UNIT 5 BUILDING ELEMENTS

Concrete floors

Concrete floors are common in both single story buildings and **high-rises**. There are several different methods of arranging the structural slabs and support. It is important to be familiar with all types.

A standard **beam-and-slab** floor has concrete slabs supported by concrete beams. Beyond this designs become more complex. A **one-way solid slab** floor has load bearing steel running in the direction of the **span**. However a **two-way solid slab** floor has load-bearing steel running in two directions. These are supported by concrete columns.

Concrete drop panels are located in between the columns and the floor. A similar floor without drop panels is called a **two-way flat plate slab** floor.

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UNIT 5 BUILDING ELEMENTS

Concrete floors

These are well suited for above grade floors. Last, a **one-way joist slab** has a series of horizontal beams that contain reinforcing steel. These may be located at construction joints.

There are additional ways to reinforce a concrete floor. Running **tendons** through concrete, and then tightening and anchoring them after curing creates a strong **post-tensioned** floor. Also, a cross-braced floor with diagonally intersecting supports, has increased **lateral** stability.

Mark the statements as true (T) or false (F)

1. _ Load-bearing steel runs in the direction of the span in a one-way solid slab floor
2. _ Drop panels are located in between concrete columns and a concrete floor
3. _Cross-braced floors are post-tensioned for added strength.

UNIT 5 BUILDING ELEMENTS

Concrete floors

Match the words (1-9) with the definitions (A-I)

1_two-way solid slab ; 2_ one-way solid slab; 3_ construction joint;
4_ one-way joist slab; 5_ two-way flat plate slab; 6_ span
7_ drop panel; 8_ post-tensioned 9_ cross-braced

A. a concrete surface where the laying of concrete was stopped and later continued
B. concrete with tension added to it so that it can reach over a longer distance
C. a structural slab with load-bearing steel running in the direction of the span and steel that controls cracking running perpendicular to the span
D. the extent of a structure between supports
E. a structural system that has a series of horizontal concrete beams containing reinforcing steel.
F. a thickened section of a concrete floor located over a supporting concrete column.
G. reinforced by diagonally intersecting supports.
H. a structural slab that has load-bearing steel running in two directions.
I. a structural slab similar to a two-way solid except that it does not have drop panels.

UNIT 5 BUILDING ELEMENTS

Concrete floors

Read the sentence pairs. Choose where the words best fit the blanks

1 *concrete floor / lateral stability*

A. This building is cross-braced for increased_____

B. The_____of this building is reinforced by steel beams.

2 *high-rise / above grade*

A. This_____building is over forty stories tall.

B. The contractor is installing a floor_____rather than underground.

3 *tendon / beam-and-slab*

A. A strong_____has been added to this concrete to give it tension.

B. This_____floor is a very common design.

UNIT 6 Construction Process

Site investigation

Before we begin construction on your property, we must conduct a thorough site investigation. This letter explains the steps in that process. First, we will do a complete **surface evaluation**. This will include a **topographic survey** of the surface features. The designers will use this data to design appropriate landscape features. We will also know if we need to move soil to make the site level.

Next, a subsurface investigation will be necessary. We need to know what kind of soil the foundation will rest on. A preliminary check showed mostly sand and larger pieces of gravel. However, there may also be weaker silt or clay soils present. We will dig several **test pits** to obtain a complete **soil profile.** Some of these will only be a few meters deep. For others we will use a drill rig to dig twenty meters down.

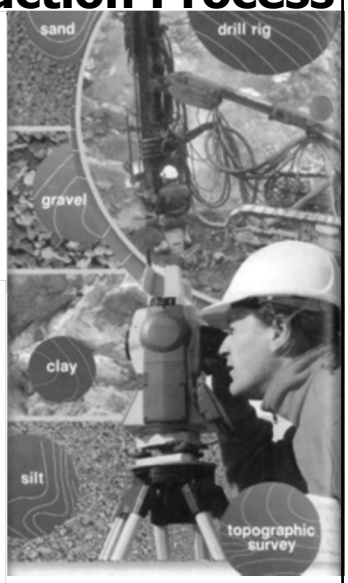
UNIT 6 Construction Process

Mark the statements as true (T) or false (F)

1 The topographic survey provides data for landscape design

2 The preliminary investigation showed silt soil to be present

3. The soil profile includes soil from twenty meters below the surface.



1.The contractor will need a test pit / surface investigation ten feet deep at this location.

2. Some soil will have to be moved to make this area sand / level

3. Can that test pit / drill rig make a hole 25 meters deep?

4. Conduct a subsurface investigation / topographic survey to determine the foundation requirements.

5. The drill rig / soil profile shows a mix of clay and Slit in this area

UNIT 6 Construction Process

Site investigation

Match the words (1-6) with the definitions (A-F)

1. Sand; 2. clay; 3. gravel; 4. surface evaluation; 5. silt; 6. topographic survey

A. a soil type with particles measuring between 0.002 mm and 0.02 mm in diameter

B. a soil type with particles measuring between 630 micrometers and 5 mm in diameter.

C. an examination of the top layer of soil at a construction site

D. a soil type with particles measunng less than 0.002 mm m diameter

E. a soil type with particles measuring between 5mm and 75mm m diameter

F. an examination and description of the surface! features of a construction site

UNIT 6 Construction Process

Site layout

Today we'll finish the site layout for the office building on Lincoln Boulevard. We'll need to have a complete **site plan** by the end of the day. It should show the **property lines**, available utilities and all significant changes in elevation.

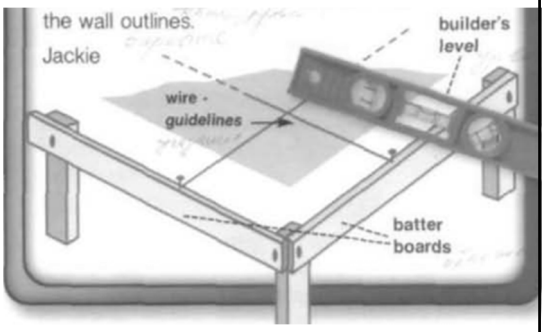
I know this is your first time leading the crew. So I'll just give you a few reminders. Be sure your crew brings all the necessary equipment. Don't forget the **builder's level** and **grade rod**. You can't establish horizontal planes or measure elevation changes without them. There are already **bench marks** set at the site to help with that. You'll also need some **monuments** to **stake** out the property lines. Last, bring several **batter boards** and at least 100 meters of string or **wire**. Put the boards at the building comers Then run the wire between them to show the wall outlines.

UNIT 6 Construction Process

Site layout

Read the email from a contractor to a site manager.
Then, mark the statements as true (T) or false (F).

1_The grade rod is needed to measure elevation changes.
2_ The team has to set bench marks by the end of the day
3_ Batter boards and wire mark the property lines.



UNIT 6 Construction Process

Site layout

Match the words (1-6) with the definitions (A-F).

1_site plan
2_horizontal
3_batter board
4_ utilities
5_ property line
6_ wire

A .a set of services required at most buildings including electricity, natural gas, water and sewage
B. parallel to the plane of the horizon, or flat
C. a drawing for a building project that shows its location, utilities, and property lines
D. a piece of metal shaped into a thin, even thread.
E. a horizontal board fastened to a post and located at the corners of an excavation to mark the desired level
F. the legal boundary of a piece of land owned by someone

UNIT 6 Construction Process

Excavation 1

I just wanted to let you know about a delay in construction.
We ran into a problem during today's **excavation**. While drilling, we **encountered** a large amount of **seepage** from **groundwater** The water table in this area was unexpectedly high. Before we can proceed, we need to extract the water.
Since this isn't runoff or standing water, It won't be possible to let the water collect in a **sump**. The best way to solve this problem is by lowering the water level with a dewatering system. We will install a series of **well-points** throughout the area. As the water fills the well-points, we will use a pump to empty them. We will have to lower the water table by several feet.
I expect the process to take a few days. In the meantime, our crews will check the other areas of the construction site and make sure that this isn't a problem anywhere else.
If you have any questions, feel free to call me. Marcus Adams

UNIT 6 Construction Process

Excavation 1

Mark the statements as true (T) or false (F).

1. The worksite was flooded by runoff.
2. The crew cannot use a sump to solve the problem
3. Work cannot continue until the water table is lowered

Fill in the blanks with the correct words and phrases.

water table groundwater pump drill dewatering system

1 A_____is a good way of lowering the underground water levels
2 He attempted to_____a hole in the ground, and hit a massive piece of rock.
3 The_____rises and lowers according to environmental conditions, such as the amount of rainfall
4 They used a_____to collect the standing pool of water
5 Most of our drinking supply comes from sources of _____below the earth s surface

UNIT 6 Construction Process

Excavation 2

After your site is laid out, we will dig and remove earth for the foundation. Many jobs are general excavations that use standard machinery. Others may be special excavations requiring explosives or other equipment.

Please verify that the **payline** is marked accurately. This way we will only remove what is necessary. We will **haul** the earth and **deposit** it where you choose. Please note that **soil swell** can lead to more earth being hauled from that site. This can lead to additional charges for removal.

We will also talk to you about the best way to protect the dig site. The method selected depends on site conditions and project budget. Laying **timber lagging** between **steel soldier** piles is inexpensive and effective. **Interlocking sheet piling** creates a solid steel wall. If there is water nearby we may need to construct a concrete slurry wall. A **tieback** can protect a sloping excavation site while keeping it free of obstructions.

UNIT 6 Construction Process

Excavation 2

Mark the statements as true (T) or false (F).

1. General excavations usually require explosives
2. Soil swell can increase hauling costs.
3. Timber lagging is used with interlocking sheet piling

Match the words (1-7) with the definitions (A-G).

1. dig
2. haul
3. sloping
4. interlocking sheet piling
5. steel soldier piling
6. deposit
7. concrete slurry

A. running evenly upward or downward
B. a method of supporting an earth wall using sheets of steel to form a single wall in the ground
C. a material used to make protective excavation walls when the earth is very wet
D. to remove earth from the ground
E. sections of steel driven into the ground used with timber sheeting to protect an excavation
F. to carry something from one place to another
G. to place something somewhere after it was moved from its original location

UNIT 6 Construction Process

Excavation 2

Read the sentence and choose the correct word.

1. The contractor will need to use explosives in this *special excavation / general excavation*
2. Mark the *tieback / payline* correctly so the excavator doesn't remove more earth than we need.
3. Run some *timber lagging / concrete slurry* between those soldier piles to form a wall
4. Soil *swell / Deposit* often leads to higher than expected hauling costs.
5. A *general excavation / special excavation* is one that can be completed using regular machines
6. The subcontractor will use a *tieback/soil swell* here to keep the excavation area clear

UNIT 6 Construction Process

Formwork 1

At PXT Formwork we specialize in the production of high-quality prefabricated molds

These molds have steel or aluminum frames. The side facing the concrete is covered with the desired surface material. This may be steel or plywood. This type of formwork system is quick and easy to set up. The units are **lightweight** and easy to transport.

Prefabricated, **temporary** formwork molds are also easy to **strip** after the consolidation process. This occurs only after the concrete has cured. The beams are left behind until the structure has achieved its design strength. The concrete walls formed by these molds are capable of supporting any building's **framing**. The module frames can be reused thousands of times. You'll appreciate the time and money you save!

Our staff would be happy to provide a free consultation about your project's formwork needs.

UNIT 6 Construction Process

Formwork 1

Mark the statements true (T) or false (F)

1. The molds have frames made of plywood.
2.The formwork is difficult to strip
3.The frames can be used many times

Fill in the blanks with the correct words

Temporary mold lightweight prefabricated strip

Plastic formwork panels are_____,so even one person can lift them.
2._____formwork systems arrive alread_____ in the necessary shapes.
3._____formwork is only used for a short periods of time.
4. The contractor will_____this formwork after the concrete is dry
5. Pour concrete into a_____to shape it correctly

UNIT 6 Construction Process

Formwork 1

Match the words (1-6) with the definitions (A-F)

1. consolidation
2. design strength
3. formwork
4. framing
5. reuse
6. cure

A. To use something again
B. mold into which concrete or another material is poured tio form a building structure
C. to dry until solid
D the process of concrete becoming solid and denser, thereby taking less space.
E. the assumed Ioad-bearing capacity of steel or concrete
F. the use of structural pieces to support building and provide places to attach exterior and interior walls

UNIT 6 Construction Process

Formwork 2

Several kinds of formwork are used in the construction industry today. The use of modular systems permanent insulated formwork, and stay-in-place formwork is on the rise. However, the most common and affordable system remains wood formwork.

Wooden formwork is made of timber and plywood. It is assembled at the building site

Wood can be used to make both wall forms and footing forms. Footing forms produce concrete columns and walls to serve as structure bases.

There are five essential parts to a wooden wall form. **Sheathing** lines the inside of the form to shape and hold the concrete. Vertical **studs** make a framework and support the sheathing. Horizontal **wales** serve to align the form and keep the studs in place. **Braces** help to keep the form standing up. Last**, tie-spreader** units maintain the correct spacing of the form. This basic structure has helped to erect buildings around the world.

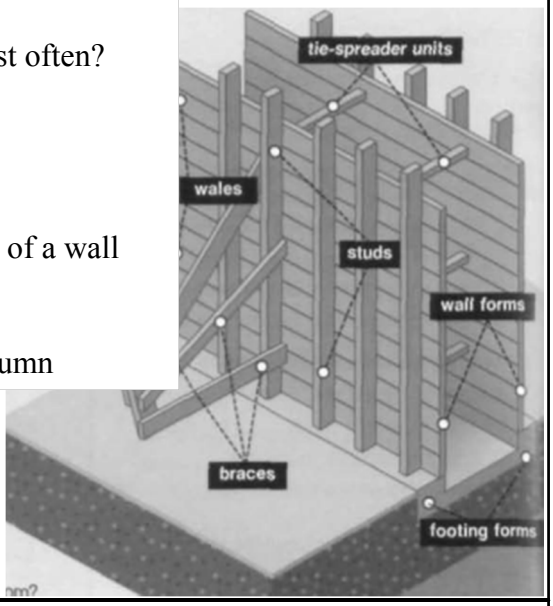
UNIT 6 Construction Process

Choose the correct answers.

1. What type of formwork is used most often?
A wooden formwork
B modular formwork
C stay-in-place formwork
D permanent insulated formwork

2 Which of the following is NOT part of a wall form?
A braces B sheathing
C tie-spreader unit D concrete column

3 What do wales do in a wall form?
A hold the concrete
B make the framework
C maintain form spacing
D keep the studs m position



UNIT 6 Construction Process

Formwork 2

Match the words (1-6) with the definitions (A-F).

1. sheathing
2. line
3. wale
4. tie-spreader unit
5. stay-in-place
6. footing form

A. a horizontal piece of lumber used to support or retain earth

B. a device that holds the sides of a wall form at the correct spacing

C. made from prefabricated plastic forms that remain after the concrete has cured

D. a tube used to pour a concrete base column for a building structure

E. something that wraps around or surrounds something else

F. to cover the bottom or sides of something with a thin material

UNIT 6 Construction Process

Worksite Safety

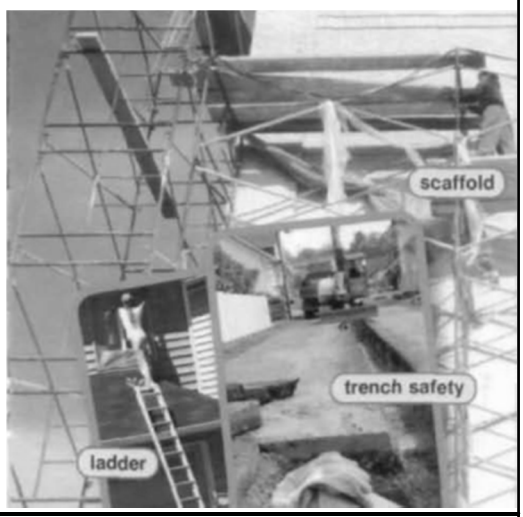
- Follow the **guidelines** below at all times. In the event of an accident notify a supervisor and call **emergency** services.
- When working on ladders follow the 4:1 rule. Avoid falls from scaffolds and pump jacks by wearing a safety harness. Pay attention to the platform's weight limit. Exceeding that limit can cause a collapse.
- Ensure proper **ventilation** when working with **toxic** chemicals in closed spaces. Read the Material Safety Data Sheets (MSDS) thoroughly and take all recommended **precautions**.
- Know the causes of each class of fire and the correct type of **extinguisher** to use on each type. Keep fire extinguishers on hand for Class A and B fires.
- Never take water near an electrical ground. Wear rubber-soled boots to protect against **electric shock**
- Practice good trench safety. Never stack equipment or pile dirt near trench edges

UNIT 6 Construction Process

Worksite Safety

Mark the statements as true (T) or false (F).

1. Not following the 4:1 rule can cause a scaffold to collapse.
2. Different classes of fire need different types of fire extinguishers.
3. Not wearing rubber-soled boots violates trench safety.



UNIT 6 Construction Process

Worksite Safety

Fill in the blanks with the correct words and phrases

toxic pump jack trench safety 4:1 rule Material Safety Data Sheet Position the ladder

1. According to the _____, you should wash your eyes thoroughly if the chemical gets in your eyes.
2. Position the ladder according to the_____
3. Most deaths occur when the walls cave in, so it is important to follow _____ guidelines.
4. When he finished installing the windows. Tim lowered the _____to the ground.
5. This substance is _____ and will cause illnesses if inhaled.

UNIT 6 Construction Process

Worksite Safety

Choose where the words best fit the blanks

1. class / accident

A. The _____ A fire occurred when a piece of paper got too close to a stove

B. An employee broke his leg in the _____ at the construction site.

2. scaffold / fall

A. Avoid a _____ by wearing a safety harness.

B. John stood on a _____ that was fifteen feet off the ground.

3. ground/ladder

A. The _____ was a metal rod installed into the foundation of the building.

B. Use a _____ to repair the gutter on the roof.

4. closed space / ventilation

A Keep the window open to ensure proper_____

B Never use a toxic chemical in a_____