МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ РОССИЙСКОЙ ФЕДЕРАЦИИ
КАЗАНСКИЙ ГОСУДАРСТВЕННЫЙ АРХИТЕКТУРНО-СТРОИТЕЛЬНЫЙ УНИВЕРСИТЕТ

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CONSTRUCTION FOR MASTERS

Учебное пособие для студентов-магистров очной формы обучения всех профилей направления строительство

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Учебное пособие предназначено для студентов–магистров очной формы обучения направления строительство.

Основная цель учебного пособия – развитие и совершенствование профессиональных языковых навыков студентов.

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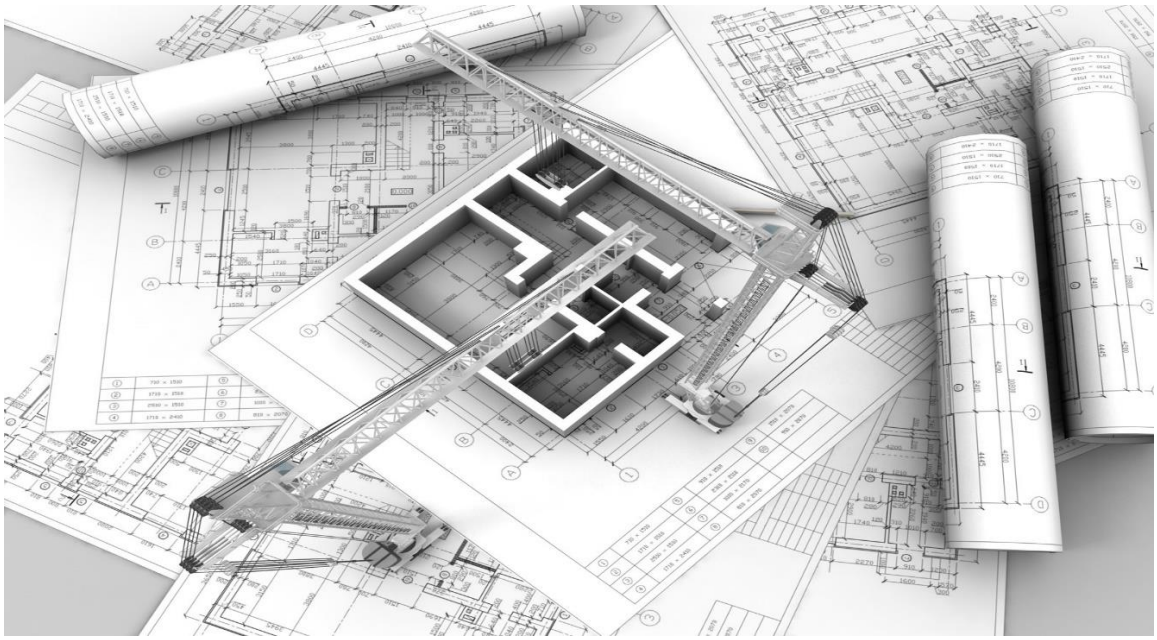


https://www.swaidanmotors.com/wp-content/uploads/3d-building-construction-image_1600x1200_78599.jpg

Cadaster in the Russian Federation

Construction is not a homogenous industry and is better characterized as a number of market segments coming together to form a representation of an industry. The traditional classification is that construction comprises of civil engineering, building, repair and maintenance, and materials sectors. Such simplicity would be easy but even within this framework other classifications such as housing commercial, public and industrial construction also exists. There are also variations in project size, complexity and location. Modern procurement approaches have also created crossovers between design, execute and operational activities. A large modern construction services organization can operate in a complex business environment. There will be competition within market sectors as well as across sectors. The process of developing a business has to be carefully thought through.

Industrial analysis clearly indicates that construction is a fragmented industry in which no single company has a dominant position able to influence the outcomes of the industry.

Speaking about any construction project it is impossible to avoid the topic of cadaster and land usage.

The Federal Service for State Registration, Cadastre and Cartography (Rosreestr) was established by merging three government agencies: Rosregistratsia, Rosnedvizhimost and

Roskartografia (Government Decree of 1 June 2009, No. 457). With this merger a single organisation responsible for all tasks related to the registration of rights, recording of parcels (cadastral map) and geodetic and (topographic) mapping was created. Since the start of the Russian Federation approximately 80 million parcels have been registered together with associated rights and restrictions (responsibilities) and the involved parties (persons). Therefore Rostreestr maintains probably the world's largest cadaster. Both information on parcels and the legal and administrative information can be accessed online by the public (http://maps.rosreestr.ru/Portal/). The Russian cadaster registers five types of objects: 1. Parcels, 2. Buildings, 3. Apartment Units, 4. Other structures (bridges, pipelines etc.), 5. Unfinished objects, i.e. objects under construction (buildings, bridges, pipelines, etc.)

The current parcel system is 2D polygon based, implying that the boundary between two neighbouring parcels is repeated (redundancy). The database contains the full history of the polygon since its creation. There are regional differences in the contents of the cadastral map, for example in some areas government parcels are included, while in others these are not (yet) included. The coverage is not yet complete. The scale differs for pragmatic reasons from 1:2,000 in urban areas up to 1:10,000 in rural areas. Because of the size of the Russian Federation several coordinate reference systems are used for accurate coordinates on cadastral maps (3 degree zones). In each region, special local coordinate systems are used for cadastral purposes. There are rules to avoid overlap between parcels. The survey plans needed for the registration of new parcels are made by commercial companies. Data maintenance is executed by the cadaster offices and data is managed in the databases of a number of regional offices. The software used countrywide comprises: Oracle 9, ArcGIS and some local software. Currently every three months data is copied to a central server for online web access to countrywide data (based on MapInfo's MapExtreme). From 2011 onwards it is foreseen that the updating will be executed on a daily basis resulting in real-time data.

Applicable laws and articles to 3D cadaster modelling are: – Federal Law 'On State Cadaster for Real Estate', Article 1; – Civil Code, Article 130; – Land Code, Article 11.1; and – Urban Development Code, Article 1. The cadaster law in the Russian Federation is quite generic: it neither explicitly mentions 3D, nor does it prohibit 3D volumetric parcels for registration.

Source: (https://www.researchgate.net/publication/241886547_3D_Cadastre_modelling_in_Russia; Construction Business Development Meeting New Challenges, Seeking Opportunity By C.N. Preece, K. Moodley and P. Smith)

Part 1. Construction Management

UNIT 1

Business development within the construction industry

The process of business development within the construction industry is a complex activity.

The business environment is complex and dynamic making it more difficult for businesses to succeed. Construction markets are complex and require careful segmental analysis. Business development is intertwined with the strategic decisions a firm takes. The business strategy the firm adopts sets out the path of business development activity. Business development is also tied into the business model of the firm. This model set out how value is going to be created, the markets, the financial proposition and network that are going to deliver the product or service. It defines the constraints and targets that are placed upon the business developer.

Business development is not an isolated activity. It requires interaction with both internal and external sources. Interaction with primary and secondary stakeholders is essential given the pressure that they bring to bear on the firm and their ability to influence success. Business success is complex activity that requires individuals to have a sound understating of the organizations they are developing.

Business development and stakeholders

Business development is not done in isolation and for a firm to succeed it has to consider the environment it operates in. Who are stakeholders?

The primary stakeholders are: owners, suppliers, competitors, employees, customers.

These stakeholders are critical to the very existence of the firm, the exception being the competitors. These are the traditional stakeholders of the firm. Each of these stakeholders has a role to play in the development of the firm. In all cases, competitors excepted, contribute to the functioning of the firm. Competitors on the other hand seek to gain advantage. This is not only in a technological or service context but also in social and political arenas. From a business

development context the primary stakeholders have an important role to play in the organizations development.

The secondary group of stakeholders are those individuals, groups and organizations that are not directly related to the core business of the firm. Secondary stakeholders include groups such as government, local authority, unions, local communities, political parties, consumer groups, etc. The diversity and potential influence of these groups suggest that secondary stakeholders can exercise the same level of influence on the development of the firm. The power of the secondary stakeholders could have a greater influence on the firm, particularly through the use of legislation. In the construction industry secondary stakeholders exercise a great deal of influence particularly regulatory authorities. Powerful lobbies such as the environmentalists can also influence business development. Traditional approaches to stakeholder engagement suggested that secondary stakeholders were less important. In the dynamic environments that exist engagement of secondary stakeholders as part of business development are essential.

Source: (Construction Business Development Meeting New Challenges, Seeking Opportunity By C.N. Preece, K. Moodley and P. Smith)

1. Answer the Questions:

1. What makes business success difficult?
2. What is a business model of the firm?
3. Which interactions does business development require?
4. What is a business success?
5. Who are the primary stakeholders?
6. Why are the stakeholders essential?
7. What is a second group of stakeholders?

2. According to the text tell if a statement is TRUE or FALSE

1. Construction markets are simple and require careful segmental analysis.
2. Business development is an isolated activity.
3. From a business development context the primary stakeholders have an important role to play in the organizations development.
4. Powerful lobbies such as the environmentalists cannot also influence business development.

3. Retell the text commenting on the obtained information

UNIT 2

Strategic management

The process of strategic business planning is already well documented. The process of strategic management has three interlocking parts:

1. Strategic analysis
2. Strategic choice
3. Strategic implementation

Strategic analysis is concerned with the analysis of the organizations capability both internally and its external environment to match the opportunities and threats in the environments in which it operates. This process is about examining the competitive position of the firm within the industries, markets, sectors and segments that forms its operational environment. This analysis will determine the opportunities and threats to the firm and the standing of the firm within its industry. The internal assessment of the firm is about determining its competencies, and its strengths and weaknesses. This provides an assessment of its resources, skills and capability to undertake the challenges it faces. The process of analysis will determine if the company has any competitive advantages over its competitors, its relationships to its suppliers and customers, its resource strengths and its standing in its industry. These issues and many others form a view of the company and its operating environment and allows a strategy to be developed.

Strategic choice is about making decisions that will determine the long-term strategic position of the firm. Based around a range of options open to the firm these decisions will put in place a plan that will determine how the firm chooses to position itself in the market. The decisions that are taken take cognisance of the strategic analysis of the organization that constrains the options available to decision-makers. A number of options are open to the firm such as growth, retrenchment or stability strategies that can be achieved either through internal measures or through external activity. To be competitive the firm had to follow a strategy of either cost leadership, or differentiation or focus. These strategic decisions are governed by the degree of fit between the proposed strategy and the strategic analysis, and the practicality of adopting the proposed strategy.

Strategic implementation is the last phase of the strategic management process. It is about putting the decisions taken in identifying the strategy into practice. Implementation involves the creation of business plans, setting up control and feedback systems, resourcing, budgeting, training and revising organizational structure to ensure the strategy is achieved. The implementation phase is about carrying out the strategy through action. From a business development perspective much of the most important work goes on during this phase. The actions taken in business development are critical to the strategic outcomes of the firm.

Source: (Construction Business Development Meeting New Challenges, Seeking Opportunity By C.N. Preece, K. Moodley and P. Smith)

1. Answer the Questions:

1. What does the process of strategic management include?
2. What is a strategic analysis?
3. What is the internal assessment about?
4. What is the main idea of a strategic analysis?
5. Who makes the decision?
6. What can be achieved thought the internal measuring?
7. What does a strategic implementation involve?
8. What is the main idea of the text?

2. Correct the mistakes in accordance with text information:

1. ***Strategic choice*** is concerned with the analysis of the organizations capability both internally and its external environment to match the opportunities and threats in the environments in which it operates.
2. The internal assessment of the firm is about destroying its competencies, and its strengths and weaknesses.
3. ***Strategic implementation*** is about making decisions that will determine the long-term strategic position of the firm.
4. To be destructive the firm had to follow a strategy of either cost leadership, or differentiation or focus.
5. ***Strategic analysis*** is the last phase of the strategic management process.
6. The implementation phase is about carrying out the strategy through action.

3. Retell the text commenting on the obtained information

UNIT 3

The construction management philosophy

A standard contract format contains the following broad categories:

■ The Work (capitalized) of the contract is the description of the work as set forth in the plans, specifications, and other documents that define or expand them, as well as addenda, revisions, and so on.

■ The date of commencement of Work and the date of completion.

■ The contract sum.

■ Contractor payment schedules.

■ Final payment requirements.

■ Procedures for contract modifications, increasing or decreasing the scope of work, and associated cost- and time-related implications.

Each one of these broad segments can be expanded with the insertion of specific contract language regarding the owner, architect, and contractor obligations and responsibilities, contract administration processes, safety and insurance issues, and specific project-management requirements.

Construction management is primarily a management philosophy and secondarily a set of contracts. The central feature of a construction management project is that the employer contracts directly with the trade contractors who are doing the work, and the coordinator of the construction work has no contractual responsibility for their performance. If the construction manager *does* have contractual liability for the performance of the trade contractors, the arrangement is not really construction management at all, and will probably be found on analysis to be some form of management contracting. That said, however, a construction manager *will* be liable where defective performance by a trade contractor is due to the construction manager's breach of its own duty to exercise the reasonable skill care and diligence of a properly qualified and competent construction manager in managing, administering, planning and co-ordinating the trade contractors' work. The separate trade contracts are each let directly by the employer, in much the same way that the employer has a direct contract with each of the consultants. In this way, the construction manager is a construction consultant in the same way that the architect is a design consultant. While the construction manager would

be expected to manage the overall process in terms of information flow and coordination, it is not beyond the bounds of possibility that the architect might manage the process during the design stage, using the construction manager as a consultant for advice on fabrication, assembly and co-ordination. When the time comes to work up the initial proposals into detailed 'bid packages', it is sensible for the construction manager to take a more dominant role while the architect remains a consultant. At every step, even though the construction manager might be responsible for management of the process, design decisions lie squarely with the design team. Design co-ordination remains the responsibility of a design manager.

Depending on the nature of the project, overall responsibility may shift during its different stages, or it may start and finish with the construction manager. This implied flexibility (relating the actual management structure to the needs of the particular job) is essential for successful management of the project. Indeed, it would probably not make sense to have a rigid standard-form contract for construction management since, by standardizing the contractual terms, this flexibility might be lost. There is a detailed list of obligations of which some must be deleted according to the particular project. Such options help to avoid the danger that once a procurement method becomes established, issues that need to be weighed carefully in the balance at the outset of the project cease to be issues. In a fixed standard approach of any type, attention ceases to be focused on the strategic questions and roles become taken for granted.

This could make the whole system prone to the problems that it has been designed to overcome. Therefore, it is good practice to ensure, that the standard form cannot be entered into unless the parties make decisions about the apportionment of risks and the management of particular risks, according to the circumstances of the project in question.

The appointment of a construction manager necessarily removes much supervisory and management responsibility from the architect, particularly in the production information and construction stages of the process. This requires that design and management are separate responsibilities. If the two functions are not separated, then the procurement process may well resemble design and build rather than construction management. An inherent problem with such separation is the question of who signs certificates. This is traditionally the role of the design leader as contract administrator. In construction management the contract administrator is not the design leader. It is not obvious who should certify work. Typically, funders and insurers insist that designers sign certificates and therefore, despite the split of design from management, it is almost inevitable that both designer and construction manager have a central role to play

in certification and, by implication, other aspects of contract administration. For these reasons, design cannot be fully separated from management.

The intention to split design from management requires the construction manager to be a specialist in management. This calls for skills quite different from those of a general contractor and probably different from those of a management contractor. The wise employer should steer clear of firms who claim to be specialists in all these things. In any event, the employer should always be wary of contractors using the appellation as a marketing tool, rather than as an accurate description of the services offered.

Sources: (Construction Contracts Law and management By J. Murdoch and W.Hughes;
Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

1. Which categories do you know in a standard contract format?
2. Can they be expanded and how?
3. What is a construction manager liable for?
4. When might the construction manager be a construction consultant?
5. What are the "big packages"?
6. Why is the design team necessary?
7. What is a flexibility?
8. What is an effective practice?

2. Match the terms with their definitions:

1. management	a. the effect that an action or decision will have on something else in the future
2. fabrication	b. the control and organization of something
3. implication	c. the fact that someone is legally responsible for something
4. appellation	d. something that you want and plan to do
5. liability	e. a name or title
6. risk	f. the act of producing a product, especially in an industrial process
7. intention	g. the possibility of something bad happening

3. Retell the text commenting on the obtained information.

UNIT 4

www.chiefexecutivenetwork.com/ind_generalcontracting

General contracting

General contracting involves the separation of construction from design. A main contractor is employed to build what the designers have specified. Since this form of procurement was developed it has become very common and is often referred to as traditional.

A contractor must consider many factors when laying out a site to support construction operations:

1. Site size compared to building size and configuration;

2. Location of adjacent roads, buildings, and utilities-pedestrian traffic must be kept at a safe distance from the construction site, fencing and barricades may be necessary to block off all or part of a road during construction operations.

3. Soil conditions and excavation requirements – it is important to consider how soil conditions and excavation of a site will change over the duration of a project. The bearing capacity of soils in areas where a crane will operate should be verified. Consideration must be given to the proximity of the crane to the edge of an excavation or foundation wall.

4. Construction sequence and schedule.

5. Location of utilities – the impact of overhead obstructions such as power or communication lines must be considered, precautions must also be taken if cranes must be operated over underground utilities.

6. Equipment requirements-determine size and location of hoisting equipment based on both the physical hoisting requirements and the project schedule.

7. Material quantity, storage, and delivery.

8. Worker parking-parking availability on and around a job site will typically be addressed in the project bid package.

9. Tool and equipment storage.

10. Construction operations facilities and trailers.

11. Sanitary facilities – the general contractor usually provides sanitary facilities on a job site.

The basic defining characteristic of general contracting is that the contractor agrees to produce what has been specified in the documents. Designers, on behalf of the employer, produce the documents and builders produce the building. In theory, the contractor should be invited to price a complete set of documents that describe the proposed building fully. Such documentation demands that the architect (or lead designer) co-ordinates design advice from a wide variety of specialists. The result is that the contractor has no responsibility for design. The contractor's offer of price is based on the bill of quantities, a document that itemizes and quantifies, as far as possible, every aspect of the work. The bill forms not only the pricing document but also, an important mechanism for controlling costs as the project progresses. Therefore, it has a central role in the process and the quantity surveyor, as the author of the bill, is an important contributor. General contracting, then, revolves around the relationships between employer, architects, quantity surveyors and builders.

Structural and services engineers provide specialized design advice which is co-ordinated by the architect. In civil engineering projects, the lead designer will generally be a civil engineer and will co-ordinate the design advice from other specialist engineers. These specialist designers will often take on supervisory duties as well as design. The purpose would be to visit the site and inspect the work to ensure that the work is produced in accordance with the design. There will be problems when work does not concur with the design. Such problems can only be resolved by examining the means by which the contractor was instructed what to build. The importance of the documents used for this purpose is self-evident. It is for this reason that the standard-form contracts tend to oblige the builder to produce what is in the documents.

One of the most important documents in general contracts is the bill of quantities. It cannot be produced if the design is incomplete. It is usually impracticable to prepare a complete design because of the time needed and because sometimes choices need to be left as late as possible in the process. If design is only partially completed then general contracting begins to break down because it is based on the assumption that the contractor prices, and builds, what

has been documented. When the documentation is incomplete, there is a high demand for communications and information. These demands render the process very difficult to manage. Similarly, when complex technologies are required, the need for specialist sub-contractors can place too many demands on the co-ordination and information systems. Clearly, there are problems if general contracting is used where it is inappropriate. Therefore, guidelines are needed as to where it is best suited.

Sources ((Construction Contracts Law and management By J. Murdoch and W.Hughes;
Construction Planning Equipment and Methods Seventh Edition By R.L. Peurifoy, C.J. Schexnayder and A.V. Shapira)

1. Answer the Questions:

1. What is a general contracting?
2. What does a general contracting involve?
3. What is a basic defining characteristic of a general contracting?
4. Why are documents that describe the proposed building fully important?
5. What the contractor's offer of price is based on?
6. Why do the bill forms have a central role in the process and the quantity surveyor?
7. What responsibilities does the lead designer have?
8. What is the most important documents in general contracts?
9. Why general contracting begins to break down if design is only partially completed?

2. According to the text tell if a statement is TRUE or FALSE:

1. A designer is employed to build what the main contractor have specified.
2. Designers, on behalf of the client, produce the documents and builders produce the building.
3. The bill forms only the pricing document.
4. One of the most important documents in general contracts is the bill of rights.
5. When the documentation is complete, there is a high demand for communications and information.

3. Retell the text commenting on the obtained information.

Part 2. Design

UNIT 5

Design-build

Engaging an architect at the conceptual stage of a project is not the only way to proceed down the path to design and construction. An increasingly popular process called design-build is being employed in both private- and public-sector work. The essence of design-build is to place both activities in the hands of one firm: a design-builder.

Some design-build firms were created when a general contractor employed architects and/or engineers on staff to provide a full-service organization. Other general contractors offering design-build services form a joint venture with an architectural firm or hire an architect much as they hire subcontractors to perform the design work.

Architects can also be the lead team member in a design-build situation, inviting a contractor with whom they have worked successfully on previous projects to join with them. This process of placing design and construction in the hands of one entity has the advantage of being able to monitor real-time costs as the design progresses to keep the owner's budget on track. The contractor employs the current database of costs in parallel with the progression of design so if changes need to be made to remain on budget, these changes can be reviewed quickly by the owner, who may elect other cost-saving options or increase their budget. At least there are fewer surprises.

The architect's team

In most projects, the architect is the team captain; they require the services of other design consultants, each one of whom will work together in a coordinated design effort:

■ The structural engineer's job is to design the building's foundation and superstructure after consultation with the architect, whose visual scheme for the building's exterior may impact the structural design.

■ The civil engineer's responsibility is to investigate soil conditions for foundations; design driveways, roadways, and parking areas; and, working with other engineers, provide the

size and location of all underground utilities (gas, water, electric power, storm sewer) required for the project.

■ The electrical engineer will establish the building's total power requirements and design the circuitry within the building proper. The electrical engineer may also consult with a lighting designer to provide the most efficient and cost effective interior and exterior (site) lighting for the building. A "low-voltage" consultant may also be employed to design the building's security and data and telecommunications systems. The electrical engineer will consult with the civil engineer on the design of the underground incoming electrical conduits and cables.

■ The mechanical engineer has the responsibility of designing the plumbing; heating, ventilating, and air conditioning (HVAC); and fire-protection systems within the building, and also consults with the civil engineer to design all incoming underground utilities: water, sanitary sewer, storm sewer, and fire-protection mains.

■ The landscape architect will work with the civil engineer to design the contours of the property for both practical and aesthetic purposes. The landscape architect will set aside grass and planting areas and select regional plantings for beauty and sturdiness.

■ The interior designer can interface with the architect to select materials and colors for various finishes – floors, ceilings, walls – and can assist in the selection of artwork within the structure.

Roles and responsibilities

One of the most significant features of design and build arrangements is the lack of an independent certification role in the contract. There is no architect or contract administrator to settle differences between the parties and there is no independent quantity surveyor responsible for preparing the basis upon which contractors tender.

The role of the quantity surveyor is in parentheses because, although cost information and economic advice are essential, there is no need for traditional quantity surveying in this form of procurement. There is no standard method of measurement, no bill of quantities, and no *contractual* role for the quantity surveyor.

The contractual relationships in design and build offer some advantages over other methods of construction procurement. The most important advantage is that the contractor is responsible for everything. This 'single-point' responsibility is very attractive to clients, particularly those who may not be interested in trying to distinguish the difference between a design fault and a workmanship fault.

Sources: (Construction Contracts Law and management By J. Murdoch and W.Hughes;
Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

1. What is the essence of a design-build?
2. What is the advantage of the process of placing design and construction in the hands of one entity?
3. What the contractor employs the current database of costs in parallel with the progression of design for?
4. What is the responsibility of a civil engineer?
5. What does the structural engineer's job include?
6. Who may the electrical engineer consult with?
7. What may a "low-voltage" consultant also be employed for?
8. What are the most significant features of design and build arrangements?
9. What is the advantage of the contractual relationships in design and build?

2. Correct the mistakes in accordance with text information:

1. An increasingly popular process called design-build is being employed in both country- and city-sector work.
2. Architects can also be the lead team member in a design-build situation, inviting a friend with whom they have worked successfully on previous projects to join with them.
3. The electrical engineer's job is to design the building's foundation and superstructure after consultation with the architect, whose visual scheme for the building's exterior may impact the structural design.
4. The landscape architect will work with the quantity engineer to design the contours of the property for both practical and aesthetic purposes.
5. The family relationships in design and build offer some advantages over other methods of construction procurement.

3. Retell the text commenting on the obtained information

UNIT 6

www.tsuab.ru/educational–programs/safetyTechnologicalProcessesProductionsMagInt

The design process

The design process consists of many phases, beginning with the initial meeting between the project owner and the architect where concepts were exchanged and continuing on to the production of what is often referred to as "working drawings". Drawings at this point represent the final stage of design and are required to obtain a building permit and thereby commence construction. The documents produced at each of these stages are referred to as "deliverables".

A project owner may not always want to proceed directly to "working drawings" for a number of reasons:

1. Full funding for the project many not yet be in hand, but some design documents may be necessary to obtain the funding required.

2. Conceptual drawings may be necessary to start the budgeting process, not only for construction purposes but for the interior fit-up of the building and costs associated with the relocation from an existing facility.

3. Approval of the project by the owner's board of directors.

4. The client's spatial needs may not be fully defined, and a preliminary set of basic floor plans may be required to do so.

There are a number of options open to an owner to obtain less-than-complete drawings, and the architect can be helpful in selecting the proper phase or stage of design to meet the owner's needs. The architect may also be able to provide a cost associated with each stage of design.

The initial schematic phase of design will require the architect to obtain some basic information from the owner: What is the function of the building – commercial, retail, corporate office? What square footage will be required, and how many people will occupy the space? Are there any special needs that must be addressed? What does the *owner* consider the project's goal? The architect will then begin to produce a "schematic design", which will generally include the following drawings:

■ A site plan locating the building on the owner's construction site.

■ A floor plan, dimensioned, possibly with a lobby floor if multistoried.

■ A section through the building (as though one took a knife and sliced the building in half, much like a layer cake); this allows an owner to see the spatial dimensions of a typical floor and ceiling heights.

■ An elevation – the view one would see standing outside and looking at the completed building, with floor to floor and overall height dimensions.

■ Possibly a computer image of the building in 3D, a colored rendering, or a model.

At the schematic level, the architect will also include an estimate based on this design, a proposed construction start, and the length of both design and construction.

The design-development stage

The design-development stage picks up where schematic design leaves off and includes some structural, MEP (mechanical-electrical-plumbing), and architectural details. Windows will be sized and located accurately in the building's exterior elevation, and partitions and rooms will be defined, along with some descriptions of basic materials.

The owner will receive more detailed floor plans, sections, and elevations with full dimensions. Components such as door types, sizes, and materials will be indicated. The architect will also provide "outline specifications", a descriptive narrative of basic building components.

It is important for both the architect and the owner to review each phase of design as it is produced to be assured that they have included the essential program requirements. This is no easy task for an owner who is not versed in design and construction terminology or has little experience in reading and interpreting construction drawings. An architect will welcome questions, no matter how basic, because the designers will need to explain what they have created and confirm that their design meets the needs of the owner's program.

The drawings produced at this stage, known as construction documents, will include sufficient information and detail for the contractor to estimate the cost of the project. They will

also include a complete specification manual. These are also the drawings and specifications that will be presented to the local building department to obtain a building permit, so they are also referred to as “the permitting set”.

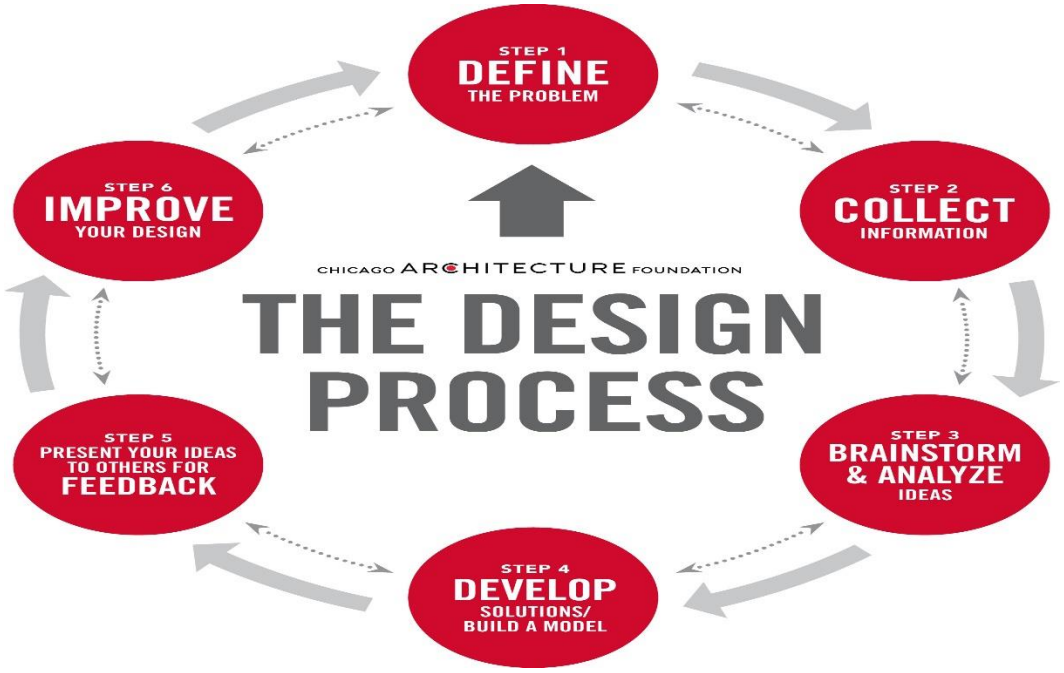
The specification book or manual contains detailed information about each material, piece of equipment, and component of construction to be installed in the project.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

1. What phases does the design process include?
2. May a project owner not always want to proceed directly to “working drawings”?
3. What conceptual drawings are necessary for?
4. What information does the designer need on initial schematic phase?
5. Which drawings does initial schematic phase require?
6. What does specification books include?

2. Comment on the following diagram:



wiringdiagram.net/engineering–design–process–diagram/engineering–design–process–diagram–engineering–process–diagram–engineering–design–process–diagram/

3. Retell the text commenting on the obtained information

UNIT 7

https://www.pbctoday.co.uk/news/building–control–news/bim–connecting–content/2677/

Building information modeling

The latest application of computer imagery in the design process is referred to as building information modeling (BIM), the creation of 3D and 4D models of the owner's building, sometimes referred to as virtual design. By creating a 3D image of the proposed project and passing it by all of the related consulting engineers for their reviews and comments, the end product avoids some of the problems associated with the more conventional method of computer-assisted design (CAD) and ensures that everything fits in its allotted space.

One of the major problems that can occur in a complex, multistoried design is when all of the various design consultants – the structural engineer, the electrical engineer, the mechanical engineer, and other involved in the design development – work independently and are not thoroughly coordinating their work with other members of the team. This is essential in ensuring that all work is being reviewed by other designers so electrical and mechanical elements.

With BIM, the structural "skeleton" is transmitted to all other consultants electronically; they must fit their work into the system. This 3D image can be rotated on its axis, and when the mechanical engineer designs a 3-foot by 2-foot heating and air conditioning duct for the third floor and finds that there is not enough room to pass under a steel beam, they can reduce the depth and increase the width so a 4-foot by 18-inch duct can fit. When such conflicts occur and items of work don't fit in their allotted space, all parties are aware of these conflicts and adjust their systems accordingly.

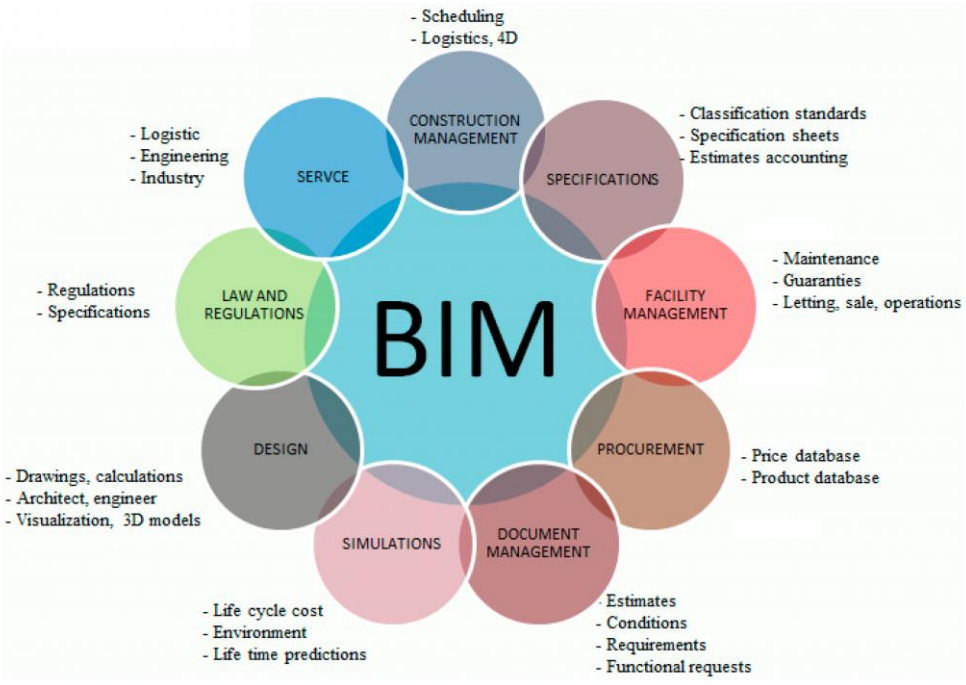
By adding the fourth dimension – time – BIM can create a virtual construction schedule that diagrammatically shows the building evolving from foundation through superstructure to completion. This "virtual" visual construction schedule is very effective when used as a tool to review actual progress during the weekly project construction meetings. While standing outside the construction field office, the status of construction can be compared to the contract schedule as represented by the BIM imagery to dramatically reveal the actual progress as opposed to the planned schedule.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

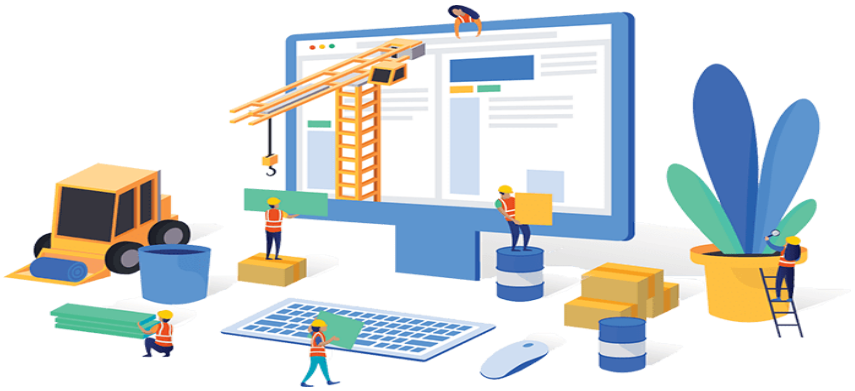
1. What is BIM technology?
2. What is the major problem while designing multistoried buildings?
3. What experts are involved in the design of the building?
4. How do experts exchange data using BIM technology?
5. What advantages of 3D modeling in construction can you name?
6. What is a virtual construction schedule?
7. At what stages of building construction can BIM be used?

2. Retell the text adding the information given in the chart



http://www.bimananews.ir/wp-content/uploads/2018/08/sustainability-10-00600-g001-1024x721.png

UNIT 8



https://www.builderstorm.com/

A case of online construction project

How can the Internet and e-business so fundamentally change and improve how construction works? It sounds great in theory, but what must the construction marketeer actually be doing in practice on a day-to-day basis?

The germ of an idea

Someone at Company X has a germ of an idea, which triggers off the need for more information.

This includes research for use in their feasibility study into the viability of the project, for sourcing the right advisers and for finding suppliers that could meet their requirements.

Company X will: 1) need to know where land is available, and will probably register with Web-based property databanks as well as enquiring through normal agents; 2) find out how online property finding services can help its search, and register on selected sites; 3) research the consumer demographics, trends and spending statistics for potential locations by downloading data from websites such as the government's.

As you can see, for the construction marketeer, several opportunities are already opening up for sponsoring or advertising on these Web-based sources of information.

The next step

Having completed the feasibility study and land option successfully, the next step for Company X is to translate the leisure center concept into something more tangible prior to the planning application. And this means finding a good architect. The Company X team is not convinced the architect from its last development has sufficient skill, so it is off to the Web

again where it finds Company Y, an up-and-coming practice. Company Y has just gone live with its new website covering all its core architectural disciplines, including some award-winning developments in the leisure industry.

Sourcing suppliers

Company Y is appointed and its design team swings into action. Plans need preparing, materials chosen, planning approval secured and potential tenderers shortlisted. For the construction marketeer, this is a crucial time. Company Y has been receiving regular e-newscasts from several suppliers of technically advanced materials that would be just right for a job like this. The e-newscasts were very low cost for the companies to produce, and much more acceptable than old fashioned newsletters.

These suppliers really are using the Internet well, thinking about the specifier's problems and trying to position themselves as 'partners'.

Company Y has to find suitable contractors too. The team uses the construction industry directories to see what contractors are doing – in some cases quite literally. They notice that some contractors have installed webcam to provide live pictures of what is happening on projects which can be viewed via their company website – either on open access or in a password protected area. This is an excellent marketing tool, and will also be of considerable help to Company Y and Company X. It would mean they can see what is happening on the project without always having to travel to the site, saving money and time, especially for busy executives. Webcam images can be automatically archived, which means there is always a contemporary photographic record to fall back on to reduce disputes.

Tendering

Tendering for the project is all carried out online, with no paperwork exchanged.

Training

When making decisions on plant, materials and equipment, an interesting factor emerges use and maintenance. Company X is worried about its responsibilities for staff training in these areas and knows that increasingly, training will be a health and safety issue. Inadequate training could lead to legal action either from the public or from Company X's own staff which, in the leisure market, has quite a high turnover rate. But training in specialist plant, materials and equipment is expensive.

Handling public relations

As soon as site excavation gets underway, a problem arises which could be disruptive if not handled well by the on-site team. Despite a painstaking environmental impact assessment

and widespread local consultation, the project finds itself the subject of pressure group action. Company Y and the contractor work together to run a project-specific website for use as a communications channel to the public and, especially, to the media, for whom regular online press packs are provided.

So often, poor external communication can undo much good technical work. However, on this occasion, by giving people the facts about what is happening and what to expect, the initiative stays with the project team.

Using application software

One of the areas where e-business can transform the construction process is in application software. You do not have to continue to buy software in the conventional and costly way. Software can be provided online by product and service suppliers, for example to help with the design of a special part of the project, or it can be shared with a number of other users on a remote server, as with market research or questionnaire systems.

Legal checks

A factor not overlooked by Company X's legal eagles is the regulatory controls needed for Internet activity, which is slightly different to standard legislation. Terms, disclaimers and privacy statements should be in place for all Internet uses, especially websites. This particularly applies to suppliers and their products. With websites being visible worldwide, the construction marketeer in a product company should, among other things, check whether there are any countries in which the products are not legal, for example due to their materials, packaging, or recommended use.

Ongoing marketing and communications

Towards the end of the project, the main contractor draws up a directory of e-mail addresses for every individual involved. This will be invaluable during the maintenance period. Contractors' people move so often that tracking them down to answer a small but important defects question can be difficult. An e-mail address can be the only static link to an individual once they leave the project. As an aside, the product and plant hire suppliers are keen to get hold of this list too, as it is an excellent database for their next e-newscasts and marketing campaigns.

Conclusion

The review of the Company X project could go on, but we will leave it there. By now, you can probably see how things are panning out. Every part of the construction process offers an opportunity for the construction marketeer to use e-business to gain competitive advantage

to win orders and improve relationships. E-Business can be used to challenge the way every activity in construction is carried out, making the process better, faster and more time and cost efficient. In some cases, e-business creates opportunities that were just not feasible before. The trick for the construction marketeer is to bring all this into play as components of a winning bid and, as most marketing people will readily agree, it is very satisfying to win without having necessarily to be the lowest tenderer.

Remember that, wherever possible, e-business systems should be compatible between organizations which, while seeming obvious, is not always the case. Talk with your IT people for an insight into system compatibility, and you will find a marketing issue in its own right.

Also, any marketeer who can reach the point whereby the client is (willingly) relying on part or all of the supplier's own systems will be making real progress. In the past, such an outcome would be rare. Now however with a greater appreciation of the value of collaboration to client and supplier alike, single supplier and partnership working are becoming more common.

Source: (e–Business development By D. Bentley and J. Butler)

1. Answer the Questions:

1. What should X know to get the necessary information?
2. What step follows the feasibility study?
3. Why are the e-newscasts better than paper ones?
4. Why is the usage of webcams found its use in construction?
5. What is the tendering process?
6. Why is employee training important?
7. Why do companies need to provide regular online press packs?
8. What are the advantages of using an application software?
9. What are the main advantages of e-business usage?

2. Think of advantages and disadvantages of on-line construction projects:

ADVANTAGES	**DISADVANTAGES**
1	1
…	…

3. Retell the text commenting on the obtained information

Part 3. Construction Site

UNIT 9

Site work and utilities

Site work extends from the exploration of a planned new construction site to the work associated with preparing that site for the building to the installation of all new site utilities: gas, water, sewer, paving, and landscaping. Site exploration is required prior to the building's structural design, since the information uncovered will determine the bearing capacity of the soils, which in turn will determine the size and type of foundation required for the new structure. These explorations, which are performed by a civil engineer, may also uncover the presence of rock strata that may need to be removed and may also indicate the presence of underground water or springs that must be controlled.

This geotechnical report consists of test borings drilled at various points around the site to discern subsurface conditions. This geological technician's (geotech) report not only provides the structural engineer with foundation design information but is also used when bid documents are prepared so contractors can be made aware of existing conditions where those borings were taken. Test pits can be dug with an excavator if a larger portion of underground strata is required for soils analysis.

Site work includes "clearing and grubbing" – removing trees in the area where the building will be placed and clearing out all brush and unwanted vegetation overgrowth.

Site utilities

The installation of underground site utilities encompasses potable (drinking) water, incoming electrical power, sanitary sewers and manholes, storm sewers and storm inlets, gas mains, and fire-protection mains. Sanitary sewer and storm sewer lines are installed to allow for gravity flow and potable water, and fire-protection mains are under pressure and generally require pressure-reducing valves to regulate the pressure and volume of water after it enters the building.

High-voltage electrical conduits (another name for pipe), usually plastic, are often encased in concrete to prevent damage if inadvertently uncovered at some later date.

A variety of conduit materials is available for each of these underground utilities:

■ Potable water – copper pipe, cement-lined steel pipe, cast-iron pipe, ductile iron pipe, plastic, cross-linked polyethylene

■ Electrical cable – PVC or metallic conduit

■ Sanitary sewers – PVC, cast iron, ductile iron, manholes (generally precast concrete segments that fit together, although some are constructed of concrete masonry units)

■ Storm sewers – concrete pipe, PVC, corrugated metal, high-density polyethylene, manholes (similar to sanitary with storm sewer inlets placed around the site)

■ Gas mains – steel, corrugated stainless steel

■ Fire protection – steel, cement-lined ductile iron

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

1. What is a construction site?
2. What is an exploration of the construction site?
3. What does a geological report consist of?
4. How do engineers do the test pits in soils?
5. What site utilities do you know?
6. What materials are used for sewage systems, heating, and water supply?

2. Basing on the text information say what kinds of materials are used for the following underground utilities and comment why:

1) Potable water;

2) Electrical cable;

3) Sanitary sewers;

4) Storm sewers;

5) Gas mains;

6) Fire protection.

3. Retell the text commenting on the obtained information

UNIT 10

Foundations

The construction of a large building is usually started by making a big hole in the ground. This excavation has two purposes: to reach a layer of soil or rock strong enough to support the building, and to allow the construction of one or more basements and sub-basements in order to get the most use out of the expensive building lot.

When the soil is of clay or shale rather than rock or sand, it is weak. The footings may then become so large in order to distribute the building's weight over a wide area, that they touch each other and they become a single foundation mat of concrete. There are soils, made out of a mixture of sand and water, that are so weak the foundation mat has to be made hollow so that it literally floats in the almost liquid soil.

If you look at an excavation in weak soil you may often see long round poles of wood, concrete, or steel, called piles, being driven into the soil by a noisy pile driver that repeatedly drops a heavy weight on the top of the pile until the pile reaches solid soil or rock or cannot be pushed down any further. When the pile is tightly gripped by the solid soil, it is called a friction pile; when the pile is supported by rock it is called a bearing pile. The footings or the mat can then be built over the piles, which support them.

Once the structure is built, nobody sees the foundations and it is easy to forget they exist; but they are there and they are perhaps the most important part of any building. Remember this next time you see a building or bridge, and remember also that if they are complex and costly it is to prevent structural failures, most of which are due to faulty foundations; a building is only as strong as its foundations.

Poured-in-place concrete foundations are easily recognizable and are applicable when soil-bearing capacities are appropriate. When soil-bearing capacities cannot adequately support the building to be placed on them, other forms of foundation design are employed, most frequently piles. The two basic types of piles are friction piles and end-bearing piles.

A friction pile depends on the friction created along the entire surface of the pile – that is, around its circumference and its length – to support the force exerted by the building to be placed upon them. An end-bearing pile depends on reaching a depth where the pile will come to bear on a surface that can support its load. There are various types of materials used for piles:

■ Timber piles, generally treated with a preservative.

■ Precast-concrete piles – concrete piles produced under controlled conditions in a precast concrete factory.

■ Cast-in-place concrete piles, which usually require a form – a shell – into which concrete is poured at the job site.

■ Steel H piles – special steel columns with a cross section approximating an "H" shape.

■ Steel pipe piles – cylindrical steel piles.

■ Minipiles or micropiles – small-diameter steel piles, bored into the soil and then filled with grout, a cementitious material.

■ Caissons – typically large-diameter drilled or augered holes filled with concrete.

Sources: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy; The Art of Construction Projects and Principles for Beginning Engineers Architects By M. Salvadori)

1. Answer the Questions:

1. What are the purposes of excavation?
2. Which soil can be considered as weak?
3. How piles are installed in weak soil?
4. How do you understand the phrase "a building is only as strong as its foundation"?
5. How does a friction pile work?
6. When is an end-bearing pile installed?

2. According to the text tell if a statement is TRUE or FALSE

1. The construction of a large building is usually started by making a big hole in the ground.
2. There are soils, made out of a mixture of sand and clay, that are so weak the foundation mat has to be made hollow so that it literally floats in the almost liquid soil.
3. When the pile is tightly gripped by the solid soil, it is called a bearing pile; when the pile is supported by rock it is called a friction pile.
4. When soil-bearing capacities can adequately support the building to be placed on them, other forms of foundation design are employed, most frequently piles.
5. An end-bearing pile depends on reaching a depth where the pile will come to bear on a surface that can support its load.

3. Retell the text commenting on the obtained information

UNIT 11

https://drevologia.ru/dogovor–postavki–stroitelnyx–materialov/

Construction materials

Since all parts of a structure are either in tension or in compression, or both, the materials used to build structures must, first of all, be strong in tension, in compression, or in both.

In nature there are many materials strong in compression: stones of all kinds, for example. To make sure that the stones will stay one on top of the other, they are “glued” with mortar, a mixture of lime, sand, and water that looks like a paste when it is just mixed, but becomes hard as stone in about a week. Among stones, marble is one of the strongest and that is why many columns and walls were built of marble in ancient times, and some still are today.

There are many man-made materials that behave like stone. Bricks, made out of burned clay, are so strong in compression that we can use them to build columns or walls 25 to 30 stories high. Many arch bridges of the Middle Ages were also made out of brick and are still able to carry today’s traffic.

Concrete is a man-made material, a mixture of water, sand, small stones, and a gray powder called cement, that hardens to full strength in four weeks. It is very strong in compression because it is very compact: the grains of sand fill the voids between the stones and the paste of cement and water fills the voids between the grains of sand. The cement, which glues the sand, and the stones together, is made by burning limestone and clay till they fuse and grinding the cooled mixture into powder in a big mill. Concrete made with good cement and stones, sand, and water in the right proportions can be stronger in compression than most natural stones. But, like bricks and stones, concrete is weak in tension.

Though stone, brick, and concrete are good materials to build columns or arches with, they are not well suited to build beams, as some part of a beam is always in tension. Beams of concrete, when heavily loaded, show vertical cracks near the bottom because the tension there pulls the concrete apart.

A common natural material strong both in compression and in tension is wood. The strongest man-made material-much stronger than wood and equally strong in tension and compression – is steel. This is why you see columns as well as beams of wood (these beams are often called joists) in one-family houses whose floors span not more than 20 feet and do not carry heavy loads, but steel columns and beams in office buildings or industrial factories that must carry heavy loads over much longer spans. Aluminum is as strong as steel both in tension and in compression, although it is three times lighter. However, aluminum is much more expensive than steel.

There is a most ingenious way of combining two materials, concrete and steel, in order to increase the strength of a concrete beam. You remember that because concrete is weak in tension the bottom part of a concrete beam cracks, due to the tension developed there when it bends up. If a concrete beam is in danger of cracking at the bottom it can be "stitched" together with steel bars that, being strong in tension, prevent the cracks from occurring or opening wider if they do occur. Such beams are said to be made of reinforced concrete and are now used in all concrete buildings. The steel bars in a concrete beam are much stiffer in tension than the concrete.

Reinforced concrete is a very good and inexpensive material because it uses a large amount of cheap concrete and a small amount of expensive steel. In addition, it is a fire-resistant material. Steel is very strong at normal temperatures, but if a fire develops in a steel-framed building, the columns and beams, even if covered with fire-insulating materials, may get hot, and if their temperature rises above 700° Fahrenheit, they lose their strength and melt. Concrete is in itself a good insulating material. It protects the steel from melting for a long time and so retards its failure. A reinforced concrete building is usually safer against fire than a steel building. Buildings with columns, beams, and floors of reinforced concrete are built all over the world. The material is inexpensive and particularly well suited for apartment buildings.

If structural materials are not strong enough in tension or compression or both, the beams and columns of a building will break under heavy floor loads and the building will collapse, possibly killing the people in it. Also, an arch bridge will collapse if its material is not

strong enough in compression to support the weight of the traffic going over it. Once in a while such disasters occur.

Source: (The Art of Construction Projects and Principles for Beginning Engineers Architects By M. Salvadori)

1. Answer the Questions:

1. What natural material can you name?
2. What man-made materials are mentioned in the text?
3. What construction materials are strong in compression and how to insure their solidity together?
4. What are the properties of a brick?
5. What is cement made of?
6. What is concrete made of?
7. Why is steel a more spread material in construction than aluminum?
8. Why are brick and concrete unfit to build beams?
9. Which materials aside brick and concrete are strong both in tension and compression?
10. What purpose does combining two materials (ex.: concrete and steel) have?
11. What are the advantages of reinforced concrete? Tell about its properties.
12. Buildings made of what material are rather safe against fire?
13. What problems can be caused by not strong enough materials?

2. Think of advantages and disadvantages of natural and man-made material. Compare their application on the construction site. Which of them are more suitable for which purposes.

MATERIAL	ADVANTAGES	DISADVANTAGES
1		
2		
3…		

3. Retell the text commenting on the obtained information

UNIT 12

Structural steel

Basic structural steel shapes are I-beams, channels, and angles. Wide-flange beams and columns are the most commonly employed shapes in a building's structural steel framework. These wide-flange beams and columns are manufactured in a variety of sizes and strengths to meet the engineer's load requirements. Wide-flanged structural members are identified by the depth of the beam and its weight per lineal foot.

The steel columns and beams are joined together with either welded connections or bolted connections or a combination of both. Open-web steel joists are frequently used as intermediary support members in multistory steel frameworks to support metal decking that is used as a form for cast-in-place concrete floors or roof support.

Steel construction has many advantages. It is competitively priced, adaptable to many design innovations, and has the ability to erect its framework in all but severe weather. Structural steel requires protection from fire, which at high temperatures causes softening and collapse. Steel is "fireproofed" by either applying a spray fireproofing material or encasing the steel members in a fire-resistant material such as gypsum drywall or masonry.

Steel erection

The two primary safety concerns are fall protection for the personnel doing the erecting and stability of the frame during the erection process before all elements of the structure are in place.

Fall protection provided by the steel erector shall remain in the area where steel erection activity has been completed, to be used by other trades, only if the controlling contractor or its authorized representative.

The issue of stability is set in motion with the placement of the first structural member, which is usually a column. As the first columns are placed, ironworkers will bolt them to their footings. Prior to erection, the erector must consider column stability in accordance with safety standards. Main girders are hoisted after the columns, followed by the beams, which are hoisted and connected to the girders. At least two bolts per connection are used to temporarily fasten each connection. Teamwork and communication are important when erecting steel. The ironworkers typically use hand signals to communicate with the crane operator.

Temporary bracing is used to provide temporary lateral stability to the steel structure and to plumb the frame. Turnbuckles are a common part of the bracing system. A turnbuckle is a device that consists of a link with screw threads at both ends that is turned to bring the ends closer together or farther apart. With the use of several turnbuckles connected to the temporary bracing, the steel frame is shifted until it was vertically aligned.

After a section of the structural frame is assembled and vertically aligned, ironworkers permanently fasten the structural steel members with additional bolts and welds. Structural steel has to be protected from fire. Steel will not burn, but it will become weak when exposed to intense heat. Building codes regulate the need for fireproofing and its required locations. There are several methods for fireproofing, including spray-on materials. Spray-on material may be Portland cement or a gypsum-based product and can be applied directly to structural steel members.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy; Construction Planning Equipment and Methods Seventh Edition By R.L. Peurifoy, C.J. Schexnayder and A.V. Shapira)

1. Answer the Questions:

1. What is a wide-flange beam and and how its structural members are identified?
2. How can steel columns and beams be connected?
3. What are the properties of a steel construction?
4. How is steel erection performed?
5. What is a turnbuckle and why it is installed?
6. Why does steel need to be fireproofed if it does not burn?
7. What are the main spray-on materials for fireproofing?

2. Correct the mistakes in accordance with text information:

1. Narrow-flange beams and columns are the most commonly employed shapes in a building's structural steel framework.

2. The steel columns and beams are joined together with either welded connections or glued or a combination of both.

3. The issue of stability is set in motion with the placement of the first structural member, which is usually a beam.

4. Teamwork and communication are useless when erecting steel.

5. There are several methods for fireproofing, including gasoline.

3. Retell the text commenting on the obtained information

UNIT 13

A steel frame

The best way to understand how the frame of a building works is to build one.

A column should not take too much floor room, but must be strong enough to carry the compressive loads without buckling under them. A column buckles, that is, bends under compression along its axis, if it is too thin.

To avoid the danger of buckling, steel columns are built in the shape of a capital I. Since I-columns have fairly wide flanges and do not really look like capital Is they are called wide flange sections. They are labeled with a W and the product of two numbers, like W14x53. The first number measures their depth in inches and the second their weight in pounds for each foot of length. A W14x53 is 14 inches deep and weighs 53 pounds per foot.

If you cut a beam or a column at right angles to its axis, you see the shape of the beam's so-called cross section. This can be rectangular, circular, triangular, I-shaped, and either full or hollow. The cross section obtained by cutting the beam is a plane figure, and its area is called the cross-sectional area of the beam or column.

To determine the most efficient section for a steel beam you must remember that a beam works in bending. The beam's lower part stretches in tension, its upper part shortens in compression, and the neutral axis neither stretches nor shortens. This means that the steel at the neutral axis doesn't do any work and that the steel near it does very little work, while the steel farthest away from the neutral axis bears most of the burden of carrying the load. Because of this, it is efficient to take the material near the neutral axis (the middle axis of the beam) and put it as far away from it as possible. If we start with a rectangular cross-section beam and take away the inefficient material near the neutral axis (the shaded part on the diagram) and put it symmetrically above and below, we obtain a wide-flange section. It is not surprising, therefore, that steel beams have wide flange sections, just like columns, and are labeled with the same symbols.

Floors have to be flat and smooth so people can walk on them. In concrete buildings floors are usually made by pouring concrete on a horizontal platform of wood (called the formwork) and reinforcing it with steel bars set mostly at the bottom of the slab thus built. In steel buildings, most often, instead of a platform of wood, a steel deck, which is a wavy platform

of steel, is used. It works both as formwork to support the concrete before it hardens and as steel reinforcement for it. The wavy formwork creates small ribs at the bottom of the concrete slab, which stiffen it.

To put together a frame one must build a sufficient number of columns, beams, and floor slabs and then connect them. In practice most steel beams and columns are connected by means of angles and bolts. The bolts must be very tight and strong and are called high strength bolts. In certain frames the beams and columns are welded to each other by melting a welding material at the connections, but bolted connections are as strong as welded connections.

Reinforced concrete frames look like steel frames, but have columns, beams, and floor slabs made of concrete poured into wooden or steel forms. In flat slab construction the slabs rest directly on the columns without intermediate beams.

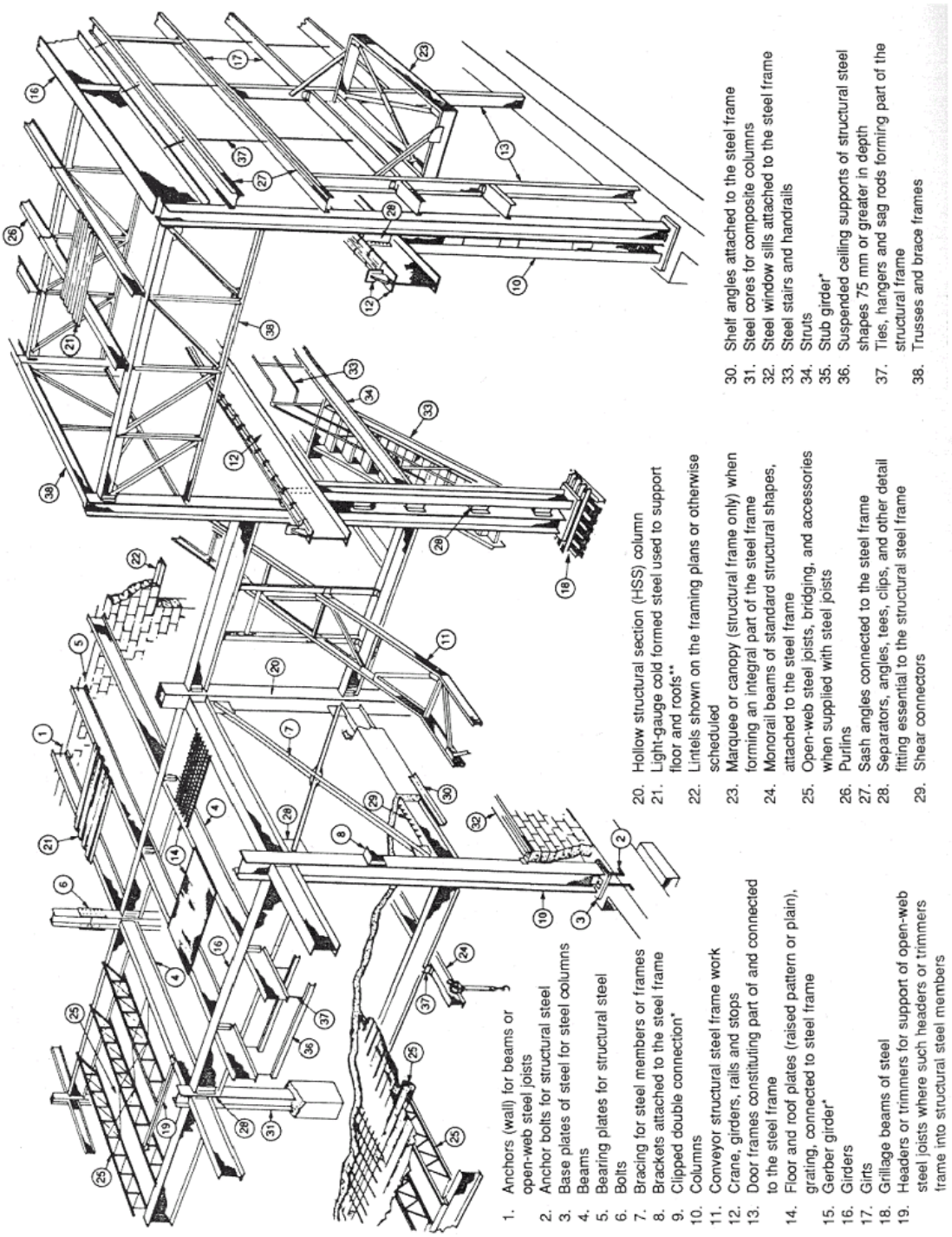
To complete the building you need to enclose the frame with walls, in which there are windows and doors. In actual buildings, the outside walls do not have to be very strong, since they must carry only their own weight and a small amount of wind pressure. They are made of brick or cement blocks, or often of thin aluminum or steel plates, which allow larger wall openings, since they are stronger than brick or block. In some modern buildings the window panes are so large that the entire facade is made of glass attached to thin vertical columns of steel, aluminum, or concrete called mullions. These facades are incapable of carrying loads and are therefore called curtain walls.

Source: (The Art of Construction Projects and Principles for Beginning Engineers Architects By M. Salvadori)

1. Answer the Questions:

1) What is the function of a column?
2) What shapes are the steel columns built in?
3) How are the steel columns labeled?
4) What types can the cross section of the steel column or beam be?
5) How can the most efficient section for a steel beam be determined?
6) What is the neutral axis?
7) What is the function of floors?
8) How are the concrete floors usually made?
9) How are beams and columns connected?
10) What are the walls made from?

2. Study the following scheme to understand the core idea of steel frame implementation:



https://yuanboit.en.made–in–china.com/product/eoVnvmhMEZkP/China–pH–Type–Steel–Structure–Workshop–Design–for–Standard–Steel–Building.html

3. Retell the text commenting on the obtained information

UNIT 14

Concrete: characteristics and performance

Concrete is a fluid mixture of cement, aggregates, and water which can be formed into different shapes and cures to a hard and durable construction material. Masonry is construction of natural building stone or manufactured units such as brick or concrete block.

All building materials expand and contract. Concrete and other cement-based products shrink permanently, and clay products expand permanently with changes in moisture content. Both materials (as well as wood, metal, glass, and plastics) expand and contract reversibly with changes in temperature. Since concrete and masonry are brittle, if construction does not accommodate this expansion and contraction, cracking and water penetration can result. Flexible anchorage and the installation of control joints in concrete and concrete masonry and expansion joints in clay masonry allow this natural expansion and contraction to occur without damage to the construction.

Concrete can be used as a structural and a finish material in slabs, walls, paving, and retaining walls. Masonry can be used as a structural system, as a veneer, or as a paving system and can be used to build fireplaces and retaining walls. Concrete and masonry are strong in compression but require the incorporation of reinforcing steel to resist tensile and bending stresses. Masonry veneers can be constructed over many types of structural frames and backing walls. Concrete and masonry also provide fire resistance, energy efficiency, and durability.

Fire Resistance: Concrete and masonry are *noncombustible* – they will not burn. This is a higher level of protection than mere *fire resistance.* Wood can be injected with chemicals to make it resistant to fire damage for a longer period of time than untreated wood, but ultimately wood becomes fuel for the fire. Steel is noncombustible, but it softens and bends when subjected to the high heat of a fire. In commercial construction, steel structural members must be protected from fire by sprayed-on mineral coatings, layers of gypsum board, plaster, or masonry. The highest level of protection and the highest fire protection ratings are associated with concrete and masonry.

Durability: Concrete and masonry are durable against wear and abrasion and weather well for many years with little or no maintenance. Wood is highly susceptible to moisture damage and requires protective coatings to prolong service life. Properly designed and

constructed concrete and masonry will provide many years of service to the homeowner without any additional investment of time or money.

Energy Efficiency: For centuries the thermal performance characteristics of masonry have been effectively used in buildings. Large masonry fireplaces used during the day for heating and cooking were centrally located within a structure. At night, the heat stored in the masonry radiated warmth until dawn. In the desert thick adobe masonry walls provided thermal stability. Buildings remained cool during the hot summer days, and heat stored in the walls was later radiated outward to the cooler night air. Until recently, however, there was no simple way of calculating this behavior.

We now know that heat transfer through solid materials is not instantaneous. There is a time delay in which the material itself absorbs heat. Before heat transfer from one space to another can be achieved, the wall which separates the two spaces must absorb heat and undergo a temperature increase. As temperatures rise on one side of the wall, heat begins to migrate toward the cooler side. The speed with which the wall will heat up or cool down is dependent on its thickness, density, and conductivity, and the amount of thermal energy necessary to produce an increase in temperature is directly proportional to the weight of the wall. Although most building materials absorb at least some heat, higher density and greater mass cause slower absorption and longer retention. Metals heat up and cool down very quickly. Concrete and masonry are heavy, so they can absorb and store heat and substantially retard its migration through a wall. This characteristic is measured by the elapsed time required to achieve equilibrium between inside and outside wall surface temperatures.

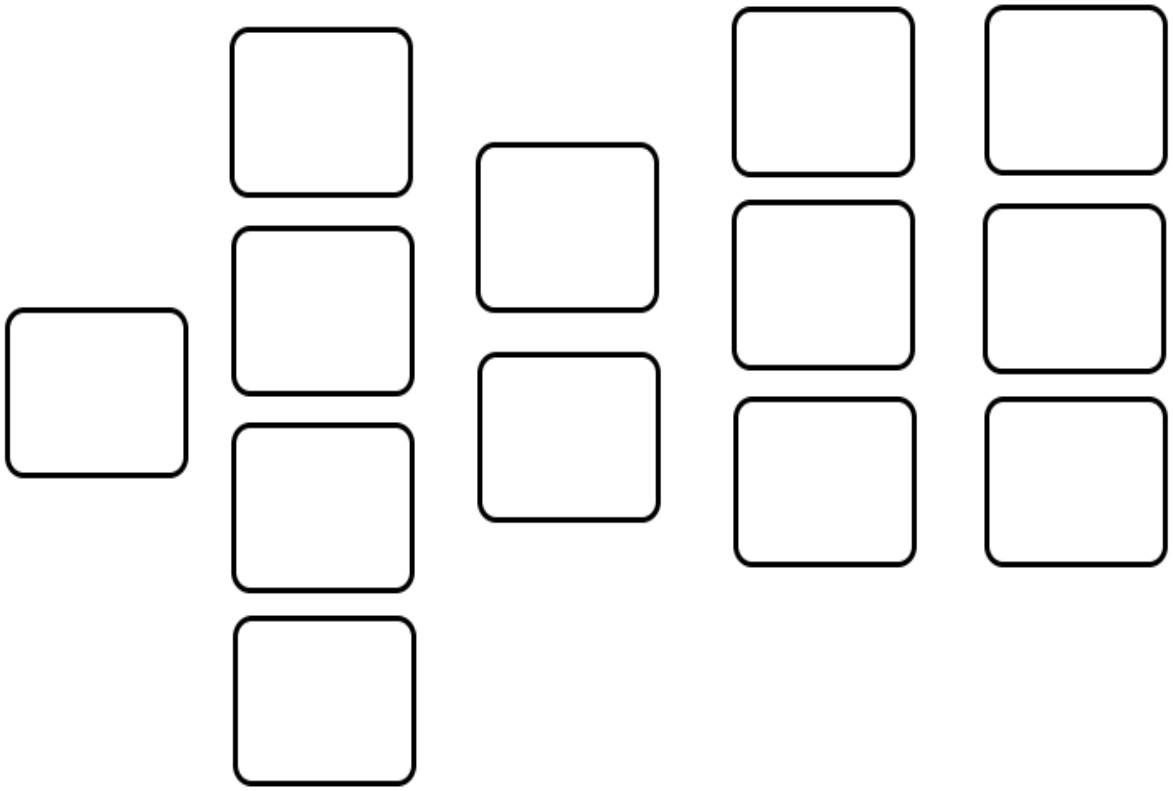
Source: (Complete Construction Real Answers Contractor Need Masonry and Concrete for Residential Construction by C. Bell)

1. Answer the Questions:

1) What is the difference between concrete and masonry?
2) What can result cracking in construction?
3) What are the similarities of concrete and masonry?
4) How to protect building materials from fire exposure?
5) How to prolong service life of constructions?
6) What does the heat migration in the wall depend on?

2. Complete the diagram of CONCRETE with the given words and make 12 links between related blocks:

Concrete, water, artificial, sand, metamorphic rocks, sedimentary rocks, cement, natural, crushed rocks, igneous rocks, aggregates, steel, gravel.



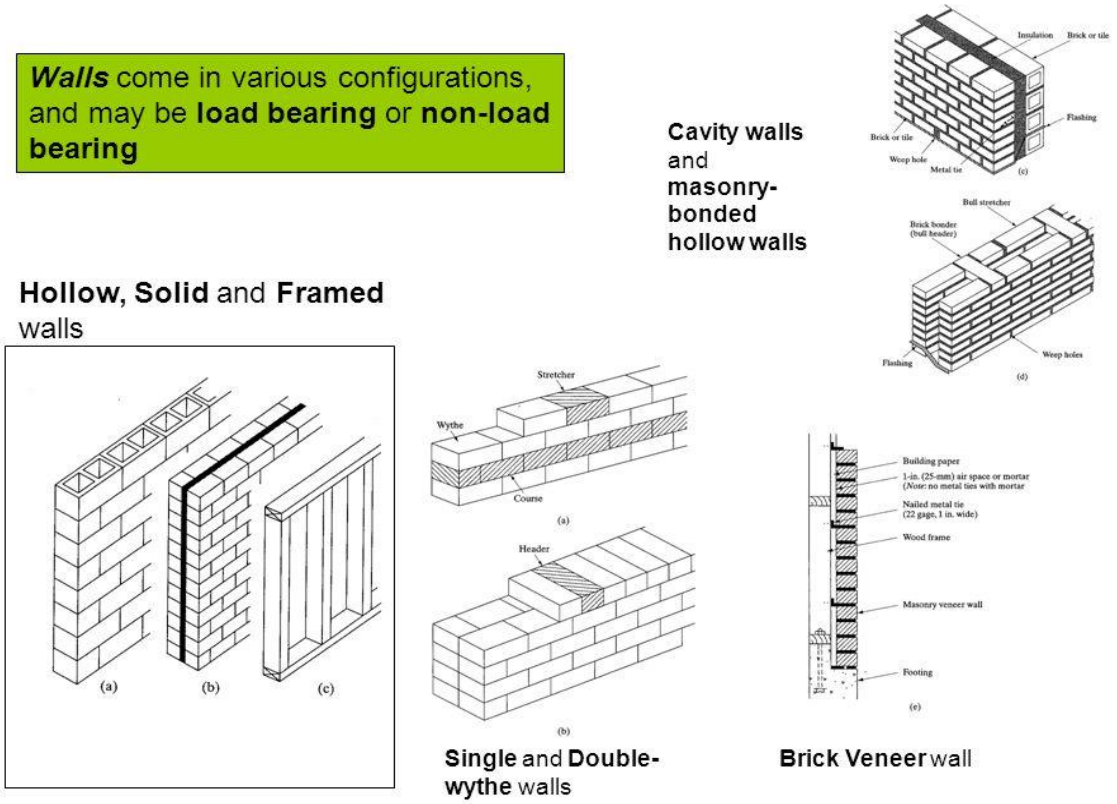
3. Retell the text commenting on the obtained information

UNIT 15

Masonry: basic properties

The term *masonry* includes many different materials and types of construction. Natural stone as well as manufactured units of clay brick, concrete block, cast stone, structural clay tile, terra cotta, adobe, and glass block are all masonry materials. Brick, concrete block, and stone are the most popular and most widely used. Brick and concrete block are usually laid with mortar, but some block can be "dry-stacked" without mortar if the units have an interlocking shape or if a special surface-bonding mortar is applied to hold the units together. Natural stone is also usually set in mortar, but can be dry-stacked for walls of modest height used in landscaping applications.

In addition to units and mortar, most masonry projects will include accessory items such as anchors, ties, flashing, or joint reinforcement. These accessories are as important to successful structural and functional performance as the units, mortar, and workmanship.



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Masonry that is used as a facing material over a nonmasonry backing wall is called *veneer*. Veneers are typically only one unit in thickness. Freestanding masonry walls may be one unit or more in thickness depending on the type of masonry and the wall design. Walls that are only one unit in thickness and are not anchored to a backing wall are called *single-wythe walls. Double-wythe walls* are two units in thickness. If the space between the wythes is less than one inch, it is called a *collar joint* and is filled solidly with mortar or cement grout. A space wider than one inch between wythes is called a *cavity*, and may be either open or filled with grout or grout and steel reinforcing bars.

Double-wythe walls with an ungrouted cavity are called *cavity walls.* Both cavity walls and veneer walls are designed to drain water through the open space between wythes or the space between the veneer and its backing wall. Insulation can also be installed in this space to increase the thermal resistance or R-value of the wall.

Veneers are nonstructural and support only their own weight while transferring wind loads to the backing wall. Masonry is strong enough to serve as a loadbearing structural wall which supports the floors and roof of a structure. Loadbearing masonry was once very common in both residential and commercial construction but was gradually surpassed in popularity by concrete, steel, and wood framing after the turn of the century. Contemporary loadbearing masonry is stronger and more economical than historic loadbearing masonry, and new structural masonry systems are gaining popularity again among home builders.

Like concrete, masonry is strong in compression but requires the incorporation of reinforcing steel to increase resistance to tension (pulling) and flexural (bending) stresses. Masonry will not burn, so it can be used to construct fire walls between units or areas of multifamily housing or closely built single-family homes or townhouses.

It is durable enough against wear and abrasion to serve as a paving material, and most types of masonry weather very well without any kind of protective coating. Masonry can provide efficient thermal and acoustical resistance, and when it is properly designed and constructed to meet current building codes, masonry is also resistant to earthquakes.

Like all building materials, masonry expands and contracts with changes in temperature, but masonry is relatively stable compared to metals and plastics. Concrete, masonry, and wood also expand and contract with changes in moisture content. Flexible anchorage, reinforcement, control joints, and expansion joints are used to accommodate the combined effects of thermal and moisture movements so that the masonry will not crack.

Source: (Complete Construction Real Answers Contractor Need Masonry and Concrete for Residential Construction by C. Bell)

1. Answer the Questions:

1. What are the most popular types of masonry materials?
2. How to provide successful structural and functional performance to masonry?
3. How does thickness depend on the type of masonry and the wall design?
4. What is the purpose of cavities in a wall?
5. Why does the modern loadbearing masonry become popular again?
6. Is it possible for masonry to be resistant to earthquakes?
7. How is it possible to protect masonry from deformations?

2. According to the text tell if a statement is TRUE or FALSE

1. Brick, concrete block, and stone are the least popular and most widely used.
2. Natural stone is also usually set in mortar, but can be wet-stacked for walls of modest height used in landscaping applications.
3. Masonry that is used as a facing material over a nonmasonry backing wall is called *veneer*.
4. *Single-wythe walls* are two units in thickness. If the space between the wythes is less than one inch, it is called a *collar joint* and is filled solidly with mortar or cement grout.
5. Contemporary loadbearing masonry is stronger and more economical than historic loadbearing masonry
6. Masonry will burn, so it can be used to construct fire walls between units or areas of multifamily housing or closely built single-family homes or townhouses.
7. Masonry can provide efficient thermal and acoustical resistance

3. Retell the text commenting on the obtained information

UNIT 16

Mortar

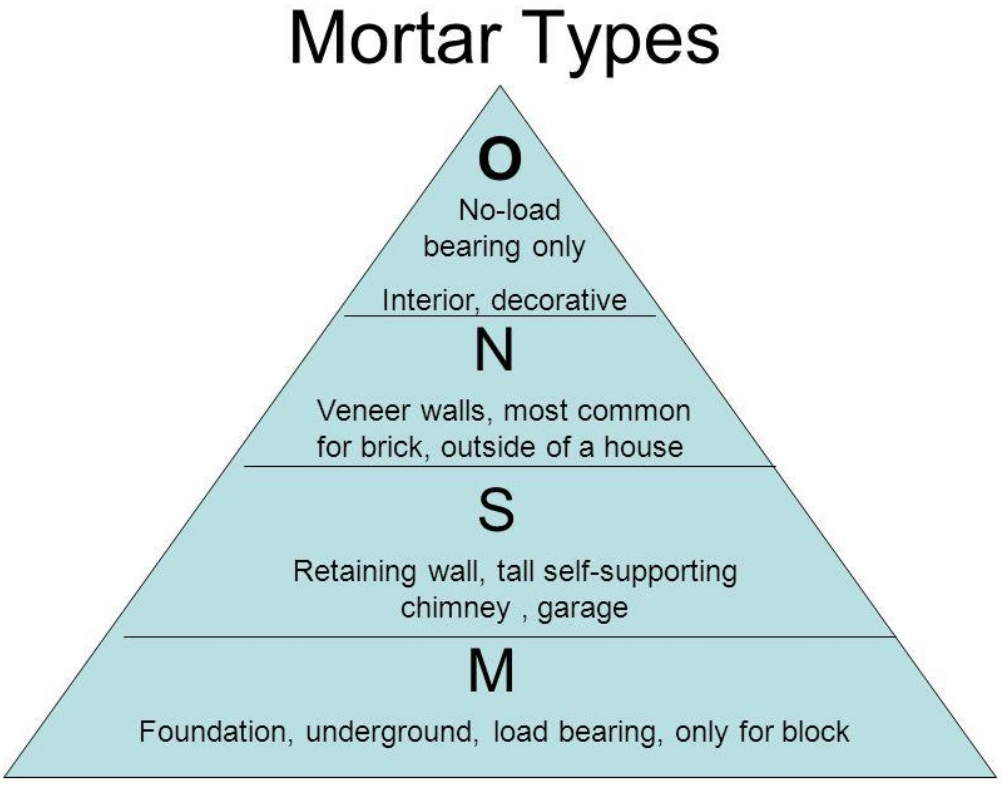
The correct type and proportion of ingredients and the proper application of mortar are essential for the structural integrity of a block or brick wall. Mortar serves many functions:

■ It bonds the masonry units together.

■ It assists in retaining a level wall, using the mortar bed as compensation for the small dimensional differences between one brick or block and another.

■ It bonds installed wall reinforcement together into one structural unit.

By varying the color of the mortar or the type of tooled joints, mortar provides an additional aesthetic appeal.



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Mortar is a mixture of cement, sand, and water, mixed to the consistency of a heavy paste. This workability or plasticity of mortar provides both cohesive and adhesive properties. There are five basic type of mortar, each applicable to specific functions of the masonry wall:

■ Type M mortar is a high-compressive-strength mix providing greater durability, generally used on unreinforced masonry walls below grade.

■ Type S mortar is also a high-strength mortar with slightly less compressive strength than Type M. It has greater tensile strength and is the product of choice when reinforced masonry walls above grade are built.

■ Type N mortar is a midrange compressive-strength product often used on interior non-load-bearing masonry walls.

■ Type O mortar has lower compressive strength than Type N and is also used for interior non-load-bearing walls.

■ Type K mortar has the lowest compressive strength and can be used for some non-load-bearing walls if local building codes allow.

Mortar is similar to concrete and shares two basic components: cement and water. Like concrete, the rapid dissipation of water in hot weather and the freezing of water in cold weather must be avoided to provide a high-quality masonry wall.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

1. What functions does the mortar serve?
2. What does the mortar consist of?
3. What specific functions do type M and type S mortar provide?
4. What specific functions do type N, type O mortar and type K mortar provide?
5. What are the similarities of mortar and concrete?
6. Express your personal opinion. Should new types of mortar be developed for the construction sphere? Why/why not?

2. Think of the ways of implementation of all mentioned in the text types of mortar: *Type M, Type S, Type N, Type O, Type K.*

3. Retell the text commenting on the obtained information

UNIT 17

Concrete and masonry reinforcement

Most load-bearing walls above grade require reinforcement to provide the flexural strength required, as these masonry walls expand and contract due to temperature changes, loads imposed by strong winds, and the weight of the wall itself.

Formwork is used to shape the fluid concrete mixture and hold it in place while it cures. It must be strong enough to withstand the pressure of the wet mix, which can exert a considerable force until it begins to harden and hold its own shape. Reinforcement is used to add tensile strength to the concrete and to help resist shrinkage cracking.

Steel reinforcement helps control the natural shrinkage that occurs as concrete cures and dries, and it makes the concrete stronger and less likely to crack. There are two basic types of reinforcing steel-bars and mesh.

Placing Steel Reinforcing Bars

Reinforcing steel must be completely embedded in concrete to develop full-strength and structural bond, and to provide adequate protection against corrosion. To keep steel reinforcing up off the ground or the bottom of the form so the concrete can surround it, use small stones or pieces of concrete block or special wire stilts to support the bars or mesh. The reinforcement should be located about one-third up from the bottom of the form. Where two pieces of reinforcing bar must be spliced together, lap them 30 times the diameter of the bar, or a minimum of 12 in. and tie them securely together with wire.

For some applications, reinforcing bars will have to be bent to certain shapes. Reinforcing bars can be cut to size and bent on site or ordered from a steel fabricator in the sizes and shapes required by the drawings.

Placing Steel Reinforcing Mesh

Steel reinforcing mesh is a grid of steel wires welded together at the wire intersections and used to distribute shrinkage stresses in thin concrete sections like sidewalks and driveways. Light-gauge, welded wire mesh comes in rolls and heavier-gauge mesh in flat sheets. Like steel reinforcing bars, wire mesh reinforcing must be completely embedded in concrete to develop full strength and structural bond, and to provide adequate protection against corrosion of the metal.

Like concrete, masonry requires the incorporation of steel reinforcement to increase flexural and tensile strength, and concrete masonry uses steel reinforcement to resist moisture shrinkage. There are two types of masonry reinforcement, prefabricated wire joint reinforcement and structural reinforcing bars. Prefabricated wire *joint reinforcement* is used in the mortar beds of concrete masonry walls to help control shrinkage cracking.

The second type of masonry reinforcement is heavy steel *reinforcing bars* like those used in concrete construction. Reinforcing bars are used in masonry to strengthen supporting members like pilasters, lintels, and bond beams. Steel reinforcement of either type must be embedded in and surrounded by mortar or grout so that it develops its full strength. Joint reinforcement is usually hot-dip galvanized to protect the thin wires against corrosion, and reinforcing bars generally should be Grade 60 steel.

Reinforcement also provides stability of walls during seismic events. Walls can be solid masonry or "veneer" or "cavity" walls.

Cavity wall construction often consists of a brick outer wall, an air space, and a structural inner wall of steel or wood studs faced with gypsum board. These two wall types must be joined together to provide structural integrity and steel wall reinforcement. Reinforcements can be truss and ladur types or wall ties that tie the outer wall to the inner wall.

Sections of masonry walls are known as wythes; a single wythe is one masonry wall thick, and a double-wythe wall consists of one outer and one inner wall, often of different masonry types.

Sources: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy; Complete Construction Real Answers Contractor Need Masonry and Concrete for Residential Construction by C. Bell)

1. Answer the Questions:

1. Why are deformations happening in constructions?
2. How is the formwork used?
3. What are the basic types of reinforcing?
4. What are the main requirements for the installation of reinforcing?
5. What are the differences and similarities between steel bars and a mesh?
6. How is masonry reinforced?
7. How does the reinforcement impact walls during seismic events?
8. What is your personal opinion towards the idea of reinforcement? Is there any alternative for construction industry?

2. Match the terms with their definitions:

1. reinforcement	*a.* the quality of being whole and complete
2. load	*b.* the process of corroding, or metal that has been corroded
3. integrity	*c.* the amount of weight carried, especially by a structure
4. cracking	*d.* a structure to give a support or shape to a building structure or an object
5. formwork	*e.* (a piece of) material like a net with spaces in it, made from wire, plastic, or thread
6. mesh	*f.* he act of including something within something else
7. corrosion	*g.* a long piece of stone or wood at the top of a door or window frame that supports the wall above
8. cavity	*h.* a hole or space inside a solid object
9. incorporation	*i.* Breaking of something so that it does not separate, but very thin lines appear on its surface, or to become broken in this way
10. shrinkage	*j.* the bricks or stones that make a building, wall, or other structure
11. masonry	*k.* an architectural element used to give the appearance of a supporting column and to articulate an extent of wall, with only an ornamental function.
12. pilaster	*l.* a reduction in the size of something, or the process of becoming smaller
13. lintel	*m.* the act of making something stronger

3. Retell the text commenting on the obtained information

UNIT 18

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Glass and glazing & doors and frames

Glass and glazing

Fenestration is a term associated with the design and placement of windows and other exterior wall openings. Many commercial buildings have fixed-glass windows, as opposed to operative windows, to better control the quality of the interior working environment. These fixed *lights*, – the term used for architectural glass and window glazing – can be of three basic types:

■ *Annealed,* commonly used in architectural glass because it does not produce distortion, which can occur when the glass is tempered. Annealed glass has very good surface flatness but tends to break into large, sharp shards upon strong impact.

■ *Heat-strengthened* glass has about twice the strength of annealed glass and is more resistant to wind loads and thermal stress, but it does produce some distortion during the heating process. Heat-strengthened glass will break just like annealed glass.

■ *Fully tempered* glass is four times stronger than annealed glass, imparts some distortion, and breaks into small, slightly rounded fragments upon impact.

Specialty glasses also come in many varieties:

■ *Laminated* glass is made by adhering two lights of glass together with a clear plastic interlayer, thereby preventing glass shards from being distributed when it is fractured.

Laminated glass also provides some protection from ultraviolet ray penetration and has some acoustical qualities.

■ *Tinted* glass distributes color uniformly throughout its surface and both looks attractive and provides protection from ultraviolet rays.

■ *Coated* glass is glass that has been coated with a reflective or low-emissivity (Low-E) coating to reduce thermal absorption from the sun's rays, thereby lowering the heat load on the surface of the building where it is installed.

■ *Insulated* glass is different from double-pane glass. It incorporates a vacuum in the dead space between the inner and outer layers before they are sealed together. *Double-pane* glass, also called double glazing, is simply an outer and inner pane installed in a frame with an air space in between but no vacuum, sealed only by the frame (wood, metal, or vinyl) in which it has been installed.

Doors and frames

In commercial construction, four types of doors and frames are used most often:

■ Wood, used primarily for architectural and aesthetic value

■ High-pressure laminate faced with engineered-wood-product cores, combining aesthetics and ease of maintenance

■ Steel, used for utilitarian and security purposes

■ Aluminum, combining architectural value with low maintenance

Wood doors can span the entire gamut of cost, function, and appearance from medium-density fiberboard (MDF) to exotic veneers, from non-fire-rated to two-hour fire-rated when installed in similarly rated frames, from low-sound-rating (STC) to high acoustical ratings when installed in the proper door frame.

Door components for each of these four types are much the same, consisting of stiles – the vertical side members; rails – the top and bottom components; the core – the center portion of the door, and the face – the visible panel.

The door's core serves several functions, adding stability, strength, and, when mineral cores are used, fire and sound ratings. Wood doors can be either flush or contain various types of glass-panel inserts, referred to as "borrowed lights".

Hollow-metal doors and frames are used in offices, corridors, and utility and maintenance areas, and have a reputation for being both cost-effective and durable.

Hollow-metal door frames are manufactured KD (knocked down), where the jambs and head must be assembled onsite, or "set up and welded", where the manufacturer welds the jambs to the head, ready for installation when shipped to the job.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

1. What is a fenestration?
2. Why do many commercial buildings use fixed-glass windows?
3. What do you know about annealed glass?
4. What are the advantages and disadvantages of a heat-strengthened glass?
5. What are the third basic type's features?
6. What are the features, advantages and disadvantages of these special varieties and their differences?
7. What are the most usable types of doors?
8. What are the door components?
9. Where are hollow-metal doors and frames often used?

2. According to the text tell if a statement is TRUE or FALSE

1. Fenestration is a term associated with the design and placement of walls.
2. *Annealed,* commonly used in architectural glass because it does not produce distortion, which can occur when the glass is tempered.
3. *Fully crashed* glass is four times stronger than annealed glass, imparts some distortion, and breaks into small, slightly rounded fragments upon impact.
4. Laminated glass also provides some protection from ultraviolet ray penetration and has some acoustical qualities.
5. *Double-pane* glass is also called a double glazing.
6. The door's core serves several functions, adding stability, strength, and, when mineral cores are used, water and sound ratings.
7. Wood doors can be either flush or contain various types of glass-panel inserts, referred to as "borrowed lights".

3. Retell the text commenting on the obtained information

UNIT 19

Roofing

Most commercial buildings nowadays use what is called a single-ply membrane roofing system. The most commonly used material for this membrane is EDPM – ethylene propylene diene monomer. Available in various thicknesses and colors, this single-ply membrane is installed over rigid roof insulation in two ways. In ballasted installation, the membrane is weighted down with small-diameter smooth-edged stones such as river gravel. The membrane can also be attached to the roof substrate with mechanical fasteners. The advantages of single-ply roofing are many: It can be applied quickly, it has a long life, and tears or damage to the surface can be spotted easily and repaired quickly using solvent or heat welding.

Built-up roofing surfaces require the installation of several layers of two- , three- , or four-ply roofing felt, an interlocking material with vegetable fibers held together with a binder. Prior to each layer being installed, the underlying surface is coated with a hot asphalt liquid. They also enjoy long life, are priced competitively, and can be easily repaired if damaged.

Roll roofing is a roll of coated felts, either smooth-faced or mineral-surfaced, that is rolled out on the roof surface in sheets about three feet wide. Edges are overlapped and either fastened with roofing nails or mopped with a liquid asphalt. Roll roofing is an inexpensive roofing system that is often used on small utility sheds.

Metal roofing, such as standing seam roofing, is often selected for decorative purposes for shed-type sloped-roof configurations. High-performance painted steel or aluminum makes up the bulk of metal roofing systems. Shingles, wood, composition, metal, and ceramic are rarely used in commercial construction but can be used on sloped roofing surfaces.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy

1. Answer the Questions:

1. What material is used for single-ply membrane roofing?
2. What advantages does the single-ply roofing have?
3. What is a roll-roofing? Name its advantages and disadvantages.
4. What purposes do people use metal-roofing for?
5. What materials are used in the commercial construction?

2. Retell the text commenting on the obtained information

UNIT 20

Drywall partitions, ceiling construction and floor

When you are in your room, look around and notice how many things rest on the floor. Can you guess how much they weigh? All these loads are called the live load on the floor, because, like your own weight, they can be moved around as if they were alive. To make sure the floor will not collapse, we must make it strong enough to support the live load, and here we run into a problem.

Partition framing can be constructed with either wood or metal framing studs of two-, four-, and six-inch nominal widths. When various combinations of gypsum wallboard (drywall) are attached to this framing, the resultant partition can meet a multitude of fire-resistance, moisture-resistance, and sound-resistance standards.

Fire-rated partitions

To achieve a one-hour or higher fire rating using metal studs, other types and layers of gypsum board must be installed:

45-minute fire rating: one layer of ½-inch fire-rated sheetrock on each side of the stud

1-hour fire rating: one layer of 5/8-inch fire-rated drywall on each side of the stud

2-hour fire rating: two layers of 5/8-inch fire-rated drywall on each side of the stud

3-hour fire rating: three layers of 5/8-inch fire-rated drywall on one side of the stud and one layer of 1-inch fire-rated coreboard on the other side

Sound-rated partitions

To lessen the transmission of sound from one area or room to another, various sound-control systems can be instituted using stud, drywall, and other acoustical components. The measurement of the ability of a wall or floor assembly to isolate sound and prevent it from being transferred from one area to another is referred to as an STC – sound-transmission-coefficient rating. The higher the STC number, the greater the sound control.

Sound control goes beyond the drywall partition and encompasses the door and frame assembly, both of which should have sound-deadening cores and gasketing around the edges of the door frame and at the bottom of the door, called a “sweep”.

Moisture resistance

Moisture-resistant wall assemblies should be considered in two situations: with limited water exposure, such as bathroom tub and shower walls, where the drywall will be covered by wall tiles, and wet areas, where surfaces, also having a tiled facing, will most likely be soaked or regularly exposed to water spray. There are moisture- and mold-resistant types of sheetrock used as a substrate when these conditions are present. Often referred to as "green board", its identifying color, this type of gypsum drywall has a surface treatment that resists the effects of high humidity.

Exterior sheathing

Exterior sheathing is composed of gypsum-core panels used as a substrate on buildings with an outer cladding of steel or aluminum panels, masonry, stucco, or similar materials. These gypsumboard panels have a yellow exterior fiberglass mat coating that provides a stronger resistance to wind loads and moisture.

FINISHES

Different types of wall finishes range from wood paneling to paint or wall coverings, generally vinyl, which are used in a commercial or institutional environment. Plywood veneer wood paneling may be specified for executive offices or conference room walls, with choices spanning wide cost and appearance levels. Interior paint products commonly used today are acrylic and alkyd.

Although the term *latex* is applied to some types of paint, the correct name would be *acrylic latex,* since the rubber-type additive is now replaced by a resin. This type of paint is easy to apply by brush or roller, dries rapidly, and presents a reasonably washable surface. Water-based acrylic paint is environmentally friendly and can be disposed of by washing down the drain. Alkyd interior paints are often referred to as "high-traffic" paints because they tend to resist normal wear and tear and are applied to moldings, doors, and high-touch areas.

Wiping stains, which are used over unfinished woods, can be brushed, sprayed, or wiped on, and after drying are usually sealed with a clear acrylic lacquer. "High-performance" coatings are available for long-life exposure to the elements that are applied to exterior steel or aluminum components.

Vinyl wall coverings, which are available in a wide range of colors, patterns, and textures, are divided into three groupings: Type I for light duty, Type II for medium duty, and Type III for heavy duty.

Sources: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy; The Art of Construction Projects and Principles for Beginning Engineers Architects By M. Salvadori)

1. Match the terms with their definitions:

wallboard	a chemical for changing the colour of something
stud	a type of cloth or plastic produced by chemical processes
stain	material consisting of two sheets of heavy paper with a layer of plaster between them, used to make walls and ceilings before putting on a top layer of plaster
transmission	a force that acts to stop the progress of something or make it slower
ability	the physical or mental power or skill needed to do something
resistance	the process of passing something from one person or place to another
humidity	a small nail or piece of metal, with a large, rounded top, that is attached to the surface of something, usually for decoration
sheathing	a measurement of how much water there is in the air
cladding	a close-fitting covering designed to protect something
acrylic	material that covers the surface of something and protects it

2. Answer the Questions:

1. What is the live load?
2. What materials are used in partition framing?
3. How many layers of gypsum boards should be installed for achieving different fire-ratings?
4. How to reduce the transmission of sound?
5. What is STC? How to determine it?
6. What is also important in the process of installation of sound-controlling systems?
7. What is “sweep”?
8. What is a “green board”?
9. What is exterior sheathing composed of?
10. What types of wall finishes are used in a commercial or institutional environment?
11. How can a paint with resin be applied?
12. What is the correct name for the term latex nowadays?
13. What are the differences between type I, type II and type III vinyl wall coverings?

3. Retell the text commenting on the obtained information

UNIT 21

Plumbing

Building plumbing systems are comprised of potable-water supply and storm water and sanitary sewer effluent collection and discharge. Plumbing pipe layouts in a multistoried building consist of three basic components:

1. Piping for potable (drinking) water and piping for plumbing fixtures

2. Waste lines for the collection of sewage, water from sinks, water fountains, and rain (storm) water

3. Vent lines to exhaust sewer gases and provide the necessary ambient air pressure to allow wastes to flow freely

From metals to plastics, the materials for plumbing systems are many. These are some of the most common ones:

■ *Copper*, primarily used for potable-water supply lines and in some heating and cooling systems. Copper piping is available in a wide range of sizes from 1 / 8 inch to 8 inches in diameter. Different types of copper piping have different wall thicknesses; Type K tube has the thickest walls, followed by Type L and Type M. Copper pipe can be joined by threading, soldering, brazing, or compression-type fittings.

■ *Cast iron* was first used in the United States in the early part of the nineteenth century. Later, cast-iron pipe was the material of choice for storm and sanitary waste pipes. Both rugged and durable, it was used for underground drain lines, and because it had soundproofing qualities, it was used in vertical storm drainpipe installation so the rush of flowing water would be somewhat silenced. Some of these applications have been replaced by plastic pipe, which is less expensive to purchase and install. Cast-iron pipe is made with hubs and hubless, each requiring a different joining method. Cast-iron pipe with a hub is joined with a compression push-on gasket, and hubless pipe and fittings are joined and connected with stainless-steel retaining clips.

■ The next most common *plastic* pipe materials are ABS (acrylonitrile-butadienestyrene), PVC (polyvinyl chloride), CPVC (chlorinated polyvinyl chloride), and PE (polyethylene). All of these plastic pipes exhibit similar qualities, such as ease of installation, corrosion resistance, low frictional loss of liquids passing through them, longevity, and

relatively low cost. These pipes, when installed above ground, generally require more support than metal pipes, and plastic pipe is not recommended for high-pressure air and gas usage. Plastic pipes can become brittle at low temperatures. Most plastic pipes are joined together by solvent welding – applying a liquid that makes the pipe surface tacky and seals the pipe after insertion into a fitting.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

1. What are plumbing systems in building comprised of?
2. What pipe materials are considered in the text?
3. How are copper pipes joined?
4. Why were cast-iron pipes used for underground drain and in vertical storm drainpipe installation?
5. How are cast-iron pipes joined?
6. What qualities do plastic pipes have?
7. What is the solvent welding?

2. Correct the mistakes in accordance with text information:

1. Building plumbing systems are comprised of sewage-water supply and storm water and sanitary sewer effluent collection and discharge.
2. Type G tube has the thickest walls.
3. *Cast iron* was first used in the United Kingdom in the early part of the nineteenth century.
4. Cast-iron pipe with a hub is joined with a welding push-on gasket, and hubless pipe and fittings are joined and connected with stainless-steel retaining clips.
5. Plastic pipes can become brittle at high temperatures.

3. Retell the text commenting on the obtained information

UNIT 22

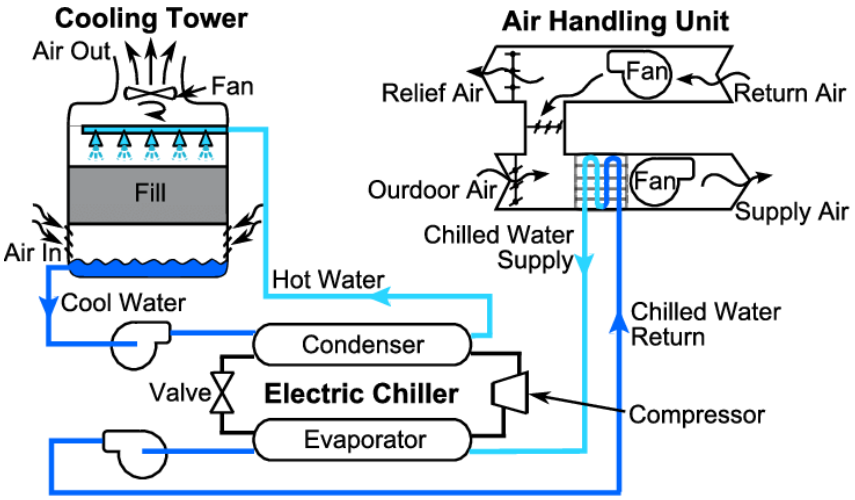
Heating, ventilating, and air conditioning

Heat in buildings is accomplished by liquid (hydronic water) or steam generated from a central heating plant, such as a boiler or heat exchanger, and distributed by heating coils, radiators, or baseboard radiation. The central-heating source can also provide hot air to be distributed via an air-handling unit (AHU) and distribution ductwork.

Ventilation is required to control indoor air quality by exchanging the tempered air within the building with outside air, in the process filtering out air pollutants both inside and outside the building. This process is accomplished by air-handling units. These are some of the most common components in a commercial air-conditioning system:

■ Air handler (AHU) – either a roof- or exterior-mounted concrete pad, this device moves air through the building's ductwork system, exiting through terminal devices – grills and diffusers. AHUs also exhaust and recirculate the air through return-air ductwork and grills.

■ Chiller – this device contains an evaporator, condenser, compressor, and expansion valve. The evaporator, with a liquid refrigerant in its tube bundle, absorbs heat, and the refrigerant vapor is taken into the compressor, which pumps that vapor to the condenser, raising its pressure and temperature. The high-pressure liquid refrigerant then passes through the expansion device, which reduces the refrigerant's temperature and pressure as it flows over the chilled water coils, absorbing heat from the water in those coils.



https://coldman.ru/?utm_source=yandex&utm_medium=cpc&utm_campaign=[obshie–poisk–region]&utm_content=gid|3667734126|aid|{creative}|placement|{placement}&utm_term=water%20chiller

■ Condensers – heat exchangers that condense a substance, usually a refrigerant, from a gaseous to a liquid state and in doing so give off latent heat, which will be transferred to the condenser coolant.

■ Cooling tower – equipment that removes heat absorbed in a circulating cooling water system.

■ Heat exchanger – a device that efficiently transfers heat from one fluid to another by passing over a solid surface. This transfer of heat can take place by either absorbing or dissipating the heat. Heat exchangers are found in boilers and air-conditioning equipment.

■ Variable-air-volume (VAV) devices – devices with both heating and cooling coils that are installed where a ceiling diffuser is normally located. As tempered air passes through a building's distribution ductwork, this system allows for individual temperature control, since each area where a device is installed can call on varying degrees of heating and cooling independently of one another.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Answer the Questions:

1. Are buildings heated by liquid or steam? How does it happen?
2. Why do we need ventilation in a building?
3. What are the most common components in air-conditioning system?
4. What are the main differences of air handler, chiller and cooling tower?
5. What functions do the conditioner, heat exchanger and variable-air-volume device have?

2. Applying internet and your professional knowledge on the topic make a presentation about the principles and standards of HVAC designing in your region.

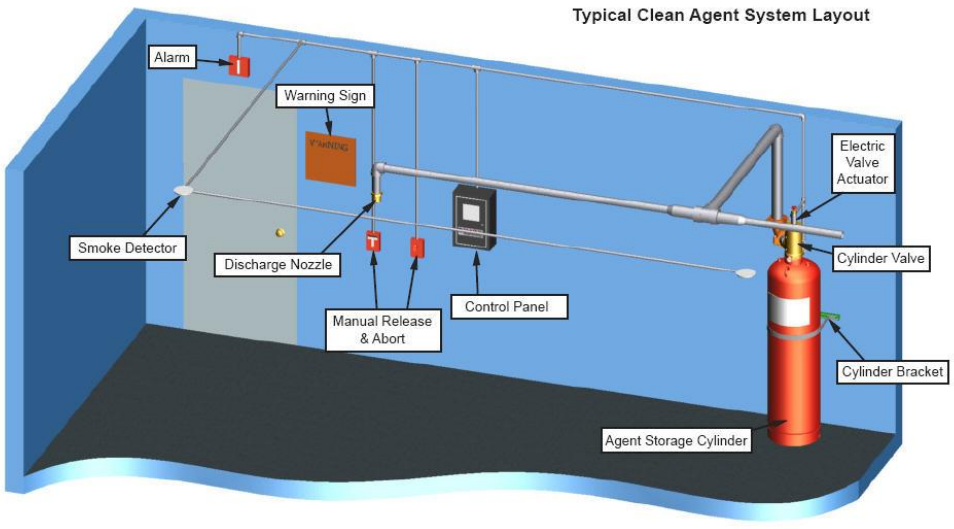
3. Retell the text commenting on the obtained information

UNIT 23

Electrical systems and fire-protection systems

A building's electrical system commences at the connection to the existing local utility company service, known as the primary service. Upon entering the construction site, this underground primary service connects to a transformer that is mounted on a concrete pad or installed in a transformed vault onsite. The electrical cables on the building side of the transformer are known as the secondary service; these are the cables that enter into the building. The secondary service connects to a main distribution panel (MDP), or switchgear, which then divides into other service panels, some for lighting and some for power panels. The lighting panels, designated LP, distribute electrical circuitry to the building's lighting system, and the power panels, designated PP, distribute electrical circuitry to the building's HVAC system and various motors and power-driven devices in the building.

Most buildings have two types of electrical systems: line voltage of 277 volts or 240/120 volts for lighting and equipment, and a low-voltage system for voice and data communication. The project's electrical plans usually consist of one or more one-line drawings: one for power and lighting and one for low-voltage systems. On occasion, another one-line drawing may be included for a building's security system if it is not included in the voice/data scheme.



http://www.janusfiresystems.com/products/fm–200/

Fire-protection systems

In most instances, the project's mechanical engineer does not furnish a design for the building's fire-protection or sprinkler system; they usually include what is called a performance specification in the contract specifications manual. This fire protection specification directs the subcontractor to prepare a design to meet certain standards.

The selected fire-protection subcontractor will design the system with a computer software program that determines the coverage required to meet the performance specifications. The subcontractor then prepares the drawings and equipment specification sheets for approval by the engineer and the local fire marshal. These are the three basic types of water-filled sprinkler systems:

1. A *wet system,* where the sprinkler mains and branches are filled with water. The sprinkler heads have either a fusible link that melts at a predetermined temperature or a small glass vial that will shatter in the presence of heat; either releases water into the affected area.

2. A *dry system* for unheated areas. The main and branch lines are filled with air under pressure; when a sprinkler head detects a fire, the air is expelled as water rushes in to extinguish the fire.

3. A *deluge system* is required for special high-hazard areas. The sprinkler heads are open all the time, and a special deluge valve that is activated by its own control panel allows a rapid flow of water through the open heads to quickly extinguish the fire.

Foam suppression systems are also available; a fire-protection system is installed in the hood over the cooking areas. A typical fire-protection system will consist of the following:

■ An incoming underground main, generally separate from the incoming potable water main.

■ A fire pump to supply water at the proper pressure and volume to all areas in the building.

■ In multistoried buildings, a sprinkler riser emanating from ground floor to all upper floors; main and branch piping will extend from this riser.

■ A fire-detection alarm and control panel.

■ Fire hose stations.

■ Sprinkler heads that will be activated by either smoke or heat.

Source: (Construction Process Planning and Management an Owners Guide to Successful Projects By S.M. Levy)

1. Match the terms with their definitions:

1. transformer	*a.* the process of giving things out to several people, or spreading or supplying something
2. vault	*b.* the connected arrangement of the wires and other parts of a closed system through which electricity can flow
3. distribution	*c.* a type of arch that supports a roof or ceiling, especially in a church or public building, or a ceiling or roof supported by several of these arches
4. foam	*d.* a thick substance containing a lot of bubbles, used for cleaning, washing, or stopping fires
5. circuitry	*e.* a device that controls the flow of air or liquid from one place to another
6. manual	*f.* a device that changes the voltage or other characteristic of electrical energy as it moves from one circuit to another
7. sprinkler	*g.* a piece of equipment for putting water onto fires in a lot of small drops to put them out
8. valve	*h.* a book that gives you practical instructions on how to do something or how to use something, such as a machine

2. Answer the Questions:

1. What two types of electrical systems do you know?
2. What should the fire-protection subcontractor do?
3. List the basic types of water-filled sprinkler systems. Where are they installed?
4. Is a foam suppression system effective or not? Where is this fire-protection system installed?
5. What elements does the fire-protection system consist of?

3. Retell the text commenting on the obtained information

Vocabulary

1. Above grade – высшего качества
2. Abrasion – истирание
3. Accommodate – приспосабливаться
4. Acrylic lacquer – акриловый лак
5. Addenda – добавление
6. Adhering – приклеивание
7. Adjacent road – примыкающая дорога
8. Adobe –саманный кирпич
9. Advanced materials – продвинутые материалы
10. Advertising – рекламирование
11. Aggregates – заполнители
12. Air – handling unit – аппарат для кондиционирования воздуха
13. Ambient – внешний, относящийся к окружающей среде
14. Amount – количество
15. Anchorage – анкеровка
16. Anchors – анкеры
17. Annealed – закаленный
18. Annealed glass – закаленное стекло
19. Application – планирование
20. Application software – прикладное программное обеспечение
21. Archive – архивировать
22. Axis – ось
23. Backing wall – забутовочная стена
24. Ballasted installation – инверсионная кровля
25. Bars – стержни
26. Baseboard radiation – плинтусное отопление
27. Be bent – быть изогнутым
28. Be coated – покрываться/быть покрытым
29. Be embedded – быть заделанным
30. Be flush – быть заподлицо
31. Be fractured – сломаться
32. Be intertwined – взаимосвязаны
33. Be laid – укладываться
34. Be liable – нести ответственность
35. Be prone – быть склонным/быть предрасположенным
36. Be soaked – впитаться
37. Be surpassed – быть превзойденным
38. Be susceptible – быть подверженным
39. Beam – балка
40. Bear the burden – нести нагрузку
41. Bearing capacity – несущая способность

42. Bearing capacity's – несущая способность
43. Bearing pile – свая – колонна/ коренная свая
44. Bid – предложение
45. Bid documents – тендерные документы
46. Big packages – пакеты предложений
47. BIM – Технология информационного проектирования строений
48. Binder – вяжущее вещество
49. Bolted connection – соединение болтами
50. Bonds – скреплять
51. Bond the masonry – производить перевязку кладки
52. Boring drilled – буровая скважина
53. Borrowed light – стеклянная часть внутренней перегородки
54. Branch – питатель
55. Brazing – спайка
56. Breach – нарушение
57. Brittle – хрупкий
58. Buckle – терять устойчивость
59. Building codes – строительные нормы
60. Building permit – разрешение на строительство
61. Built – up roofs – совмещенная крыша
62. Business development – развитие предпринимательства
63. CAD – система автоматизированного проектирования
64. Caisson – опускной колодец
65. Cast iron – чугун
66. Cast stone – искусственный камень
67. Cavity wall – стена с пустотами
68. Channel – швеллер
69. Circuitry – схема
70. Circumference – окружность
71. Civil engineer – инженер строитель
72. Clay brick – глиняный кирпич
73. Coated felts – войлок с покрытием
74. Coated glass – стекло с защитным покрытием
75. Coating – покрытие
76. Cohesive and adhesive properties – связующие и сцепляющие свойства
77. Collar joint – внутренний вертикальный шов в кирпичной кладке
78. Commencement – начало
79. Competencies – компетенции/полномочия

80. Competitors – соперники, конкуренты
81. Completion – конец
82. Complexity – сложность, трудность
83. Composition – композитный материал
84. Compression – сжимающее усилие
85. Compressive load – сжимающая нагрузка
86. Comprise – включать, состоять из
87. Conceptual drawings – предварительный проектный чертёж
88. Concrete – бетон
89. Concrete pad – бетонная подушка
90. Conductivity – теплопроводность
91. Constraint – ограничения
92. Construction management – руководство строительными работами
93. Construction management philosophy – концепции управления строительством
94. Construction marketeer – строительный маркетолог
95. Construction operation – строительные процессы
96. Construction sequence – последовательность выполнения строительных работ
97. Constructural schedule – график строительства
98. Consumer groups – группы потребителей
99. Contemporary – современный
100. Contract schedule – срок исполнения договора
101. Contractor – подрядчик
102. Contractual liability – договорное обязательство
103. Control joint – деформационный шов
104. Corrugated – гофрированный
105. Cost – saving options – варианты экономии
106. Crack – трескаться.
107. Cross section – поперечное сечение
108. Crossover – пересечение
109. Cure – затвердевать
110. Current database of costs – текущая база данных затрат
111. Curtain walls – несущие стены.
112. Decision–makers – директивные органы/руководители

113. Defective performance – ненадлежащее исполнение/недостаток в исполнении
114. Deluge system – дренчерная система
115. Density – плотность
116. Design – проектирование, проектировать
117. Design consultants – специалисты по проектированию
118. Design process – процесс проектирования
119. Design team – команда разработчиков
120. Designer – проектировщик
121. Diammatically – графически
122. Differentiation – дифференциация/различие
123. Diffuser – диффузор, расширяющаяся часть воздуховода
124. Diligence – усердие/осмотрительность
125. Dimensions – размеры
126. Directories – каталок(справочник)
127. Disclaimer – заявление об отказе от ответственности
128. Dissipate – разгонять
129. Distortion – искажение
130. Distribute – распространять
131. Distribution panel – распределительный щит
132. Diversity – разнообразие
133. Door frame – дверная коробка
134. Double – pane glass – двойное стекло
135. Drain – дренажный
136. Driveway – проезжая часть
137. Dry-stacked – сухая кладка
138. Ductwork – воздуховод
139. Duetile iron – ковкий чугун
140. Durability – долговечность
141. E-newscasts – электронный новостные выпуски
142. Earthquake – землетрясение
143. Ease of maintenance – простота обслуживания
144. EDPM – этилен – пропилен монодиен
145. Efficient – приемлемый
146. Elapsed time – пройденное время
147. Electrical engineer – инженер-электрик
148. Enclose – заключить
149. Encompasses – охватывает, включает в себя
150. Energy efficiency – энерго-эффективность

151. Engagement of secondary stakeholders – привлечение вторичных заинтересованных сторон
152. Engineered–wood–product core – ядро из конструкционного дерева
153. Ensure – обеспечить/ обеспечивать
154. Entire facade – весь фасад
155. Entity – организация
156. Equilibrium – равновесие.
157. Evaporator – эвапоратор, выпариватель
158. Excavation – разработка грунта экскаватором
159. Execute – выполнять
160. Exert – прилагать усилие
161. Exotic veneers – экзотические шпоны
162. Expand – растягиваться
163. Expansion joints – компенсаторы
164. Expansion valve – запорный клапан
165. Exterior sheathing – внешняя обшивка
166. Fabrication – изготовление/производство
167. Facing material – облицовочный материал
168. Feasibility study – технико-экономическое обоснование
169. Fencing – ограждение
170. Fenestration – распределение окон
171. Fiberglass – стекловолокно
172. Financial proposition – финансовый план
173. Finishes – отделка
174. Fire-rated coreboard – слой огнестойкого картона
175. Fire-resistance – огнестойкость
176. Fire marshal – ответственный за пожарную безопасность
177. Fire resistance – огнестойкость
178. Fireplace – камин
179. Fixed–glass – неподвижное стекло
180. Fixture – прибор
181. Flanges – полки двутавровой балки
182. Flashing – гидроизоляция
183. Flexural strength – прочность на изгиб
184. Flexural/bending stresses – напряжения при изгибе
185. Floor assembly – монтаж пола
186. Floor room – междуэтажное перекрытие
187. Flow – поток

188. Foam suppression – пеноподавление.
189. Footing – основание
190. Formwork – каркас
191. Foundation – фундамент
192. Frame assembly – монтаж дверной коробки
193. Freestanding – отдельно стоящий
194. Freestanding wall – отдельно стоящая стена
195. Friction pile – висячая свая
196. Fully tempered glass – полностью закаленное стекло
197. Functional performance – эксплуатационные характеристики
198. Funders and insurers – спонсоры и страховщики
199. Funding – финансирование
200. Gamut – гамма
201. Gasket – прокладка, уплотнительное кольцо
202. Gasketing – технология нанесения уплотнительной система (звукоизоляционный уплотнитель)
203. General contractor – генподрядчик
204. Girder – пролетная балка
205. Glazing – остекление
206. Grid – сетка
207. Grill – решётка
208. Grout – жидкий строительный раствор
209. Grout – цементный раствор
210. Guidelines – нормативные документы
211. Gypsum–core panels – гипсокартонные панели
212. Gypsum – гипс
213. Gypsum wallboard – гипсовая стеновая плита
214. Head – верхний брус дверной коробки
215. Heat-strengthened glass – жаростойкое стекло
216. Heat exchanger – теплообменник
217. Heat welding – термическая сварка
218. Heating and air conditioning – воздуховод отопления и кондиционирования
219. Heating coil – нагревательный элемент
220. Heating plant – котельная
221. High-compressive – strength mix
222. High-performance coatings – высококлассные покрытия
223. High–pressure laminate – ламинат высокого давления

224. High-traffic paints – краски для помещений с большой проходимостью
225. High acoustical rating – высокий акустический рейтинг
226. High density – высокоплотный
227. High humidity – высокая влажность
228. Hollow – полый
229. Homogenous industry – однородная отрасль
230. Hot – dip galvanized – нанесение покрытия горячим способом
231. Hub – втулка
232. I-beam – двутавровая балка
233. Implication – последствие
234. Impose – прилагать (нагрузку)
235. Incapable – неспособный
236. Inch – дюйм
237. Incorporation – монтаж
238. Increase – повышение
239. Inherent problem – неотъемлемая проблема/насущная проблема
240. Inject – инъецировать
241. Inner wall – внутренняя стена
242. Insertion – введение
243. Instantaneous – мгновенный
244. Insulated glass – изоляционное стекло
245. Insulating material – изолирующий материал
246. Insulation – теплоизоляция
247. Integrity – целостность
248. Interior fit – up – внутренняя отделка
249. Interlayer – прослойка
250. Interlocking material – изолирующий материал
251. Interlocking parts – взаимно сопряженные звенья
252. Interlocking shape – взаимосвязанная форма
253. Intermediate beams – промежуточные балки
254. Internal assessment – внутренняя оценка
255. Jamb – дверной косяк
256. Joint reinforcement – армирование
257. Joint venture – совместный бизнес
258. Knocked down – разобранный вид
259. Labeled with a W – с индексом “W”
260. Land option – выбор земельного участка
261. Landscape architecture – ландшафтный дизайнер

262. Lap – нахлест
263. Latent heat – удельная теплота
264. Lateral stability – поперечная устойчивость
265. Layout – планировка
266. Legal eagles – юристы
267. Legislation – законодательство
268. Lessen the transmission – уменьшить теплопередачу
269. Light – gauge – тонкая проволока
270. Lime – известь
271. Limited water exposure – ограниченное воздействие влаги
272. Line voltage – сеть линейного напряжения
273. Lintels – перемычки
274. Live load on the floor – полезная нагрузка на перекрытие
275. Load-bearing walls – несущие стены
276. Lobby floor – вестибюль
277. Local authority – местные органы власти
278. Local communities – местные общины
279. Long-term strategic position – долгосрочное стратегическое положение
280. Low-emissivity – низкая теплоотдача
281. Low-sound rating – низкий уровень шума
282. Low–voltage – низковольтная система
283. Low maintenance – низкие эксплуатационные расходы
284. Main contractor – главный подрядчик
285. Maintenance – эксплуатация
286. Makes up the bulk – составляет основную часть
287. Manhole – люк
288. Market segments – сегменты рынка
289. Masonry – каменная кладка
290. Masonry wall – стена ручной кладки
291. Mechanical engineer – инженер механик
292. Mechanical fasteners – механические крепежные элементы
293. Medium-density fiberboard – древесно-волокнистое плиты средней плотности
294. Melting – плавка
295. Mesh – сетка

296. Metal stud – стойка из тонкостенных профилей
297. Mineral cores – минеральные ядра
298. Modern procurement – современные закупки
299. Modest – умеренный
300. Moisture – влага
301. Moisture–resistance – влагостойкость
302. Mold-resistant – защита от плесени
303. Moldings – декоративные литые детали
304. Mortar – строительный раствор
305. Mortar beds – слой цементного раствора
306. Mullions – импосты
307. Nominal widths – номинальная ширина
308. Non-fire-rated – не огнестойкая
309. Non-load-bearing walls – ненесущие стены
310. Noncombustible – негорючий
311. Occur – происходить/случаться
312. Online press packs – онлайн рассылка информации для прессы
313. Operational activities – оперативная деятельность
314. Operational environment – оперативная обстановка
315. Organizations capability – потенциал организаций
316. Outer cladding – внешняя облицовка
317. Outer wall – наружная стена
318. Outline specifications – основные характеристики
319. Outward – наружу
320. Overlapped – обшитый внакрой
321. Partition framing – перегородки
322. Paving material – облицовочный материал
323. Paving, veneer – облицовка
324. Performance specification – эксплуатационные технические условия
325. Pilasters – пилястры
326. Pile – свая
327. Placing design – передача проекта
328. Planned schedule – запланированный график
329. Plaster – штукатурка
330. Plywood veneer wood paneling – деревянные панели фанерованные шпоном

331. Potable-water – питьевая вода
332. Pour – заливать
333. Practicality of adopting – практические возможности принятия
334. Precast-concrete piles – железобетонная свая
335. Precautions – меры предосторожности
336. Prefabricated – изготовленные на заводе
337. Preliminary set – предварительный набор
338. Pressure reducing valves – редукционные клапаны
339. Privary statement – заявление о конфеденциальности
340. Procurement method – метод закупок
341. PVC – ПВХ (поливинилхлорид)
342. Quantity surveyor – инженер–сметчик
343. Questionnaire system – система опросов
344. R-value – коэффициент сопротивления теплопередаче
345. Rapid dissipation – быстрое испарение
346. Regulatory authorities – регулирующие органы
347. Reinforced masonry – армированная кладка
348. Reinforcement – армированное усиление
349. Remote server – удаленный сервер
350. Requirement – требование
351. Resistance in tension – сопротивление растяжению
352. Resultant partition – результирующая (итоговая) перегородка
353. Retaining a level wall – выровнять несущую стену
354. Retaining clip – зажим
355. Retention – удержание
356. Retrenchment – сокращение
357. Ribs – ригели
358. Rigid – жесткий/негибкий
359. Rigid roof – жёсткая кровля
360. Rock strata – горная порода
361. Roller – валик
362. Roof substrate – основание крыши
363. Roofing nails – кровельный (толевой) гвоздь
364. Rubber – type additive – резиносодержащие добавки
365. Rugged – негладкий
366. Seal – герметизировать.

367. Secondary service – внутренняя сеть энергопотребления
368. Segmental analysis – сегментарный анализ
369. Selected sites – выбранный участок
370. Set up and welded – установить и сварить
371. Sewage – сточная вода
372. Sewer – канализация
373. Shard – осколок
374. Shed – type sloped – roof – односкатная крыша
375. Shingles – черепица
376. Shrink – сжиматься
377. Shrinkage cracking – образование трещин при усадке
378. Sidewalks – тротуары
379. Simplicity – простота
380. Single – ply membrane – однослойная мембрана
381. Sink – раковина
382. Site – стройплощадка
383. Skelet – каркас
384. Skill care – навыки обеспечения ухода
385. Slab – плита
386. Sloped roofing surfaces – поверхность скатной крыши

387. Small-diameter smooth-edged stones – гладкие камни малого диаметра
388. Soil – грунт
389. Soil conditions – грунтовые условия
390. Soldering – сварка
391. Solid – твердый
392. Solvent – растворитель
393. Solvent welding – запайка с растворителем
394. Sound–deadening cores – звукопоглощающее ядро (сердечник)
395. Sound–resistance standards – стандарты шумозащиты
396. Sources information – источник информации
397. Spatial dimensions – пространственные размеры
398. Stable – стабильный
399. Stainless – нержавеющий
400. Stakeholders – круг заинтересованных лиц
401. Standing seam roofing – стоячий фальц
402. STC – класс звукоизоляции
403. Steel bars – стальные балки
404. Steel beam – стальная балка
405. Steer clear – держаться подальше
406. Stiffen – усиливать

407. Strategic implementation – стратегическое осуществление
408. Strategic management – стратегическое управление
409. Strategic outcomes – стратегические результаты
410. Stretch in tension – растяжение
411. Strong in compression – работает на сжатие
412. Structural bond – структурная связь
413. Structural clay tile – строительная керамическая плитка
414. Structural engineer – инженер–строитель
415. Structural integrity – прочность конструкции
416. Stucco – алебастр, гипс
417. Subcontractor – субподрядчик
418. Substantially retard – существенно замедляет
419. Substrate – основание
420. Sufficient skill – необходимая квалификация
421. Superstructure – надстройки
422. Supplier – поставщик
423. Surface – bonding – поверхностное соединение
424. Switchgear – распределительное устройство

425. Tacky – липкий
426. Take cognizance – рассматривать/ впредь учитывать
427. Temporary bracing – временное крепление
428. Tend to break – склонны ломаться
429. Tensile and bending stresses – растягивающие и изгибающие напряжения
430. Tensile strength – предел прочности
431. Tensile strength – прочность на растяжение
432. Tension – растягивающее усилие
433. Terra cotta – терракота, обожженная глина
434. Test pit – шурф
435. The bill of quantities – смета
436. Thermal performance – тепловые характеристики
437. Thermal resistance – тепловое сопротивление
438. Thermal stress – тепловое напряжение
439. Thickness – толщина
440. Threading – резьба
441. Ties – соединители
442. Tiled facing – кафельная облицовка

443. Timber pile – деревянная свая
444. Time delay – временная задержка
445. Tinted glass – дымчатое стекло (затемненное тонированное стекло)
446. Tooled joints – кладочный шов
447. Trade contractor – субподрядчик
448. Transformer – трансформатор, преобразователь
449. Tube bundle – связка труб
450. Turnbuckle – винтовая стяжка
451. Turnover rate – текучесть кадров
452. Ultraviolet ray penetration – воздействие ультрафиолетового излучения
453. Undergo – претерпевать
454. Underground utilities – подземные коммуникации
455. Underlying surface – подстилающая поверхность
456. Uniformly – равномерно
457. Unions – профсоюзы
458. Untreated – необработанный
459. Up-and-coming – быстроразвивающийся
460. Utilities pedestrian traffic – пешеходная зона
461. Utilitis – инженерные системы
462. Variable-air-volume – регулируемый объём воздуха.
463. Vegetable fibers – растительное волокно
464. Viability – жизнеспособность
465. Vinyl – виниловый
466. Wall tiles – настенная плитка
467. Washable surface – моющаяся поверхность
468. Water penetration – проникновение воды
469. Wear – износ
470. Wed-baced property data banks – онлайн база данных
471. Welded connection – сварное соединение
472. Wet mix – смесь повышенной влажности
473. Wide-flange beam – двутавровая широкополочная балка
474. Wind load – ветровая нагрузка
475. Window panes – оконные стекла
476. Wiping stains – пропитка для дерева

477. Wire intersections – пересечение проволоки
478. Wire stilts – проволока
479. Withstand – выдерживать
480. Wood studs – деревянные бруски
481. Work in bending – работать на изгиб

482. Workability or plasticity – обрабатываемость или пластичность
483. Working drawings – черновая схема
484. Workmanship – квалификация рабочего
485. Wythes – перегородки

CONSTRUCTION FOR MASTERS

Учебное пособие для студентов-магистров очной формы обучения всех профилей направления строительство

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