bottles, only white -placed one inside the other. The cases have turned out to be an excellent construction material. On the one hand, their matt surface creates a pleasant glittering effect; and, on the other, no special skills are required during construction and the structure can easily be transferred to another plot of land.

Some history. Toronto's Little House was built in 1912 by well-known contractor, Arthur Weeden. Mr. Weeden was born in England and migrated to Canada in 1902. For a short time, he was Superintendent of the old Lighthouse Mission and later became one of the pioneer builders in Toronto's west end. Located in what was known as the Earlscourt District, Day Avenue is home to many of Arthur's building projects. During the street's development, Lot 128 was conceived as a laneway for the neighboring home. However, the curb was never cut by the City to allow vehicular passage from the street. Observing this, Arthur decided that «in order to use the land, I would build on it» (Weeden, Toronto Sun Telegram, 1939). After completing the laneway house, he and his wife lived in it for 20 years. After his wife passed away, Mr. Weeden, 77 years of age at the time of the Sun Telegram article, lived in the house for 6 more years, during which time he tended to the vegetable garden in the rear of the house, growing tomatoes, cabbages, Swiss chard, rhubarb and some flowers. At the time, a house on Sydenham street was said to be the smallest, but Weeden discredited this claim by noting, «it has a frontage a foot and a half longer than his», and was not a complete house as it did not have electricity and other conveniences. The other disputed «smallest house» is located at 383 Shuter Street, but it too is larger. Eight inches wider, to be exact Arthur Weeden on the porch of The Little House, 1939. One year before Arthur Weeden began construction on his home, Sir Henry Pellatt broke ground for his home, Casa Loma, completed in 1913, this was the largest residence in Toronto. It is interesting that during this two years span, both the largest and smallest homes in the city were constructed. After a market value assessment in 1923, Sir Henry was prompted to move out, and it has been a tourist attraction ever since. 128 Day Avenue, on the other hand, has always been occupied and has changed hands numerous times over the years. After being sold by Mr. Weeden, it was inhabited by several different families (although information on them was difficult to track down), including one elderly man who now lives down the street. He visited during our renovation and recounted a story of the time he lived in the house: he came to Canada from Italy, after serving as an officer in his country's army. Working in the construction industry among other jobs, he lived with his family in the house for 15 years. He claims to have lived there with his wife and three children It was not clear if his story was completely accurate, however, we do know the most recent owners (a couple), who came to Toronto in 1996 from Brazil, lived in The Little House for over 10 years. While in the home, they made many improvements: updated flooring, a new roof, new electrical, new drywall and insulation in the bedroom and living room. The couple moved out in May, 2007, when the Little House was sold.

The current owners continued with renovations and upgrades, with a view towards making the space as useful, enjoyable and comfortable as possible. In the fall of 2007, media interest continued and this website was created so that people from all over the world could visit The Little House, even has its own song by Maria Lee Carta. The song was recorded at Sweet Fire Studios in Brooklyn, New York on August 14, 2008.

EXAMPLES OF THE SMALLEST HOUSES. SMALL HOUSES IN RUSSIA

The established practice for building small private houses in Russia allocates almost no role to architects. What usually happens is that the owner himself plays the part of architect and the main challenge is thought to be that of finding responsible and inexpensive builders with

experience of constructional methods. Architects themselves are often not interested in resigning small houses, a business which they consider unprofitable. There are, though, definite signs of movement in the field of small house resign. First, the Russian middle class gradually coming to the conclusion that spending money on an architect is not necessarily such a bad idea - in final. It's more convenient to in a well-designed house and expenditure on maintenance and use is considerably reduced. This is the view of a client from Samara who has played the services of architect.

This 230-m^2 house we use, consists of two linked structures founded for the older and younger generations of a single family. Fathers and sons are dispatched to different levels. At minus 1.5 meters there is a shared 'service area' containing storage space, boiler room, and sauna. Half a level higher to the left is an apartment for the parents; a further half a level higher to the right is an apartment for the children. Each has its own entrance and faces its own part of the plot. In this way, people with different timetables can perfectly comfortably live together and yet apart under the same roof.

On the other hand, architects are beginning to acquire sufficient experience of technologies and types of housing to make designing small houses a financially justifiable proposition. Thus Concept Design, which is famous for its luxury villas, has established a separate department dealing in design of houses for the middle classes, an area of specialization which Dmitry Dolgoy, the firm's head, considers to be both important and interesting. Concept Design produces a high-quality product for an acceptable price; the original constructions have been developed and perfected in the design of grand houses and the decorative elements, for all their intricacy and diversity, are technically fairly straightforward and inexpensive. In this issue of PR we publish houses designed by Concept Design in the 80 m^2 to 190 m^2 size band. These are low-cost houses that nevertheless maintain links with the architecture of this firm's larger projects with regard to structural engineering and decorative techniques. These buildings are distinguished by having well developed terraces. In the summer, the terraces are an important link between the inside of the house and the garden. In winter, the wooden decks form an extensive territory outside the house that does not have to be cleared of snow.

THE CANADIAN WAR MUSEUM

The Canadian War Museum is located in downtown Ottawa, overlooking the pastoral banks of the Ottawa River and rising slowly towards the east to engage the urban cityscape. The building is horizontal, with a rooftop of wild grass. To the south is a large new urban park called The Commons which is used for concerts and other large events throughout the year. The museum is organized around two points in order to make connections beyond the bounds of its immediate site. The first is the view towards the Peace Tower which soars three hundred feet high on Ottawa's Parliament Hill to the east.

The second is the position of the sun on Remembrance Day, November 11 at 11a.m., when all Canadians observe a moment of silence in remembrance of their fallen soldiers. The materials for the museum were kept sparse and simple: mainly concrete, steel and copper. To reflect the devastation wrought by war, the idea of controlled imperfection was employed to bring out the

more expressive qualities of these materials. Concrete was allowed to ooze through deliberately spaced gaps, rough edges and missing knot holes in the formwork. Steel bolt connections and exposed fasteners are celebrated; weld joints and burn marks left unfinished. Discarded copper panels taken from the roof of Canada's Library of Parliament were recycled, hammered flat and reinstalled in their raw form as the finish for many interior walls. The public can travel right over the top of the Museum from the Riverside to the Commons along a wheelchair accessible pathway called 'La Traverse'. From the roof, they will enjoy a moment where the Museum's architecture frames a view of the Peace Tower and Canada's Parliament buildings in the distance. "The Museum's architecture frames a view of the Peace Tower and Canada's Parliament buildings in the distance." The main lobby is another option for travelling through the museum, connecting rooms through various pathways. Within this is the Hall of Remembrance, which honours the memories of veterans and the lives sacrificed for Canada. The space is a 9 by 9 m cube: austere, calm and meditative. The concrete walls of the space display an alternating joint pattern reminiscent of rows of white grave markers in Allied war cemeteries.

OFFICE BUILDING

An office is generally a room or other area in which people work, but may also denote a position within an organization with specific duties attached to it (see officer, office-holder, and official); the latter is in fact an earlier usage, office as place originally referring to the location of one's duty. When used as an adjective, the term office may refer to business-related tasks. In legal writing, a company or organization has offices in any place that it has an official presence. An office is an architectural and design phenomenon and a social phenomenon.

There are many different ways of arranging the space in an office and whilst these vary according to function, managerial fashions and the culture of specific companies can be even more important. Choices include, how many people will work within the same room. At one extreme, each individual worker will have their own room; at the other extreme a large open plan office can be made up of one main room with tens or hundreds of people working in the same space. Open plan offices put multiple workers together in the same space, and some studies have shown that they can improve short term productivity, i.e. within a single software project. A type of compromise between open plan and individual rooms is provided by the cubicle, possibly made most famous by the Dilbert cartoon series, which solves visual privacy to some extent, but often fails on acoustic separation and security. Most cubicles also require the occupant to sit with their back towards anyone who might be approaching; workers in walled offices almost always try to position their normal work seats and desks so that they can see someone entering, and in some instances, install tiny mirrors on things such as computer monitors.

The primary purpose of an office building is to provide a workplace and working environment primarily for administrative and managerial workers. These workers usually occupy set areas within the office building, and usually are provided with desks, PCs and other equipment they may need within these areas.

SYSTEMS DESIGN AND ANALYSIS

Systems design comprises a logical series of steps that leads to the best decision for a given set of conditions. The procedure requires:

Analysis of a building as a system.

Synthesis or selection of components, to form a system that meets specific objectives while subject to constraints, or variables controllable by designers.

Appraisal of system performance, including comparisons with alternative systems.

Feedback to analysis and synthesis of information obtained in system evaluation, to improve the design.

The prime advantage of the procedure is that, through comparisons of alternatives and data feedback to the design process, systems design converges on an optimum, or best, system for the given conditions. Another advantage is that the procedure enables designers to clarify the requirements for the building being designed. Still another advantage is that the procedure provides a common basis of understanding and promotes cooperation between the specialists in various aspects of building design. For a building to be treated as a system, as required in systems design, it is necessary to know what a system is and what its basic characteristic are.

A system is an assemblage formed to satisfy specific objectives and subject to constraints and restrictions and consisting of two or more components that are interrelated and compatible, each component being essential to the required performance of the system.

Because the components are required to be interrelated, operation, or even the mere existence, of one component affects in some way the performance of other components. Also, the required performance of the system as a whole, as well as the constraints on the system, imposes restrictions on each component.

A building meets the preceding requirements. By definition, it is an assemblage. It is constructed to serve specific purposes. It is subject to constraints while doing so, inasmuch as designers can control properties of the system by selection of components. Building components, such as walls, floors, roofs, windows, and doors, are interrelated and compatible with each other. The existence of any of the components affects to some extent the performance of the others. And the required performance of the building as a whole imposes restrictions on the components. Consequently, a building has the basic characteristics of a system, and systems-design procedures should be applicable to it.

Systems Analysis.

A group of components of a system may also be a system. Such a group is called a **subsystem.** It, too, may be designed as a system, but its goal must be to assist the system of which it is a component to meet its objectives. Similarly, a group of components of a subsystem

may also be a system. That group is called a subsystem. For brevity, the major subsystems of a building are referred to as systems in this text.

In a complex system, such as a building, subsystems and other components may be combined in a variety of ways to form different systems. For the purposes of building design, the major systems are usually defined in accordance with the construction trades that will assemble them, for example, structural framing, plumbing, electrical systems, and heating, ventilation, and air conditioning. In systems analysis, a system is resolved into its basic components. Subsystems are determined. Then, the system is investigated to determine the nature, interaction, and performance of the system as a whole. The investigation should answer such questions as:

- what does each component (or subsystem) do?
- what does the component do it to?
- how does the component serve its function?
- what else does the component do?
- why does the component do the things it does?
- what must the component really do?
- can it be eliminated because it is not essential or because another component can assume its tasks?

SIX STEPS TOWARD BUILDING OF YOUR DREAM

Design and construction projects involve several steps. Typically, projects go through the following six phases. However, on some projects, several of these steps may be combined or there may be additional ones.

STEP 1. Programming / Deciding What to Build. The homeowner and architect discuss the requirements for the project (how many rooms, the function of the spaces, etc.), testing the fit between the owner's needs, wants, and budget.

STEP 2. Schematic Design / Rough Sketches. The architect prepares a series of rough sketches, known as schematic design, which show the general arrangement of rooms and of the site. Some architects also prepare models to help visualize the project. The homeowner approves these sketches before proceeding to the next phase.

STEP 3. Design Development / Refining the Design. The architect prepares more detailed drawings to illustrate other aspects of the proposed design. Floor plans show all the rooms in correct size and shape. Outline specifications are prepared, listing the major materials and room finishes.

STEP 4. Preparation of Construction Documents. Once the homeowner has approved the design, the architect prepares detailed drawings and specifications, which the contractor will use to establish actual construction cost and build the project. These drawings and specifications become part of the building contract.

STEP 5. Hiring the Contractor. The homeowner selects and hires the contractor. The architect may be willing to make some recommendations. In many cases, homeowners choose from among several contractors they've asked to submit bids on the job. The architect can help you prepare bidding documents as well as invitations to bid and instructions to bidders.

STEP 6. Construction Administration. While the contractor will physically build the home or addition, the architect can assist the homeowner in making sure that the project is build according to the plans and specifications. The architect can make site visits to observe construction, review and approve the contractor's applications for payment, and generally keep the homeowner informed of the project's progress. The contractor is solely responsible for construction methods, techniques, schedules and procedures.

PROJECT PHASES AND ORGANISATION

Projects, by definition, have a beginning and an end. They also have defined phases between the project kickoff and project closeout. A phase represents a grouping of similar activities that has a very loosely defined beginning and end. Phases are typically sequential, where the prior phase is essentially complete before the beginning of the next phase; however, phases do not have clear-cut end dates and some activities in an early phase of the project will continue into the later phases. This is in contrast to project beginning and ending dates and milestone dates, which do have clearly defined dates with the expectation that these dates will be met.

The Project Management Institute (PMI) identifies four major phases of a project as characteristics of the project life cycle. [1] These four life-cycle phases are initiation, planning, execution, and project closeout. The knowledge, skills, and experience needed on the project can vary in each phase. During the early phases of a project, the project leadership needs good conceptual skills, the ability to build a team, and the experience to build a project roadmap. During project closeout, the project leadership provides a high degree of motivation and attention to details. On a large project, lasting two or more years, it is common to see the project management team change leadership to provide skills that are appropriate to the final phases of the project.

Initiation phase.

The initiation phase, which PMI labels «starting the project», includes all the activities necessary to begin planning the project. The initiation phase typically begins with the assignment of the project manager and ends when the project team has sufficient information to begin developing a detailed schedule and budget. Activities during the initiation phase include project kickoff meetings, identifying the project team, developing the resources needed to develop the project plan, and identifying and acquiring the project management infrastructure (space, computers). On projects where the scope of work for the project is not well defined, the project team will invest time and resources in developing a clearer scope of work. On projects where the

major project stakeholders are not aligned, the project team will expend resources and time creating stakeholder alignment.

Unlike project milestones, some activities associated with project initiation may be delayed without delaying the end of the project. For example, it is advantageous for the project to have the major project stakeholders aligned from the beginning, but sometimes it is difficult to get the commitment from stakeholders to invest the time and resources to engage in an alignment process. Sometimes it is only after stakeholders begin observing progress on a project that the project manager can facilitate the stakeholder alignment processes.

Planning phase.

The planning phase, which PMI labels «organizing and preparing», includes the development of more detailed schedules and a budget. The planning also includes developing detailed staffing, procurement, and project controls plans. The emphasis of the planning phase is to develop an understanding of how the project will be executed and a plan for acquiring the resources needed to execute it. Although much of the planning activity takes place during the planning phase, the project plan will continue to be adjusted to respond to new challenges and opportunities. Planning activities occur during the entire life of the project.

Execution phase.

The execution phase, labeled by PMI as «carrying out the work», includes the major activities needed to accomplish the work of the project. On a construction project, this would include the design and construction activities. On an information technology (IT) project, this would include the development of the software code. On a training project, this would include the development and delivery of the training.

Closeout phase.

The closeout phase – or using PMI's nomenclature, «closing of the project» – represents the final stage of a project. Project staff is transferred off the project, project documents are archived, and the final few items or punch list is completed. The project client takes control of the product of the project, and the project office is closed down.

The amount of resources and the skills needed to implement each phase of the project depends on the project profile. Typically, a project with a higher-complexity profile requires more skills and resources during the initiation phase. Projects with a profile that indicates problems with alignment among key stakeholders or political and legal issues will require specialized resources to develop plans that address these issues early in the project. A project with a lower complexity level will invest more resources in the execution phase to complete the project as effectively and efficiently as possible.

PROJECT PHASES ON A LARGE MULTINATIONAL PROJECT

A United States instructional design company won a contract to design and build the first distance-learning-based college campus in northern Argentina. There was no existing infrastructure for either the educational or large internet-based projects in this part of South America. During the initiation phase of the project, the project manager focused on defining and

finding a project leadership team with the knowledge, skills, and experience to manage a large complex project in a remote area of the globe. The project team set up three offices. One was in Chile, where large distance education project infrastructure existed. The other two were in Argentina. One was in Buenos Aries to establish relationships and Argentinean expertise, and the second was in Catamarca—the largest town close to the campus site. With offices in place, the project start-up team began developing procedures for getting work done, acquiring the appropriate permits, and developing relationships with Chilean and Argentine partners.

During the planning phase, the project team developed an integrated project schedule that coordinated the activities of the design, procurement, and design teams. The project controls team also developed a detailed budget that enabled the project team to track project expenditures against the expected expenses. The project design team built on the conceptual design and developed detailed drawings for use by the procurement team. The procurement team used the drawings to begin ordering equipment and materials for the implementation team; to develop labor projections; to refine the construction schedule; and to set up the campus site. Although planning is a never-ending process on a project, the planning phase focused on developing sufficient details to allow various parts of the project team to coordinate their work and to allow the project management team to make priority decisions.

The execution phase represents the work done to meet the requirements of the scope of work and fulfill the charter. During the execution phase, the project team accomplished the work defined in the plan and made adjustments when the project factors changed. Equipment and materials were delivered to the work site, labor was hired and trained, a learning center site was built, and all the development activities, from the arrival of the first computer to the installation of the final light switch, were accomplished.

The closeout phase included turning over the newly constructed campus to the operations team of the client. A punch list of a few remaining items was developed and those items completed. The office in Catamarca was closed, the office in Buenos Aries archived all the project documents, and the Chilean office was already working on the next project. The accounting books were reconciled and closed, final reports written and distributed, and the project manager started on a new project.

WHY BUILDING DESIGN IS SO IMPORTANT?

Buildings and other components of infrastructure are products, but on a different scale. Buildings also have multiple functions, making performance measurement more difficult. The challenges that architects and engineers face in building design force us to think in the most rigorous and creative ways about resource performance. Few things could be more important. Consider:

Buildings tie up a lot of resource mass for decades. Buildings have a much longer life than most products. It’s becoming increasingly evident that a sustainable economy is one where

resources recirculate. In the future, we will see more mining «above-grade», or extracting and reusing materials from obsolete uses, rather than mining from the earth's crust. We will also have to find ways to harvest a higher yield (more benefit) from every ton of resource each time it's recovered for re-use. Buildings keep loads of resources out of circulation that could otherwise be invested in new, higher-performing uses. For building design, using *more* recycled and recovered materials is important; so is reduction of the total mass required to get the job done.

A building's design is the primary factor that determines its ongoing resource use. In addition to the mass embodied in buildings, we have to consider ongoing resource use, like that of fuels and water. The LEED program has been important for slowing the growth in fuels and water use, but it isn't enough. We need to keep asking the most fundamental questions about what functions a building is designed to perform and then become much smarter about matching those functions with opportunities for mass reduction, both initially and throughout the life of the building.

Buildings influence how efficiently organizations of people work. They influence behavior by affecting the kinds of activities that can be efficiently conducted within them. And they influence how easy it is to perform different kinds of tasks, to recycle, to communicate, to get jobs done. This in turn influences resource use. So, for example, highly specialized buildings are harder to adapt for re-use, or they may restrict activities or make improving performance over time more difficult. Flexibility, therefore, is an important consideration.

Buildings must last longer than most products. Given the amount of capital and resources invested, buildings are rightfully expected to last. They have to be more resilient than most products, though they are subject to continuous exposure to the elements. This poses a challenge when introducing new materials, techniques, and designs. Architects need to balance innovative, resource-saving strategies with resilience.

In a resource-constrained world, we have to do an ever-better job of designing buildings that reduce required mass, both in the initial design and over the life of the building. Resource savings won't just be found in innovative new materials and products, they will be achieved through a planning process that considers what functions the building needs to serve and designs that deliver those functions most effectively with the least amount of mass possible.

BUILDING MATERIALS IN CONSTRUCTION

Materials that are used for structural purposes should meet several requirements. In most cases it is important that they should be hard, durable and easily fastened together. The most commonly used materials are wood, stone, brick, concrete, steel, glass, plastics, etc. They all differ in hardness, durability, strength, weight, fire- and decay-resistance and, naturally, cost. Wood is the most ancient structural material. In comparison with steel wood is lighter, cheaper, easier to work with and its mechanical properties are good. On the other hand, wood has certain disadvantages. First, it burns and is therefore unsuitable for fire-proof buildings. Second, it decays. Stone belongs to one of the oldest building materials used by man. Stone is characteristic of many properties. They are mechanical strength, compactness, porosity, sound and heat insulation, and fire resistance. Stone is widely used for foundations, walls and steps of buildings, for the supports of piers, and bridges, and for finishing and decorating all sorts of structures. Bricks were known many thousand years ago. Bricks are hard and easily fastened together with the help of mortar. A brick building is strong, durable and weather resistant. Concrete is referred to as one of the most important materials.

Mass concrete was employed by the Egyptians and the Romans but the use of steel reinforcement did not begin until the nineteenth century. Concrete is a mixture of cement, sand and crushed stone, made into a paste with water. It forms a hard, durable mass and is used largely for the foundations and walls of houses and for structures under water. Steel has come into general use with the development of industry. Its manufacture requires special equipment and skilled labour. Glass and plastics are also widely used nowadays in the construction of different kinds of buildings. The raw materials employed in the manufacture of glass are limestone, sand, soda ash, sodium sulfate, cullet (broken glass), and a small amount of aluminium. Glass is unaffected by gasses and most acids. Plastics is a name for various organic derivatives of resin, cellulose, and protein. All building materials are divided into three main groups:

1 – primary (main) building materials such as rocks and artificial stones, timber and metals are used for bearing structures.

2 – secondary (auxiliary) materials are used for the interior parts of the buildings, for the interior finish of structures.

3 – cementing or binding materials such as lime, gypsum and cement are the three materials most widely used for the purpose of binding together masonry units, such as stone, brick and as constituents of wall plaster.

Building materials can be further categorized into two sources, natural and synthetic. Natural building materials are unprocessed or minimally processed by industry, such as timber, sand, lime or stone. Whereas synthetic materials are made in industrial settings after some human manipulations, such as plastics and petroleum based paints. Cement, clay products and concrete are also examples of artificial buildings materials.

The designer must be able to select and adapt such materials of construction that will give the most effective result by the most economical means. In this choice of materials for any work

of construction the civil engineer must consider many factors. These factors include availability, cost, physical properties of materials and others.

NATURAL STONE: FAR MORE THAN JUST ANOTHER BUILDING MATERIAL

Natural stone has been used for every function imaginable, from weapon to a bartering currency. The various ways it can be installed in a project are limited only by the creative imagination of the designer and technical understanding of the installer. Each mason's workmanship is unlike that of another, and each mason's project is unlike his last. The project can be structural, aesthetic, or both. The effect can be powerful or subtle and, yet, ever changing with the mood of the day or season. Each different kind of stone has its own unique graining. The rift will run perpendicularly to the bedding grain of a sedimentary stone. The stone cutter would need to identify the rift in order to successfully cut the stone. This is one example of the knowledge a stone cutter would need. The master stone cutters who worked the quarries in the United States' early years are a reflection of the different cultures that helped settle America. Master stone cutters have come from Sweden, Germany, Italy and Ireland, to name a few.

The many different availabilities of texture, color, hardness and a workable nature of natural stone lend to an ability to express any desired outcome. The abundant choices in appearance and uses of natural stone, coupled with the abounding skills of the mason and creative genius of an architect or designer, present possibilities that no other medium could. The increased availability of natural stone is due mostly to the innovations of stone processing equipment and tooling. Improved methods for quarrying and new ways of processing all of the stone removed from the ground can result in greater profit for the quarries and a greener product than any imitations. It has a history of use that is part of the human race. The stone industry has been able to take advantage of technological advances that improve yield and offer more options. Natural stone is a gracious compliment to any modern setting.

MORTAR

1. What does lime improve when it is used in the mortar?

Mortar is the material which binds the bricks and blocks together. It helps to distribute the load through a wall and seals the brick or block joints against water ingress. Mortars should have:

- good workability;
- sufficient resilience to accommodate long term thermal movement of the masonry;
- adequate bond strength;
- good resistance to water penetration.

Mortar is made from fine aggregate (usually sand) and a binding agent (nowadays usually cement). When mixed with water a chemical reaction, called hydration, occurs and the mortar sets. Early mortars were usually based on lime and sand but they were very slow to set and readily absorbed rain water (the mortar sets through a process known as carbonation where the lime gradually hardened by absorbing carbon dioxide from the atmosphere). Modern mortars use cement as the main binding agent although hydrated lime (i.e. bagged lime) is often introduced into the mix to give it a more plastic feel and to make it more 'workable'. Lime also improves the mortar's ability to cope with thermal and moisture movement. By varying the proportions of the cement the strength of the mortar can be increased or decreased as required.

2. What mix proportions ensure workability, adhesion and durability?

A given volume of sand contains approximately 25 % of air space. The strength and physical properties of a mortar are determined by the type of binder that fills this air space. For example, a cement/sand mix of 1:3 will result in the air space within the sand being completely filled by the cement, producing a strong but brittle mortar. The relatively high cement content will result in shrinkage as the mortar sets. Many bricks and blocks cannot resist this shrinkage resulting in loss of bond and cracks in the mortar. By replacing some of the binder with lime (say 1:1:6, cement / lime / sand) the binder/aggregate ratio is maintained at 1:3 and the mortar has improved workability, better adhesion and longer durability.

3. What is the function of liquid plasticizers?

Liquid plasticizers can be used in place of lime to improve the nature of a mortar. Plasticizers are usually air entraining agents; in other words, air is introduced into the mix to break down the internal friction and produce more workable mortars. A mortar mix of 1 part cement to 5 parts sand, plus plasticizer, is roughly equivalent to a 1:1:6, cement/lime/sand mix. Another option is to use masonry cement. This is a pre-bagged mix of cement with added chemicals to improve the workability of the mortar. Their finished strength is lower than cement mortars so they should only be used for lightly stressed brickwork in sheltered situations. They should not be used below ground level. In recent years the use of pre-mixed mortars has become common. These are delivered to site in sealed containers, ready for use. They usually contain a retarder so they remain usable for 36 – 48 hours or so. At the end of this period they develop their strength in the same way as normal mortars.

4. What is pointing?

The face of the joint may be finished in a number of ways. These are largely dependent on the exposure of the building, the type of brick and the preference of the designer. Most brickwork, these days, is jointed as work proceeds. Pointing is the term used to describe existing or new joints which have been raked out and filled with fresh, often coloured, mortar. Pointing is relatively rare in new construction because coloured mortar mixes are now relatively cheap. In addition pointing requires great care. The pointing mortar mix must be slightly weaker than the jointing mortar. If it is stronger the outer face of the bricks, immediately above and below the pointing, will carry excess load. This can result in the edges of the bricks spalling.

TEN GOOD REASONS FOR NATURAL STONE

We’ve all heard it before: the often-debated question of stone or no stone. Why should I build with natural stone, ask developers and architects. Looking for some good arguments for stone? Try these ten.

1. Natural stone is a natural product with individual properties determined by the type and bonding of the minerals comprising the natural stone. Natural stone holds an outstanding position among all building materials. Components of natural stone are unique specimens, which can be combined with each other and with many other materials.

2. Natural stone is ecological. Natural stone as a building material is found naturally in a virtually finished form. No energy is needed for its actual manufacture. Energy is only consumed for quarrying and processing, but the share is small compared with other building materials. The stone is extracted mostly from relatively small quarries without major blasting operations. The unused stone waste can be used directly for filling in the parts of the quarry where stone has been

extracted. Nothing is lost in the complete cycle of natural stone quarrying, processing, and returning to nature.

3. Natural stone is environmentally compatible. As a natural building material, natural stone contains no pollutants that are damaging to the health. Natural stone can be used safely in food areas. It also releases no substances that are hazardous to health in case of fire. Natural stone requires no auxiliary chemical substances such as protective coatings, impregnating agents or coatings before it can be used as a building material.

4. Natural stone is varied. No other building material has as many different colors and structures as natural stone. Various surface finishing processes make this variety virtually unlimited. Developers and architects therefore have a broad spectrum of choice, which allows matching to any desired appearance or ambience. Natural stones are often chosen for their good visual and technical qualities. Natural stone is available in a variety of different colors, structures and textures. A suitable natural stone is available for virtually any requirement imposed on a building material.

5. Natural stone is individual. Natural stones are quarried in large blocks and cut to the desired size by natural stone companies. The sizes of natural stone slabs are limited only by the size of the rough blocks and not by standard dimensions specified by production. The sizes can be adapted individually to meet planning requirements. Any desired shape can be provided, not only square or rectangular slabs. Modern processing machines allow inlay work in natural stone. The variety of the stones and the individual processing and design possibilities constitute the uniqueness of the building material.

6. Natural stone ages well. Whereas many building materials become unsightly in the course of years, natural stone retains a natural patina, which is not detrimental to the beauty of the natural stone. Many natural stones are like good wine. They only attain their full elegance with advancing years. Natural stone can also be cleaned easily and cheaply. Even centuries-old floor coverings of natural stone can be ground and restored to their original condition. The lifetime of natural stone is extremely long. With the right planning and construction, buildings of natural stone have been known to survive for thousands of years.

7. Natural stone is three-dimensional. Any desired shape of stone can be produced as well as slab sizes. Milling grooves and flutings in the stone surfaces can create interesting light and shade effects. Such processed slabs radiate strength and solidity when mounted on a facade. Solid components, like moldings, frames and pillars, permit an aesthetic structure.

8. Natural stone is attractively priced. If the total costs of a building material are considered over a useful life of 30 years or more, independent investigations show that natural stone is no more expensive than comparable synthetic building materials. The relatively high investment costs are offset by the low long-term maintenance costs and long life. The cost of cleaning and maintenance of natural stone is low.

9. Natural stone is physically practical. Natural stone has very good thermal conductivity and a large heat storage capacity. Natural stone as facade material absorbs the heat radiated by the sun and prevents unwanted heating up of the building. Tests show an energy requirement of 100-150 kWh/m^2 (1076-1616 kWh/ft^2) for multi-story buildings with stone facades, in contrast to an energy requirement of 300-700 kWh/m^2 (3229-7534 kWh/ft^2) for the necessary heating and cooling of glass facades.

10. Natural stone is durable. The high-pressure resistance values of many natural stones have given the material a reputation of being an everlasting building material. Only the so-called stainless steels, which are costly in production, achieve the durability of natural stones. Natural stone is also the most durable material with the lowest abrasion values for floor coverings. Coverings of granite or similar hard stones show hardly any signs of wear even after decades or use.

BUILDING CONSTRUCTION

BUILDING CONSTRUCTION

The construction of the homes and buildings in which people live and work has been a major industry ever since early human beings first made huts of sticks, mud, or rocks. Methods of building construction have been constantly improved since those first crude structures. Modern skyscrapers can be built within a year or two. **Prefabricated** buildings, with their various parts made in factories by assembly-line methods, can be built in a day or two, but are rarely as durable as traditionally made buildings.

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**. It includes the basement walls, even though these may extend above the ground. Both the substructure and the superstructure help to support the **load** (weight) of the building. The **dead load** of a building is the total weight of all its parts. The **live load** is the weight of the furniture, equipment, stored material, and occupants of a building. In some regions, the **wind load** of a building is important if the structure is to withstand storms. The **snow load** may also be an important factor. In some areas, buildings have to be constructed to withstand earthquake shocks.

Foundations are the chief means of supporting a building. They carry both the dead and live loads. There are three main types of foundations: spread, pier, and pile. **Spread foundations** are long slabs of reinforced concrete that extend beyond the outer edges of the building. Such foundations are not as firm as those based on solid rock. The footing areas in contact with the soil must be of sufficient size to spread the load safely over the soil and to avoid excessive or uneven settlement. Any such settlement would cause walls to crack or doors to bind.

Pier foundations are heavy columns of concrete that go down through the loose topsoil to a bed of firm rock. This bed may also be sand, gravel, or firm clay. If the bed consists of firm clay, the pier is usually enlarged at the base, to increase the bearing area.

Pile foundations are long, slender columns of steel, concrete, or wood. Machines, called **pile drivers** hammer them down as deep as 60 meters to a layer of solid soil or rock. Workers can tell when the columns reach their proper depth by the number of blows the pile driver needs to drive the columns a few centimeters deeper. These columns transmit the building load to the supporting soil. Most skyscrapers are supported by rock foundations.

Types of construction. In **load-bearing-wall construction**. The walls transmit the load to the foundation. In **skeleton construction**, all loads are transmitted to the foundation by a rigidly constructed framework made up of beans, girders and columns. This skeleton carries the

roof, walls, and floors, together with their loads. Load-bearing-wall construction is usually most economical for buildings less than four storeys high, but skeleton construction is better for taller buildings. All buildings in the **skyscraper** class are of skeleton construction.

The first building to have skeleton construction was the 10-storey Home Insurance Building in Chicago. Completed in 1885, this building was the world's first skyscraper. Many parts of a building have no structural function. **Partition walls** and **curtain walls** carry only their own weight and serve to divide the interior of a building or to keep out the elements. Other non load-bearing parts include windows, doors, stairs, and lifts. In one method of construction, called **tilt-up construction**, concrete wall panels are formed at ground level. Cranes or derricks then lift them into position. **Lift-slab construction** may be used for positioning roof and floor slabs. These slabs are formed with concrete at ground level, within the framework of the building. They are then lifted into place using hydraulic jacks.

Beams, girders, and columns 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. Girders are usually larger than beams. Closely spaced beams are called **joists**, especially in wooden buildings. **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.

Prefabricated Construction. Prefabrication has become an important part of most 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 may allow work to continue despite poor weather conditions and should reduce any waste in time and material 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 churches, 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**, first used in Japan. Modular construction refers to the use of a standard measurement as the basis for all building materials. The size of the module may vary considerably from country to country. In the United States, the basic module is 10 centimeters. All building parts are designed so that each dimension equals this measurement. Modular parts are also used in buildings that are not prefabricated.

SITE IMPROVEMENT METHODS

If the expected settlement for a proposed structure is too large, then different foundation support or soil stabilization options must be evaluated. One alternative is a deep foundation system that can transfer structural loads to adequate bearing material in order to bypass a compressible soil layer. Another option is to construct a floating foundation, which is a special

type of deep foundation where the weight of the structure is balanced by the removal of soil and construction of an underground basement. Other alternatives include site improvement methods, such as the following:

Soil Replacement. There are basically two types of soil replacement methods: removal and replacement, and displacement. The first is the most common approach and consists of the removal of the compressible soil layer and replacement with structural fill during the grading operations. Usually the remove and replace grading option is economical only if the compressible soil layer is near the ground surface and the groundwater table is below the compressible soil layer or the groundwater table can be economically lowered.

Water Removal. If the site contains an underlying compressible cohesive soil layer, the site can be surcharged with a fill layer placed at ground surface. Vertical drains (such as wick drains or sand drains) can be installed in the compressible soil layer to reduce the drainage path and speed up the consolidation process. Once the compressible cohesive soil layer has had sufficient consolidation, the fill surcharge layer is removed and the building is constructed.

Site Strengthening. Many different methods can be used to strengthen the onsite soil. For example, deep vibratory techniques are often used to increase the density of loose sand deposits.

Grouting. In order to stabilize the ground, fluid grout can be injected into the ground to fill in joints, fractures, or underground voids. For the releveling of existing structures, one option is mud jacking, which has been defined as a process whereby a water and soil-cement or soil-lime cement grout is pumped beneath the slab, under pressure, to produce a lifting force that literally floats the slab to the desired position. Another commonly used site improvement technique is compaction grouting, which consists of intruding a mass of very thick consistency grout into the soil, which both displaces and compacts the loose soil. Compaction grouting has proved successful in increasing the density of poorly compacted fill, alluvium, and compressible or collapsible soil. The advantages of compaction grouting are less expense and disturbance to the structure than foundation underpinning, and it can be used to relevel the structure. The disadvantages are that analyzing the results is difficult; it is usually ineffective near slopes or for near-surface soils because of the lack of confining pressure, and the danger exists of filling underground pipes with grout.

Thermal. *T*he thermal site improvement method consists of either heating or freezing the soil in order to improve its shear strength and reduce its permeability.

SOLAR HEATING SYSTEMS

Sunshine can be converted directly into heat. In this form it has several advantages over conventional fuels: it is clean; it is nonpolluting; and it is virtually inexhaustible. However it is also intermittent. Thus one big difference between solar heating systems and conventional ones is the necessity of storing energy in the form of heat. A suitable heat-storage tank should maintain desired levels of temperature for 2 consecutive days without direct sunlight when the heat supply cannot be replenished.

In solar heating systems, the principles of operation are simple. Solar collectors are situated where they will have maximum exposure to sunlight. A dark surface inside the collector absorbs the solar radiation and converts it to heat. Retention of this heat is made easier by a natural phenomenon known as «green house effect». Radiation which passes easily through glass or

clear plastic in the form of light cannot pass back out in the form of heat, because the wavelength is much longer. It is thus trapped. A fluid (for example, air and water) passed through the collectors transfers this heat either to fulfill an immediate demand or to be stored for later use. Rat plate solar collectors are the most common. They are easy to install. They can also function to some extent even on days that are overcast. Stationary collectors are usually installed on a south-facing wall or roof and inclined to take best advantage of the winter sun, which is very low in the sky. For optimum performance, the collectors should be inclined above the horizon at an angle equal to the local latitude plus 10 degrees. Heat is captured better in collectors with a second cover. This is especially important where heat loss is a serious problem. In general, the better insulated double glazed collectors are recommended for cold northern climates, but single-glazed once are perfectly adequate for warm climates.

All collectors have insulating material along the underside, but those intended for use in cold climates should be especially well protected against heat loss to the building or the environment. In south countries specialists design and build solar power systems for shepherd's homes. It makes life and work more comfortable for shepherds and agricultural workers who have to spend long spells in the desert. With the aid of solar power system people in the desert are able to use a television and other electric appliances.

HEATING. VENTILATING. CONDITIONING

Heating. There are many different types of standard heating systems. Central heating is often used in cold climates to heat private houses and public buildings. Such a system contains a boiler, furnace, or heat pump to heat water, steam, or air, all in a central location such as a furnace room in a home. Water is often used as the heat transfer medium. The system also contains either ductwork, for forced air systems, or piping to distribute a heated fluid in radiators to transfer this heat to the air. The term radiator in this context is misleading since most heat transfer from the heat exchanger is by convection, not radiation. The radiators may be mounted on walls or buried in the floor to give floor heat.

At all systems of heating except the simplest systems have a pump to circulate the water and ensure an equal supply of heat to all the radiators. The heated water can also be fed through another heat exchanger inside a storage cylinder to provide hot running water. Forced air systems send heated air through ductwork. During warm weather the same ductwork can be used for air conditioning. The forced air can also be filtered or put through air cleaners. Heating can also be provided from electric, or resistance heating using a filament that becomes hot when electric current is caused to pass through it. This type of heat can be found in electric baseboard heaters, portable electric heaters, and as backup or supplemental heating for heat pump (or reverse heating) system. The heating elements (radiators or vents) should be located in the coldest part of the room, typically next to the windows to minimize condensation and offset the convective air current formed in the room due to the air next to the window becoming negatively buoyant due to the cold glass. Cold air drafts can contribute significantly to subjectively feeling colder than the average room temperature. Therefore, it is important to control the air leaks from outside in addition to proper design of the heating system.

The invention of central heating is often used by the ancient Romans, who installed a system of air ducts called a hypocaust in the walls and floors of public baths and private villas.

Ventilating. Ventilating is the process of «changing» or replacing air in any space to control temperature or remove moisture, odors, smoke, heat, dust, bacteria, carbon dioxide, and to replenish oxygen. Ventilation includes both the exchange of air to the outside as well as circulation of air within the building. It is one of the most important factors for maintaining acceptable indoor air quality in buildings. Methods for ventilating a building may be divided into mechanical/forced and natural types. Ventilation is used to remove unpleasant smells and excessive moisture, introduce outside air, to keep interior building air circulating, and to prevent stagnation of the interior air.

Mechanical or forced ventilation. «Mechanical» or «forced» ventilation is provided by an air handler and used to control indoor air quality. Excess humidity, odors, and contaminants can often be controlled via dilution or replacement with outside air. However, in humid climates much energy is required to remove excess moisture from ventilation air.

Kitchens and bathrooms typically have mechanical exhaust to control odors and sometimes humidity. Factors in the design of such systems include the flow rate (which is a function of the fan speed and exhaust vent size) and noise level. If ducting for the fans traverse unheated space (e.g., an attic), the ducting should be insulated as well to prevent condensation on the ducting.

Ceiling fans and table/floor fans circulate air within a room for the purpose of reducing the perceived temperature because of evaporation of perspiration on the skin of the occupants. Because hot air rises, ceiling fans may be used to keep a room warmer in the winter by circulating the warm stratified air from the ceiling to the floor. Ceiling fans do not provide ventilation as defined as the introduction of outside air.

Natural ventilation. Natural ventilation is the ventilation of a building with outside air without the use of a fan or other mechanical system. It can be achieved with open able windows or trickle vents when the spaces to ventilate are. In more complex systems warm air in the building can be allowed to rise and flow out upper openings to the outside (stack effect) thus forcing cool outside air to be drawn into the building naturally through openings in the lower areas. These systems use very little energy but care must be taken to ensure the occupants' comfort. In warm or humid months, in many climates, maintaining thermal comfort solely via natural ventilation may be so conventional air conditioning systems are used as backups. Air-side economizers perform the same function as natural ventilation, but use mechanical systems' fans, ducts, dampers, and control systems to introduce and distribute cool outdoor air when appropriate.

Air conditioning. Air conditioning and refrigeration are provided through the removal of heat. The definition of cold is the absence of heat and all air conditioning systems work on this basic principle. Heat can be removed through the process of radiation, convection, and Heat cooling through a process called the refrigeration cycle. The conduction mediums such as water, air, ice, and chemicals are referred to as refrigerants.

An air conditioning system, or a standalone air conditioner, provides cooling, ventilation, and humidity control for all or part of a house or building. The refrigerant cycle consists of four essential elements to create a cooling effect. The system refrigerant starts its cycle in a gaseous state. The compressor pumps the refrigerant gas up to a high pressure and temperature. From there it enters a heat exchanger (sometimes called a «condensing coil») where it loses energy (heat) to the outside. In the process the refrigerant condenses into a liquid. The liquid refrigerant is returned indoors to another heat exchanger («evaporating coil»). A metering device allows the

liquid to flow in at a low pressure at the proper rate. As the liquid refrigerant evaporates it absorbs energy (heat) from the inside air, returns to the compressor, and the cycle repeats. In the process, heat is absorbed from indoors, and transferred outdoors, resulting in cooling of the building.

Central, «all-air» air conditioning systems are often installed in modern residences, offices, and public buildings, but are difficult to retrofit because of the bulky air ducts required. A duct system must be carefully maintained to prevent the growth of pathogenic bacteria in the ducts. An alternative to large ducts to carry the needed air to heat or cool an area is the use of split systems. These systems, although most often seen in residential applications, are gaining popularity in small commercial buildings. The evaporator coil is connected to a remote condenser unit using piping instead of ducts.

Dehumidification in an air conditioning system is provided by the evaporator. Since the evaporator operates at a temperature below dew point, moisture in the air condenses on the evaporator coil tubes. This moisture is collected at the bottom of the evaporator in a condensate pan and is removed by piping it to a central drain or onto the ground outside. A dehumidifier is an air-conditioner-like device that controls the humidity of a room or building. It is often employed in basements which have a higher relative humidity because of their lower temperature (and propensity for damp floors and walls).

All modern air conditioning systems, down to small «window» units, are equipped with internal air filters. These are generally of a light weight gauze-type element, and must be replaced as conditions warrant (some models may be washable). For example, a building in a high-dust environment, or a home with furry pets, will need to have the filters changed more often than buildings without these dirt loads. Failure to replace these filters as needed will contribute to a lower heat-exchange rate, resulting in wasted energy, shortened equipment life, and higher energy bills; also low air flow can result in «iced-up» or «iced-over» evaporator coils, and then there is no air flow at all. Additionally, very dirty or plugged filters can cause overheating during a heating cycle, and can possibly result in damage to the furnace unit or even fire. It is important to keep in mind that because an air conditioner moves heat from the indoor (evaporator) coil to the outdoor (condenser) coil, the latter must be kept just as clean as the former. This means that, in addition to replacing the air filter at the evaporator coil, it is also necessary to regularly clean the condenser coil. Failure to keep the condenser clean will eventually result in harm to the compressor, because the condenser coil is responsible for discharging both the indoor heat (as picked up by the evaporator) plus the heat generated by the electric motor driving the compressor. Outside, «fresh» air is generally drawn into the system by a vent into the evaporator section. Adjustment of the percentage of return air made up of fresh air can usually be adjusted by manipulating the opening of this vent.

BUILDING HOUSES

The man who builds walls is called a bricklayer. The bricks are stuck together with mortar. When the walls of the house are too high for the bricklayer to reach, the first scaffold is made. A scaffold is a platform of planks for the workmen to stand on. This is usually held up by a frame of steel tubes. Extra scaffolds are put up as the workmen need them. As the bricklayer works he often looks at the plans. Then he will know where to build in the doors, windows and ventilators. A carpenter now begins to work. He is the man who does the rough woodwork of the house.

When the walls are at the level of the first floor he puts in the wooden floor joists. These are strong wooden beams which will carry the upstairs floors and hold up the ceilings in the downstairs rooms. Then the joiner fixes the window-ledges and when the walls are plastered he fixes the doors and other woodwork.

Today most of the woodwork is made at a joinery works. At the joinery works, machines plane the wood smooth and cut it to the right size. Machines also make the joints ready for the men to fit the pieces together. Doors, window frames and even the stairs all come to the building site on lorries. They are ready to be fixed in the houses. A lot of strong timber which we cannot see is used to make a roof. The highest beam is called the ridge. The sloping beams are called rafters. When the roof is on, many different workmen can come and finish off the house.

Plumbers work on all the water pipes of the house. They lay pipes to carry clean water into the house from the water mains. Plumbers also lay pipes to carry waste water away to the sewers. Glaziers put glass in the window frames to keep out the wind and the rain. When all the wires and pipes are in place the house is ready for the plasterers. They are the men who make the ceilings and walls nice and smooth. The joiners finish all the woodwork in the house, and leave it ready for the painters and decorators.

ROOF

A roof is the topmost part of a building. It is a covering 'constructed over the enclosed space to keep out rain and wind and to preserve the interior from exposure to weather. A roof must be well framed, strong enough to resist winds and sustain snow loads, and serve as insulation to prevent transmission of heat. They should tie the walls and give strength and firmness to the structure.

Roofs are now built varying in inclination from the nearly horizontal to the steeply-pitched. The flat roofs are often used in buildings of cities not only as coverings but for play-grounds, tea-gardens, and such purposes, but in buildings where slates, tiles or stone slabs form the roof covering, the pitch should never be less than one-fourth of the span.

For utilitarian purposes, the inclination of the roof is made as flat as possible for the purpose of economizing the timber and covering material.

The pitch of roof is governed, first by climatic conditions, secondly by the covering material used and by architectural requirements. For any given covering the milder the climate the flatter the pitch that may be given to the roof.

There are numerous forms among the wooden roofs, namely: lean-to or shed roofs are roofs formed with one slope only, and used for outhouses and for sheds.

Couple roofs are roofs composed of rafters with their feet fixed to wall plates, with their heads butting against a ridge piece; there is no tie, they depend for their stability upon the abutment afforded by the walls. Couple-close roofs- for roofs about 12 feet in span; ties are used to prevent the walls being thrust out by the rafters. The ties are usually formed by fixing the ends of the ceiling joists to the feet of the rafters.

Collar roofs – in this type each pair of rafters has a collar, a scanting similar to the rafters fixed about half-way up the slope of the rafters. This tends to prevent the spread of the rafters, but it also subjects the rafters to considerable bending stress, which is at a maximum at the point where the collar is attached to the rafter.

FLOORS

Definition.

The tiers or levels which divide a building into stages or stories are called floors. These may be of timber, or they may be constructed of fire-resisting materials.

Classification.

Floors for ordinary residential purposes are mostly made of timber, and may be divided into:

- ***Single-joisted floors*** include bridging joists.
- ***Double-joisted floors*** include bridging joists supported by binders.
- ***Triple-joisted floors*** include bridging joists supported by binders the latter usually being framed into girders which finally support the load.

- ***Single Floors.***

When the total weight upon a floor is carried by a single system of joists, which span or bridge an opening, it is termed a single floor, and the joists are known as bridging joists.

- ***Basement Wood Floors.***

Basement floors constructed of timber are subject to rot unless adequate precautions are taken to keep the woodwork dry and well ventilated. To attain the latter conditions and also to comply with general hygienic requirements, the soil below the basement floor should be covered with 6 inches of good concrete, gauged and graded to be practically damp proof. A composition of 1 part Portland cement, 2 parts sand and 4 parts broken ballast will give good results and keep down dampness when not under pressure and also ground air.

- ***Double Floors.***

Where the smallest span exceeds I5"feei it becomes economical and better construction to employ double floors. These consist of girders usually placed across the shortest span, and joists crossing them at right angles and fixed in the direction of the longest span.

- ***Triple-joisted Floors.***

For spaces of 25 feet and over in timbers, the main girders require lateral support. Intermediate beams known as binders are framed into the main girders, and these in turn support the bridging joists. Large wood floors of this type are now obsolete, owing to the difficulty in obtaining timbers sufficiently large for the main girders and also from the combustible nature of the material. Where floors of this type are employed, the main girders would always be of steel, either simple rolled beams or compounds, according to the nature of the loads to be supported. The proper necessary ventilation may be obtained by the insertion of iron or terracotta air bricks at intervals in the outer walls between the ceiling and the floor boards level, and by boring a number of horizontal holes through the joists at the center of their depth, by using ceiling joists, or by brandering, so that .the air may circulate through all. The ventilation is more complete, when, instead of a few iron or air bricks, a course of perforated bricks is inserted at two or more sides of the floor, and provision is made for a thorough ventilation without draught.

- ***Fire-resisting Floors.***

The practice of employing a system of fire-resisting construction for floors in all cases where it is not imperative to reduce the initial cost to the lowest point is now becoming universal. Some of advantages of this form of construction are safety from fire, its superior hygienic properties, and ease with which floors of wide spans may be constructed thus enabling any storey

to be divided into rooms, without reference to the arrangement of the rooms either above or below.

- ***Upper Floors***.

There are a large number of patents for the construction of upper floors, but they nearly all conform to one of four types, i. e., 1) filler joists, 2) ferro-concrete slabs, 3) hollow block and rib, and 4) precast beams, each of which is a method designed to support the essential concrete slab.

- ***Filler Joist Floors.***

In this type of floor the concrete slab is reinforced with rolled steel joists of small section, spaced at from 2 feet to 3 feet centers and in spans up to 20 feet. The filler joists may rest on brick walls or cleated to main steel girders.

- ***Ferro Slab Floors.***

The floor surfaces in this type are formed of concrete reinforced with steel rods spaced at about 6 inch centers. The minimum thickness permitted for floors is 3 inches, but generally they run about inch in thickness for every foot of span.

- ***Hollow Block Floors.***

These are formed of hollow earthenware or terra-cotta blocks from 9 inches to 1 foot in width, about 1 foot in length, and of a depth varying from 6 inches to 1 foot. They are laid in parallel rows on the formwork, their ends butted, and with a space between them of from 4 inches to 6 inches wide.

- ***Precast Beam Floors.***

These consist of hollow precast reinforced beams of about 10 inches in width, and a depth varying to the requirements of the load and span. They may be supported direct upon walls or be placed between steel joists. The sides are grooved to form joggles. The beams are precast, and seasoned before delivery, and can be lifted and bedded in position directly, and the surface concrete screeded on direct.

APPENDIX «B»: TESTS IN ENGLISH

TEST № 1 / VARIANT № 1

- **Make questions in the Present Perfect using these prompts.**

1. you / speak to / the electricians?
2. he / write / the new WBS?
3. they / deliver / all the timber?
4. she / meet / the client?
5. you / hear / the weather forecast?
6. how many times / they / visit / the site?
7. why / they / not answer / the email?
8. you /ever / use/ this contract?

- **Put the verbs in the brackets in the Perfect Tense.**

1. The town centers (to provide) the main opportunity for architectural adventure.
2. All the town centers (to be designed) to contain the more important public buildings.
3. New constructional methods and multi-storied buildings (to increase) the amount of space available for public gardens, parks and playing fields.
4. All the office blocks (to be arranged) as long horizontal slabs.
5. A new specially designed ceiling (to be installed) which creates a sunny and inviting atmosphere.
6. Large-scale construction and plan making (to become) an everyday activity.
7. Gaudi (to design) the gardens surrounding the old factory.

- **Translate the sentences paying attentions to the prepositions.**

1. *Due to* the increasing number of electrical devices sensitive to damage from power surges, internal lightning protection is an important consideration.
2. Architects, engineers and other consultants charge *either* a percentage of the building construction cost, a time charge *or* a lump sum.
3. *In addition to* the requirements for individual practice of architecture, most states and countries require a certificate of registration for a single practitioner and a certificate of authorization for an entity.
4. *According to* the International Union of architects, at present there are 800000 fully qualified architects in the world.
5. Meeting rooms can be separated from the conveyer only by the transparent panoramic glass *in order to* help the visitors see the process of producing something.
6. Design of houses for the middle classes is considered to be *both* important *and* interesting.
7. Building can be classified *according to* different principles, e.g. the building material, the number of storeys, the place they are situated in, their condition, etc.
8. More complicated shapes of blocks are used *in order to* improve insulation.
9. It is desirable both for the purpose of strength and durability that concrete should be made with the lowest water-cement ratio.

- **Put in the correct preposition from the box.**

in addition to, according to, in order to, due to, as…as, as well as, both…and, either…or

1. Generally we can subdivide structures … their geometric form.
2. … the formal requirements, an individual can improve his or her chances of finding employment by developing strong communication and computer skills.
3. … the «organic» philosophy, a building should have … few rooms … needed to meet the requirements.

4. … judge the feasibility of a project, the architect or engineer should consult the local planning authority.
5. The original furniture was designed by Mies van der Rohe … every detail, including door handles and curtain tracks.
6. They were concerned with having … many socket outlets …possible, hot water, light and so on.
7. … utilize rainwater, its flow is directed from roofs into a storage tank.
8. ... hoisting and conveying cranes also perform the operation of placing the elements in accordance with the construction project.
9. All parts of building can be categorized … their functions.
10. Blocks are built … with projecting … built-in staircases.
11. Standard forms of the contract contain a wide range of clauses designed to ensure protection to … the client … the contractor.
12. … German practice, the architect or engineer is the client's representative.
13. … the industrial buildings there are many others.
14. Water is supplied to a building for drinking, cooking and washing purposes … to support HVAC.

- **Translate the sentences with *some, any, no.***

1. No explanation was given to him why the experiment had been stopped.
2. I cannot consult just any person, I need someone who is an expert on the problem and who has had enough experience.
3. The scientists believe that there is practically no atmosphere on the Moon.
4. Any moving object will continue to move in a straight line unless it is stopped some other force.
5. None of the young men seemed to enjoy this scientific film.
6. No discovery can be made without wide experimentation.

- **Use the correct indefinite pronoun.**

1. Of … truly building we can say that every element in it has a triple implication.
2. In olden time this structure had … ceiling.
3. A roof garden is … garden on the roof of the building.
4. The architect may choose … subject, but the general view of the pavilion is to depend on the chosen subject.
5. An energy-efficient building is … type of residential or non-residential building that uses less energy than what might regarded as standard.
6. … ideal plan can do justice to the potential nature of modern man if it does not further the interaction of the urban and the rural patterns of life bringing gardens, parks and recreation spaces into the heart of the city.
7. … must plan where streets are to run, parks are to be laid out, and industrial facilities are to be furnished.

TEST № 1 / VARIANT № 2

- **Make questions in the Present Perfect using these prompts.**

1. you /see/ the architect?
2. you /visit/ the site?
3. the supervisor /arrive/ yet?
4. why /you/ have /not /action/ the email?
5. he / finish?
6. where /contractor / be?
7. you / use/ the portal/ at all?
8. you/ ever/ take part/ in project meetings?

- **Put the verbs in the brackets in the Perfect Tense.**

1. Very interesting designs (to appear) for child-care institutions.
2. The prefabrication of parts and mechanization of labour on the construction sites (to create) favourable conditions for the method of accelerated conveyer construction.
3. Accelerated construction of houses (to reduce) the time required for the birth of the new cities.
4. Several large-capacity house-building plants, equipped with the most advanced machines and automatic lines, (to be built) in Moscow.
5. Special attention (to be given) to the establishment of cultural and commercial services in the microrayons.
6. The young city already (to become) well known for the huge chemical combine established there.
7. New methods and the use of new materials (to come) into existence.

- **Translate the sentences paying attentions to the prepositions.**

1. *According to* their character and purpose buildings are divided into residential, civic or industrial classes
2. Meeting rooms can be separated from the conveyer only by the transparent panoramic glass *in order to* help the visitors see the process of producing something.
3. Colour has a practical planning function *as well as* an expressive quality.
4. The staircase can be *either* projecting *or* can be contained within the block.
5. The town was built up by the hard work of the people who created it, *as well as* by the outstanding minds of those for whom it was created.
6. The architect must always study each detail from the viewpoints of *both* use *and* appearance.
7. The incidental building costs include the costs of professional services before construction begins as well as those incurred during the course of development.
8. It is necessary to reduce the labour force *according to* demand.
9. Doors provide access to the building *as well as* passages within the interior space.

- **Put in the correct preposition from the box.**

in addition to, according to, in order to, due to, as…as, as well as, both…and, either…or

1. Craftsmen were able to experiment with stone … new techniques of metal work.
2. … to the 15,000 population of Tapiola itself this center will serve 15,000 people of the surrounding neighborhood.
3. … their length and height the blocks may be slab or point blocks.
4. The contractor is responsible for the site, site staff and their safety … all services up until completion.
5. Floors may be … of timber … of a fire-resisting materials.
6. Drainage lines are sized … their location in the system and the total number and types of fixtures served.
7. Nowhere have the new forces in urbanism been organized so as to create … a functional … an aesthetic unity.
8. Feasible means possible … practicable and is influenced by a number of factors.
9. Payments are to be made at a set date or … progress.
10. The windows and doors must look well from the interior … from the exterior.
11. The strength of this building material is … high … that of steel.
12. … implementation of the new project all services in the hospital were improved.
13. There is a marked improvement in the heating and ventilating systems … in hot-water supply, kitchen and sanitary fittings.
14. Plastics are both strong and inexpensive.

- **Translate the sentences with *some, any, no.***

1. There was no water left in the radiator, so we had to stop and refill it.
2. Any architect who has worked long enough in this field can give you this information.
3. He said he had no wish to read scientific articles.
4. I don’t want to have any argument. The matter is clear enough for me.
5. You’ve got absolutely no ground for saying so.
6. It was clear that no person could do this work alone.

- **Use the correct indefinite pronoun.**

1. … have the new forces in urbanism been organized so as to create both a functional and an aesthetic unity.
2. One cannot derive an archetype for the modern city from … existing example.
3. It was a building almost entirely of iron and glass, far larger than … cathedral.
4. An arch bridge can be designed so that … part of it has to withstand tension.
5. The plan of a city must be flexible, as … one can be certain when the development will take place.
6. The city, if it is … , is an expression and symbolization of man.
7. In the ideal form of the modern city one must look for a fuller embodiment of needs than … recent culture has produced.

8. The need to make the infrastructural system more efficient, to allow people to move easily and quickly in large areas has transformed the way to perceive, making … present in the same urban scene with the … effect of a crazy remote control of a TV.

TEST № 2 / VARIANT № 1

- **Translate the sentences with – *ing* forms into Russian.**

1. A beam is a structural element that is capable of withstanding load primarily by resisting bending.
2. An early example of a city consisting entirely of high-rise housing is the 16th-century city of Shibam in Yemen.
3. An early modern example of high-rise housing was in 17th-century Edinburgh, Scotland, where a defensive city wall defined the boundaries of the city.
4. A steel frame supports the entire weight of the walls, instead of load-bearing walls carrying the weight of the building.
5. Large cities currently experiencing increased skyscraper construction include Toronto, London, Shanghai, Dubai, and Miami, which now is third in the United States.
6. The record for world's tallest building remained in Asia with the opening of Taipei 101 in Taipei, Taiwan, in 2004.
7. At the time Taipei 101 broke the half-kilometer mark in height, it was already technically possible to build structures towering over a kilometer above the ground.

- **Underline the words ending in – *ing* and identify their functions.**
  These forms may be verbal nouns, present participles or gerunds.
  Translate the sentences into Russian.

Building types may range from one-room wood-framed, masonry, or adobe dwellings to multi-million dollar high-rise buildings able to house thousands of people. Increasing settlement density in buildings (and closer distances between buildings) is usually a response to high ground prices resulting from many people wanting to live close to work or similar attractors. Multi-story buildings aim to increase the area of the building without increasing the area of the land the building is built on, hence saving land and, in most cases, money (depending on material used and land prices in the area). Any building requires internal infrastructure, which includes such elements like heating and cooling, water and wastewater, etc.

- **Find Participle I and define its function.**
  Translate the sentences into Russian.

1. There is a growing demand in dwellings in our town.
2. The most common types of residential buildings are 3-5 storey blocks with central stair-cases leading to the three flats per floor.

3. Moscow is a big growing city with high buildings, treelined streets and green parks, a city that becomes more beautiful from day to day.
4. Last year the Russians began apartment construction in which complete flats, including kitchen, bath and several rooms are precast.
5. Professional building workers were helped by the students who worked throughout the summer putting up walls and operating building machines.
6. The students were shown the uniform area consisting of clay starting about 12 ft. below the surface.
7. The word «prefabrication» is a misleading term.
8. This is a method offering speedy construction.

- **Find Participle II and define its function.**

1. Compared with a multi-storey building a single-storey structure is cheaper and easier to build, allows more freedom for the future growth of department and reduces the time absorbed in traffic movement within the building.
2. The designer believed that many useful lessons learned in new town planning could well be applied.
3. Experience gained during the construction showed several improvements as compared with traditional precast concrete form of construction.
4. The first slab to be constructed is the ground floor which is usually placed on the leveled or lifted ground.
5. Complete sections are conveyed on special trailers to the site already prepared to receive them.
6. Work is being done on the design of a building assembled from rolled concrete parts.
7. The towers will be constructed from precast blocks supplied from a site factory.
8. Located on a site between Elvet Hill Road and South Road, the new multi-storey building will accommodate about 250 students.

- **Read and translate into Russian the following sentences paying attention to the Participles. Point out the sentences with Participle 1 and Participle 2.**

1. The glass varies from opaque to reflective and black, depending on the light and the seasons.
2. The use of naturalistic forms was rejected in favour of an abstract language composed of straight lines primary colours and black, white and grey.
3. The second floor accommodates a women`s wash-room, a balcony giving onto the main prayer room and cloakroom.
4. Gothic structures have great windows filled with stained glass and ornamented with elaborately carved stonework.
5. The plant comprises a number of buildings including office block, workshops, instrument and carpenters` shops and experimental laboratory.
6. The main feature of the structure is an office tower block rising above the two-storey podium.

- **Open the brackets and put the Participle I or Participle II instead of the Infinitive.**

1. The first experimental five-storey block of flats (to assemble) from large two-room size elements was erected in Moscow in 1960-61.
2. The flat roof of the building is formed from prefabricated panels (to support) on plywood box beams.
3. The first step in the construction of a building (to use) the lift-slab method is the clearing and grading of the site area.
4. The design of motor ways is the function of the road engineers and the landscape architect (to work) in collaboration.
5. The school (to design) by country architect in no special prestige exhibition job.
6. Equipment of flats is receiving consideration. Blocks (to comprise) kitchen, bathroom and W.C. – all completely fitted – are now in production.
7. Area of the house should be between 25 and 35 sq.m. (to divide) into 2 or 3 rooms.
8. All the ancillary rooms (to serve) the main public spaces and other rooms (to serve) the main public spaces and other rooms where privacy is required have been placed around the perimeter of the main building.
9. In industrial buildings radiators (to build) of pipe are occasionally used and are satisfactory.
10. Radiators are now made according to the same design whether (to use) for steam or for water.
11. The architect divided the city into «neighbourhood units» (to comprise) four «super blocks» each.

- **Read and translate the sentences into Russian paying attention to the Participles.**

1. The construction of prefabricated buildings is simple and does not take a lot of time.
2. The building has a framework of twin columns which are of prefabricated reinforced concrete units and are assembled with screws.
3. The main problems involved are those of underheating in winter, overheating during summer and the amount of moisture contained in the air.
4. The comfort conditions which can be maintained when using a heat-recovery air conditioning system are no better than those with conventional air-conditioning.
5. The building is divided into two blocks linked by the entrance hall and lounge area.
6. Care was taken by the architects to select a hardwearing brick which at the same time would be an attractive appearance when used in large areas.
7. With the electrical equipment housed in the main portions of the structure requiring no windows, opportunity was taken to design a building which expresses a feeling of enormous energy confined and controlled within.
8. The wall adjoining the server is faced in Italian tiles.

TEST № 2 / VARIANT № 2

- **Translate the sentences with *-ing* forms into Russian.**

1. From caves to modern well built buildings, houses are fulfilling the need of shelter and protection for humans in every age.
2. The main reason of using clay is its ability to keep the house cool in summers and warm in winter.
3. Then you usually need a building permit to start building your house.
4. Construction workers start digging holes for the footings, which support the walls of the house.
5. The footings are made by pouring concrete into forms that reach down below the frost line so that the house cannot move when it freezes in winter.
6. The roofs are built of different materials, depending on the climate and amount of rainfall.
7. Western-style buildings are slowly replacing traditional houses in the Middle East and Asia.

- **Underline the words ending in *-ing* and identify their functions.**
  These forms may be verbal nouns, present participles or gerunds.
  Translate the sentences into Russian.

In architecture, construction, engineering and real estate development the word ‘building’ may refer to one of the following: any man-made structure used or intended for supporting or sheltering any use or continuous occupancy, or an act of construction (i.e. the activity of building). Buildings serve several needs of society - primarily as shelter from weather and as general living space, to provide privacy, to store belongings and to comfortably live and work. Residential buildings are called houses/homes, though buildings containing large numbers of separate dwelling units are often called apartment houses (blocks) to differentiate them from the more 'individual' house.

- **Find *Participle I* and define its function.**
  Translate the sentences into Russian.

1. Blocks comprising kitchen, bathroom and water closet – all completely fitted – are now in production in Czechoslovakia.
2. The corridors connecting the buildings of the new plant.
3. The architect sees his building as a three-dimensional object standing in space.
4. A block of flats being built of seven storeys is above basement level with two flats on each floor.
5. The prefabrication systems are composed of sections or panels that are not only self-supporting, but also load-bearing.

6. The system can be either simple or complex, depending upon exiting conditions.
7. A project also includes a separate 14-storey 194 ft. high office block with three levels of basement, of reinforced concrete construction providing some 176.000 sq. ft. of floor space.
8. Enterprises involving a fire hazard should be moved outside Moscow.

- **Find *Participle II* and define its function.**

1. A block of flats was the first experimental building constructed.
2. The concrete slabs were lifted to the desired height.
3. Construction of the school is based on pre-fabricated metal frame, doors, windows and sanitary services provided by the government.
4. The instrument used by the bricklayer is called a trowel.
5. The chief instruments used by plasterer are the trowel and the float.
6. Complete precast kitchens and baths with all service lines cast in place are delivered to building sites.
7. The main principles established for the 5-storey blocks were maintained in developing the plan form of the high-rise blocks.
8. This housing scheme consists of 171 dwellings contained in twenty-one 5-storey blocks and two 23-storey blocks.
9. The blocks are linked at third floor level by bridges supported independently and constructed from standardized precast concrete elements.

- **Translate into Russian the following sentences paying attention to the *Participles*. Point out the sentences with *Participle I* and *Participle II*.**

1. The temple`walls were covered with reliefs celebrating the achievements of the kings and the powers of the gods.
2. The walls made from concrete and gypsum slabs are covered with retroreflacting paint.
3. The basement, containing a billiard room, a home theatre and a cellar, is remarkable for the air of the Middle Ages.
4. Like many other architects of their generation across Europe, they were fascinated by the possibilities offered by new technologies.
5. The four central pillars support a monolithic ring carrying monolithic dome with a diameter of 12 m.
6. The basis of the church consists of three timber octahedrons placed one upon another to form a pyramidical silhouette.

- **Open the brackets and put the *Participle I* or *Participle II* instead of the *Infinitive*.**

1. The school will accommodate 350 pupils and will have a three-storeyed classroom block (to link) by several single-storey structures.
2. The technique (to use) consists of two reinforced structures of a total height of 160 ft.
3. The wall frame system (to base) on industrial methods is very popular in many countries of the world.

4. The house (to build) with prefab parts will be five storeyed.
5. The block boxes are being manufactured in a factory in the Moscow area (to situate) within reasonably easy access to the new housing estates.
6. The area (to surround) the new plant in the suburbs of Madrid has been attractively landscaped with flower gardens and trees.
7. The main structure of the new Zeland House is a reinforced concrete frame with circular columns (to place) at 27 ft. metres in both directions.
8. Nowadays many new houses are built fully (to equip) with combined hot water and central heating systems.
9. Experience (to gain) during the construction showed several improvements as compared with traditional precast concrete form of construction.
10. The terrace steps are formed by long L-shaped precast units (to span) between the terrace beams.
11. The house (to build) with prefab parts will be five-storeyed.

- **Read and translate the sentences into Russian paying attention to the *Participles*.**

1. The work described was carried out by the research department of the Sand and Gravel Association of Great Britain.
2. Materials used in the elevations are white painted timber boarding and natural concrete finish.
3. Steel is well suited to use in large plants having long spans, heavy loads and large clear heights.
4. They used all the methods recommended.
5. The main structure of New Zealand House is a reinforced concrete frame with circular columns placed at 27 ft centers in both directions.
6. Piers supporting the external precast columns are provided in the retaining wall.
7. We must put up buildings which ensure that there is plenty of light and air, distinguished by the simplicity of their finish and painted in clear colours.
8. Heated galleries will link ten 5 storey buildings, resembling ocean liners, into a single housing complex with a trading centre, kindergarten, school and administrative institutions.

TEST № 3

BUILDING MATERIALS

1. Building materials should be:

a. hard, plastic, easily fastened and fire-dangerous;
b. durable, hardly fastened, soft, fire-resistant;
c. fire-resistant, hard, durable, easily fastened.

2. The most commonly used materials are:

a. plastics, concrete, wood, glass, stone, brick, steel;
b. glass, concrete, ferro-concrete, plastics;
c. electricity, central heating, air-conditioning, refrigeration.

3. Building materials differ in:

a. fire-dangerousness, hardness, durability;
b. durability, fire-resistance, softness;
c. hardness, fire-resistance, durability.

4. Building materials are divided into ….. main groups:

a. four;
b. three;
c. five;

5. Main building materials are:

a. stone, glass, timber and plastics;
b. metals, lime, rocks and concrete;
c. timber, rocks, stones, metals.

6. Cementing materials are:

a. cementing, gypsum, lime;
b. binding, lime, concrete;
c. cements, gypsum, binding.

7. We use the main building materials for:

a. exterior;
b. interior;
c. auxiliary.

8. Secondary materials are used for:

a. bearing structures;
b. joining different planes;
c. interior finishing.

9. Natural building materials are:

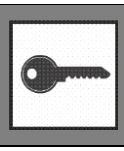
a. concrete, stone, glass, lime;
b. timber, cement, sand, plastics;
c. lime, stone, timber, sand.

10. Artificial building materials are:

a. metals, clay products, sand;
b. brick, lime, ferro-concrete;
c. concrete, cement, clay products.

REFERENCES

1. Бутник В.В. Современный англо-русский политехнический словарь: 125000 слов / Modern English-Russian Polytechnical Dictionary: 125000 words. – М.: Вече, 2006. – 512 с.
2. Долинская И.М. Англо-русский архитектурный словарь: 20000 слов / English-Russian Architectural Dictionary: 20000 words. – М.: Жираф, 2000. – 302 с.
3. Ивянская И.С. Английский язык для архитекторов: Учебное пособие. – М.: КУРС; ИНФРА-М, 2013. – 400 с.
4. Камминг Дж. Английский для студентов архитектурных и строительных специальностей: Учебник (предисловие к рус. изданию и англо-рус. словарь проф. В.Н. Бгашева). – М.: Астрель, 2004. – 270 с.
5. Кузнецов Б.В., Перлов Н.И., Янковский Г.Н. Русско-английский политехнический словарь: около 90000 терминов (под ред. Б.В. Кузнецова, 7-е издание). – М.: РУССО, 2001. – 723 с.
6. Любимцева С.Н. Английский язык для студентов финансово-экономических вузов. Начальный курс: Учебник. – М.: Высшая школа, 2006. – 296 с.
7. Полякова Т.Ю., Синявская Е.В., Тынкова О.И. Английский язык для инженеров: Учебник /Т.Ю.Полякова, Е.В.Синявская, О.И.Тынкова и др./ – 7-е изд., испр. – М.: Высш. шк., 2010. – 463 с.: ил.
8. Синдеев Ю.Г. Англо-русский политехнический словарь. – Ростов: Феникс, 2002. – 831 с.
9. Building Design and Construction Handbook. – London, 1997. – 1772 p.
10. English for Construction. Level 1, Evan Frendo, 82 p.
11. Gyetvai-Balogn A. Architecture of the 19th century and the turn of the century. – London, 2007. – 82 p.
12. Marshall D., Worthing D. Construction of Houses, 5th ed. – London, 2003. – 436 p.
13. Russen M. Architecture for Urbanity. – London, 1999. – 72 p.
14. Wood handbook, Madison, WI:U.S. Department of Agriculture, Forest Service, Forest Products Laboratory. 1999, 463 p.



CONTENTS

Коновалова Елена Николаевна
Маршева Фрида Мазитовна
Мубаракшина Фирдания Дамировна

PROFESSIONAL ENGLISH IN USE: ARCHITECTURE

Part 2

Учебное пособие

Корректура авторов

Издательство
Казанского государственного архитектурно-строительного университета

Подписано в печать: 25.11.15 Формат 60х84/8
Бумага офсетная №1 Заказ № 388 Усл.-печ.л. 18,5
Печать ризографическая Тираж 500 экз Уч.-изд.л.18,5
13 - 100

Отпечатано в полиграфическом секторе
Издательства КГАСУ.
420043, г. Казань, ул. Зеленая, д.1